EVALUATION OF THE EFFECTIVENESS OF FIRE PREVENTION ENFORCEMENT BY THE OFFICE OF THE ILLINOIS STATE FIRE MARSHAL

Strategic Management of Change

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ABSTRACT

The Office of the Illinois State Fire Marshal (OSFM) enforces state fire prevention laws and rules by conducting over 18,000 annual inspections in a variety of occupancies. The problem was that the OSFM had never conducted an evaluation of the inspection program to determine if the occupancy classifications inspected or the frequency of inspections were effective in meeting the agency's mission. The purpose of the research was to conduct an evaluation and recommend necessary policy changes.

The research questions asked were

1. In what occupancy classifications does the OSFM concentrate fire prevention inspections and what has been the fire experience in those occupancies?

2. In what occupancy classifications are fires and related losses occurring or increasing in Illinois?

3. What prior history has led to the current inspection priorities of the OSFM?

4. Have fire agencies in other states attempted to analyze their inspection priorities and if so, what can be learned from those organizations?

5. If fires and related losses are indicated to be low or decreasing in the occupancies inspected by the OSFM, how can it be determined if this is the result of the inspection effort or an event that would be realized in the absence of code enforcement inspections?

6. Can the OSFM identify social or demographic factors to assist in prioritizing future fire prevention inspections?

7. If necessary to modify the inspection priorities of the OSFM, what restraints and barriers can be identified with the change process?

Historical and evaluative research was conducted. Survey instruments were sent to other state fire agencies to determine their methods of measuring effective enforcement. Analysis of Illinois' fire experience for the past decade was conducted. Results indicated that many OSFM inspections stemmed from outdated laws, misunderstandings about the frequency and location of Illinois' fires, and exaggerated attention to infrequent, but catastrophic fires. Recommendations included (a) tailoring OSFM inspections to data from the Illinois Fire Incident Reporting System (IFIRS); (b) eliminating occupancy inspections that were based on antiquated laws and beliefs; (c) reducing inspection frequencies in occupancies that did not prove to be statistically dangerous; (d) eliminating inspections in occupancies where adequate enforcement was conducted by other agencies; and (e) redirecting OSFM inspectors into more residential-type occupancies.

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INTRODUCTION

The supporting divisions of the Office of the Illinois State Fire Marshal (OSFM) are responsible for a variety of programs designed to accomplish the agency's mission statement: "To reduce death, injury, and property loss of Illinois citizens from fires, explosions and other hazards" (OSFM, 1999a, p.1). Principal amongst these programs is the OSFM Division of Fire Prevention's (DFP) efforts to enforce Illinois laws and adopted administrative rules pertaining to fire prevention and fire safety. The importance of the DFP's work is reflected in the agency's primary goal of "Protection through Prevention" (OSFM, 1999a, p.1).

The identified problem is that despite this proactive agency mission statement and goal establishment, there has never been a formal evaluation of the occupancy inspection program enforced by the OSFM's DFP vis-à-vis the agency's mission. Therefore, the effectiveness of the agency's fire prevention code enforcement program relative to reducing death, injury, and property loss resulting from fires is unknown and unproved. Furthermore, the absence of any structured evaluation of the DFP inspection program has resulted in more pragmatic problems for the OSFM. Program budget justification, requests for additional code enforcement personnel, and attempts to restructure inspection priorities have all suffered due to the lack of quantifiable data relative to current inspection program effectiveness.

Table 1 presents fire and fire death data from the United States Fire Administration's (USFA) National Fire Data Center (NFDC) for the period from 1986 to 1995. Examination of the table indicates that during this decade the total number of fires in the nation decreased by 13.5%, while during the same time period Illinois fires

decreased only 5.5%. More strikingly, over the same decade, the nation's fire death total decreased an impressive 27.6% while Illinois' fire deaths decreased a dismal 2.0% (USFA, 1999). In addition, as indicated in Appendix A, fire deaths in Illinois remain above the national average on a per capita basis (Welch, 1999).

Table 1

1986 vs. 1995 Fire Experience - Nation and Illinois

	Fires			Fire Deaths		
	1986	1995	% Change	1986	1995	% Change
Nation	2,272,000	1,966,000	-13.5	5,850	4,585	-27.6
Illinois	76,081	71,893	- 5.5	300	294	-2.0

Note: Totals include those incidents reported to the USFA NFDC through the National Fire Incident Reporting System and may not be inclusive of all fire incidents.

The OSFM DFP has concentrated its statewide code enforcement program in many of the same occupancy classifications for decades. The OSFM conducts many fire prevention inspections in occupancies that have historically indicated low fire frequency and low fire death totals. Requirements for these inspections are rooted in a variety of Illinois laws, rules, and the licensing standards of other state agencies. However, in many instances the inspections result simply from long-standing inspection traditions and a lack of objective analysis to justify any program modifications. Included in the list of occupancy classifications in which the OSFM regularly conducts fire prevention inspections are facilities not commonly recognized as having high fire death rates: (a) gasoline service stations, (b) adult vocational education facilities, (c) telecommunications switching stations, (d) aboveground volatile liquid storage tank

installations, (e) parimutuel horse racing tracks, and (f) county fairgrounds (J. Ahern, personal interview, May 24, 1999).

Illinois participates in the National Fire Incident Reporting System (NFIRS) and collects data from 890 Illinois fire departments relative to the fire experience across the state (K. Johnson, personal interview, May 26, 1999). Despite this fact, the OSFM has never conducted an objective analysis of the fire experience in the types of occupancies that are regularly inspected by the DFP to determine the need or impact of such inspections relative to the overall state fire experience. Similarly, a formal analysis has never been undertaken to demonstrate the need for the redirection of the inspection effort into occupancies where fires and fire deaths have been increasing (J. Ahern, personal interview, May 24, 1999).

Therefore, the purpose of this research is to evaluate the effectiveness of fire prevention and life safety inspections conducted by the OSFM's DFP in relation to the organization's mission of reducing death, injury and property loss of Illinois citizens from fires, explosions and other hazards. Stated simply, the research attempts to identify if fire prevention inspections are being conducted in the types of occupancies where they will have the maximum effect in accomplishing the agency's mission statement. If it is found that this is not the case, the research will subsequently attempt to identify the occupancy classifications where the fire experience warrants more attention by OSFM fire prevention inspectors.

Specifically, the research attempts to examine the issue through a variety of methods including (a) identifying the types of occupancies and facilities in which the OSFM presently concentrates fire prevention inspections; (b) quantifying the fire

experience in those occupancy classifications over the past decade to determine if a measurable impact is being realized; (c) identifying through literature review and historical research, the reasons for the OSFM's current inspection priorities; (d) surveying the fire agencies of other states in an attempt to identify the practices and priorities of those agencies and determine if any similar analysis or study has been undertaken that may offer valuable comparative data; (e) examining fire data available from the NFIRS, the National Fire Protection Association (NFPA) and the before-mentioned survey of state fire agencies to identify the types of occupancies where fires and fire deaths are currently most prevalent; and (f) examining state and national demographic and social trends that may offer guidance to the OSFM in reprioritizing the efforts of fire prevention code enforcement personnel.

The issue will be investigated through primarily evaluative and historical research methods in accordance with the material presented in the National Fire Academy's (NFA) *Strategic Management of Change* (*SMOC*) course. Specifically, the "Evaluation Phase" of the "Change Management Model" (CMM) presented in the course (see Appendix B) has been applied to evaluate the effectiveness of the current inspection program and offer recommendations for future modifications (NFA, 1996). In keeping with the *SMOC* "CMM" content, the research attempts to (a) identify restraints and support for changing the current inspection priorities, (b) identify legal mandates that dictate where inspection efforts are concentrated, (c) examine labor agreement content that may impact the inspection process or priorities, and (d) statistically identify those occupancy classifications within Illinois where inspection efforts would better serve the life safety needs of citizens.

The specific research questions to be addressed are

1. In what occupancy classifications does the OSFM concentrate fire prevention inspections and what has been the fire experience in those occupancies?

2. In what occupancy classifications are fires and related losses occurring or increasing in Illinois?

3. What prior history has led to the current inspection priorities of the OSFM?

4. Have fire agencies in other states attempted to analyze their inspection priorities and if so, what can be learned from those organizations?

5. If fires and related losses are indicated to be low or decreasing in the occupancies inspected by the OSFM, how can it be determined if this is the result of the inspection effort or an event that would be realized in the absence of code enforcement inspections?

6. Can the OSFM identify social or demographic factors to assist in prioritizing future fire prevention inspections?

7. If necessary to modify the inspection priorities of the OSFM, what restraints and barriers can be identified with the change process?

BACKGROUND AND SIGNIFICANCE

History of the OSFM

The OSFM was established in 1909 as a subdivision within the Illinois Department of Insurance. In the following decades oversight of the Office was transferred to various other state agencies including the Department of Trade and Commerce, the Department of Public Safety, and the Department of Law Enforcement (J. Pavlou, personal interview, July 26, 1999). In 1977, the Illinois State Fire Marshal Act

established the OSFM as an independent state agency under the direction of a State Fire Marshal who is appointed by the Governor of Illinois (Illinois State Fire Marshal Act, 1977).

The Illinois Fire Investigation Act (1975) specifically states that amongst other duties, the OSFM shall

> Adopt and promulgate such reasonable rules as may be necessary to protect the public from the dangers of keeping or maintaining in a building or on a premise combustible or explosive material or inflammable conditions, that endanger the safety of said buildings or premises. Such rules shall require the inspection of necessary fire extinguishers, fire suppression systems, chemical fire suppression systems and fire alarm and protection devices. The Office of the State Fire Marshal shall inspect and examine at reasonable hours, any premises, and the buildings and other structures thereon, and if, such dangerous condition or fire hazard is found to exist contrary to the rules herein referred to, shall order the dangerous condition removed or remedied, and shall so notify the owner, occupant or other person interested in the premises. (p.2)

Today, the OSFM has evolved into a state agency that serves the citizens of Illinois through six divisions including the (a) DFP upon which this paper concentrates and which is described in detail later in this document; (b) Division of Petroleum and Chemical Safety (DPCS), which is responsible for the regulation and inspection of underground storage tanks containing regulated substances; (c) Division of Arson Investigation (DAI), which is responsible for assisting local fire departments with fire cause determination at fire scenes that are suspected to be arson or arson-related

crimes; (d) Division of Boiler and Pressure Vessel Safety (DBPVS), which in conjunction with the insurance industry's inspection force, regulates the construction, installation, repair, use, and operation of boilers and pressure vessels in the state as mandated by the Boiler and Pressure Vessel Safety Act; (e) Division of Personnel Standards and Education (DPSE), which is responsible for Illinois fire service education and training including certification programs for the state's more than 42,000 active firefighters; and (f) Division of Management Services (DMS), which provides fiscal, data processing, and statistical support to the agency through its three sections – Information Systems, Fiscal Management, and Fire Statistics. The DMS is also responsible for management of the Illinois Fire Incident Reporting System (IFIRS) - Illinois' fire data collection system that is a subset of the NFIRS (OSFM, 1999a).

The agency is headquartered in the state's capital city of Springfield, Illinois. Field offices serving the needs of the agency's various divisions are located in Chicago, Marion, Rockford, and Des Plaines, Illinois. The OSFM currently employs 159 full-time employees along with a number of part-time and contractual workers as well as college interns (D. Williams, personal interview, May 26, 1999).

The OSFM's 1999 annual budget totaled $11.8 million. This included $8.6 million for personnel wages and benefits and $1.4 million in training reimbursement grants distributed to local fire departments and fire protection districts (OSFM, 1999a). Unlike many other state agencies that rely upon apportioned tax dollars from the state's General Fund, the OSFM receives its funding entirely from the Illinois Fire Prevention Fund (IFPF). The IFPF is established by the Illinois Fire Investigation Act. The Act requires all insurance companies selling fire insurance policies within the state to "be

assessed 1% of the gross fire, sprinkler leakage, riot, civil commotion, explosion, and motor vehicle fire risk premium receipts collected from policies sold within the state to support the OSFM" (Illinois Fire Investigation Act, 1975, p.1). The law does however require the OSFM to distribute large percentages of the IFPF to specific causes including (a) 12.5% to the Illinois Fire Service Institute at the University of Illinois, (b) 10% to the Chicago Fire Department for maintenance of the city's firefighter training program, and (c) necessary funds to reimburse local governmental agencies pursuant to the Illinois Fire Protection Training Act (Illinois Fire Investigation Act, 1975).

This unique funding protocol presents particular problems to the OSFM relative to program planning. The IFPF, being directly dependent upon the amount of fire-related insurance sold within the state during the previous year, is subject to year-to-year fluctuations. Furthermore, the OSFM is not exempted from legislative oversight in the funding and budgeting process. The agency must comply with all procedures and protocol applicable to other state agencies relative to seeking appropriations and justifying budget requests. In 1995, after an adjustment to the methods used by the Illinois Department of Insurance to calculate contributory fire insurance premiums, the OSFM suffered a shortfall in the IFPF that necessitated a 20% reduction in the work force. Although additions have been made to many of the OSFM's divisions since the 1995 reduction-in-force, the number of personnel assigned to the DFP has actually decreased as the result of non-replacement of the 1995 layoffs and attrition (J. Ahern, personal interview, May 24, 1999).

In accordance with Illinois law, the OSFM has also established advisory boards to offer counsel and assistance from a variety of organizations with experience in fire

prevention, fire suppression, firefighter safety, hazardous materials and other fire service matters. These include the (a) Board of Boiler and Pressure Vessel Rules, (b) Hazardous Materials Emergency Response Reimbursement Panel, (c) Illinois Fire Advisory Commission, (d) Furniture Fire Safety Advisory Board, and (e) Fire Equipment Distributor & Employee Regulation Act Advisory Board (OSFM, 1999a).

Division of Fire Prevention

The DFP, by legislative mandate, is charged with "ensuring that no building endangers persons or property by reason of faulty construction, age, lack of repair, or any other cause that would make it especially liable to fire" (Illinois Fire Investigation Act, 1975, p.3). Under authority granted by this Illinois law, the division conducts fire safety inspections in accordance with promulgated administrative rules adopted to ensure such fire safety.

The DFP is the largest division of the OSFM in terms of budget allocation and number of personnel. A deputy state fire marshal commands the DFP, with three regional offices located in Chicago, Springfield, and Marion each being operated by a regional administrator and including a staff of secretarial and clerical assistants. A fire protection engineer and subordinate plan review staff is headquartered in the Chicago regional office. Fire prevention inspectors are assigned to one of the three regional offices and conduct fire prevention code enforcement inspections in geographically assigned territories within the region.

Essentially, the DFP's 25 fire prevention inspectors work from their homes, receiving inspection assignments via mail or telephone from their respective regional offices. The inspectors are assigned territories that follow county borders and drive state

vehicles that are conspicuously marked to indicate representation of the OSFM. Although required to attend monthly training meetings within their region and occasionally travel to their assigned regional headquarters office for supplies or specific case discussion, the inspectors essentially are home-based and prepare inspection forms and other necessary documentation pertaining to their work from within their residences (personal experience of the author).

Fire prevention inspectors are all full-time OSFM employees and their annual salaries, dependent upon length of service, range from $31,350 to $46,690 (Illinois Administrative Code, 1998). The geographical distribution of inspectors across the state often necessitates reliance upon retiring personnel from local fire departments to fill OSFM inspector positions. Currently, 89% of the OSFM's DFP field inspectors are retired or disabled personnel from local fire departments within Illinois (J. Ahern, personal interview, May 24, 1999).

Applicable Standards and Adopted Codes

The OSFM enforces a variety of laws, administrative rules and subsequently adopted model codes and standards. Essential to occupancy inspection is the NFPA's Standard #101 the *Life Safety Code* ® (*LSC*). The 1991 edition of the *LSC* is applicable to new Illinois occupancies constructed or converted after November 1, 1993 and the 1985 edition of the *LSC* is applicable to all other occupancies (Illinois Administrative Code, 1993). Unique to *LSC* enforcement compared with most model fire prevention and building codes is the fact that the *LSC* applies to new and existing occupancies. No occupancies or existing conditions are "grandfathered" to allow their continued existence if found to be in violation of the *LSC's* requirements (Lathrop, 1991).

The NFPA *LSC* was first adopted into the Illinois Administrative Code in 1988. Before that time the OSFM enforced a fire prevention code that was developed within Illinois in the late 1950s. This older rule document had conventionally become know as the “Gray Book” because for several years it was published with a gray colored cover - although many would argue that the term Gray Book was due to the outdated contents of the rules (J. Ahern, personal interview, June 3, 1999).

In 1988 when the OSFM adopted the *LSC* and abolished the Gray Book, the old fire prevention standard had truly become inadequate and antiquated. In addition to the fact that the Gray Book addressed fire prevention requirements for all occupancy classifications in only 15 pages, it contained prescriptive requirements for such outdated items as “asbestos attachments” to doors to increase their fire rating and outdated terminology referring to “fireproof” buildings (Illinois Administrative Code, 1957).

Despite several past efforts to pass legislation, Illinois has never adopted a statewide building code. Although the currently enforced *LSC* includes criteria that resembles the contents of a building code, the NFPA is specific in noting that the *LSC* does not attempt to address general building construction features that are normally a function of building codes. (NFPA, 1991).

Occupancy Classifications Inspected by the DFP

Table C1 summarizes by occupancy classification the inspections conducted by the OSFM DFP in 1998 (OSFM, 1999b). The table reflects that the occupancy and facility classifications in which OSFM inspectors conduct inspections are many and varied. Furthermore, Table C2 summarizes the myriad of codes and standards that are enforced at these facilities by DFP inspectors in accordance with the DFP’s *Policy and*

Procedures Manual (OSFM, 1998). Examination of Table C2 indicates that inspectors are required to perform code enforcement inspections within at least 20 occupancy classifications, using at least 9 different codes or administrative rules.

Although some new occupancy classifications have been added to the OSFM inspection list in recent years as the result of new legislation by the Illinois General Assembly, no occupancy classifications have been deleted from the list of inspection priorities in decades. A reduction in the number of hospital and nursing home occupancy inspections has been recently realized as the result of a temporary agreement with the Illinois Department of Public Health (IDPH). IDPH conducts *LSC* inspections in these occupancies and consequently the OSFM has currently lowered the priority of inspections in these health care occupancies. Furthermore, despite a 30% reduction in the number of inspectors assigned to the DFP over the past 5 years, the division has expanded its inspection responsibilities during this time period to include (a) telecommunications switching offices, (b) community integrated living arrangements, and (c) private adult vocational schools (personal experience of the author).

Over the past 2 decades analysis and evaluation of the work of OSFM fire prevention inspectors has never been performed to determine if the inspections being conducted are concentrating in the occupancy classifications and types of facilities where the Illinois fire experience has been proven to be troublesome. This is despite the fact that a multitude of changes have occurred during this time period that affect inspection work including (a) layoffs of OSFM fire prevention inspectors due to IFPF shortfalls; (b) the creation or reorganization of several other state agencies, including many that conduct some form of fire safety inspections in licensed facilities; (c) the

advent of modern fire suppression, detection, and passive resistance systems or equipment (e.g., residential sprinkler systems, addressable smoke detection systems, fire resistant upholstered furniture, and mattress fire safety criteria); (d) the development of several Illinois municipal fire department inspection bureaus capable of enforcing fire prevention standards; (e) the changing social status of the state relative to population distribution and demographic issues; (f) the OSFM's adoption of the NFPA *LSC*; and (g) the advent of the IFIRS to be able to identify fire experience data and trends (personal experience of the author).

Many DFP inspections are conducted as the result of legislative mandates (e.g., telephone switching facilities, self-service stations, aboveground fuel storage tanks, and propane tanks). Other occupancy inspections (e.g., hospitals, nursing homes, and day care centers) are the result of long-standing public and fire service beliefs about the types of occupancies that should receive frequent inspections (J. Ahern, personal interview, June 3, 1999). Despite the fact that the fire service has recognized for several years that the majority of fires and fire deaths occur in residential occupancies, these types of facilities make up only a small percentage of the inspections conducted by the DFP (See Table C1). Single- and two-family dwellings and apartment complexes have essentially been "off-limits" to OSFM inspectors since the inception of the agency. Reasons for this are examined in the "Literature Review" section of this research.

As the result of the multitude of inspection and regulation responsibilities required of the OSFM by the Illinois General Assembly, as well as the agency's lack of strategic analysis or evaluation of its inspection priorities, OSFM DFP inspectors are required to be "jacks of all trades" in carrying out their inspections. Due to the large geographical

area between inspectors, the OSFM has approached inspections by requiring the inspector assigned to a geographical area to conduct all inspections in that territory. This results in an individual inspector having to be familiar with the content and application of a variety of codes, standards, rules, and policies. In a single week an OSFM fire prevention inspector may be required to inspect a day care center, a self-service gasoline station, a motel, a nursing home, an aboveground flammable liquid storage tank installation, a telecommunications switching office, a portable fire extinguisher testing facility, a residential board and care home, county fair booths, and a horse race track (personal experience of the author).

Not inspected by the OSFM unless a specific complaint is received from a local fire chief are (a) colleges and universities – either classroom buildings, dormitories or fraternity/sorority houses; (b) apartment buildings or condominiums; (c) bed and breakfast facilities; (d) mercantile occupancies; (e) storage occupancies; (f) industrial occupancies; (g) restaurants; or (h) sports arenas. Not inspected at all – unless used for home day care or residential board and care - are single- and two-family dwellings (OSFM, 1998). Also, a past court decision forbids the OSFM from enforcing the state adopted standards for life safety in public elementary and secondary schools. These school occupancies are regulated and inspected by the Illinois State Board of Education and the regional superintendent of each individual school district (Board of Education *v*. Carter, 1983).

Union Representation and Contractual Obligations

OSFM fire prevention inspectors are represented by Local 4408 of the Illinois Federation of Public Employees (IFPE) .This union represents several groups of Illinois

State workers including teachers, security officers, and mental health workers. Illinois is a collective bargaining state, and a written collective bargaining agreement does exist between the Illinois Department of Central Management Services (the state's personnel agency) and the IFPE. The current contract is effective from July 1, 1997 through June 30, 2000 (Illinois Department of Central Management Services, 1997).

The current IFPE-CMS contract limits fire prevention inspector's work to 37.5 hours per week, to be conducted in five 7.5-hour workdays. Work required to be conducted outside of regular hours (8:30 a.m. to 4:30 p.m. on weekdays) or on weekends requires premium pay of 1 1/2 times the regular rate of pay and any work on holidays requires double the regular rate of pay. Inspectors enjoy health, dental, vision, and life insurance, employer funded participation in the Illinois State Retirement System, and the opportunity to participate in an employee funded deferred compensation program (C. McCaslin, personal interview, May 27, 1999).

Although a grievance and arbitration process is clearly defined within the applicable contract, the number of grievances generated by personnel of the DFP is extremely low when compared with other state agencies and OSFM averages. There has not been a labor issue grievance filed by an employee of the DFP in the past eight years. (Personal interview, J. Ahern, May 24, 1999).

Fire Safety Enforcement by Other State Agencies

Several state agencies other than the OSFM either conduct fire safety inspections or have incorporated fire safety criteria into their operating and licensing rules (See Appendix D). Therefore, occupancy owners and managers frequently find their facilities subject to compliance with more than one set of fire safety criteria and

inspected by more than one agency's inspectors. This dual enforcement authority usually results when enabling legislation empowers a state agency to regulate or license a particular occupancy classification or type of business. That agency, in an attempt to comprehensively address necessary safety issues, will often adopt model code requirements or develop their own fire safety standards based upon internal agency experience. Simultaneously, unless the enabling legislation and resultant agency licensing rules specifically prohibit such action, the state's administrative rules for fire prevention and safety enforced by the OSFM are also applicable (personal experience of the author).

Therefore, many facilities within the state are subject to dual jurisdiction of fire safety standards – one set of criteria imposed by a licensing or regulatory agency and the other by the OSFM. In addition, many of these other state agencies employ inspection personnel to ensure compliance with their standards, including fire safety criteria. Dependent upon the type of business conducted or the occupancy classification of a facility, it is not unusual for a facility owner to be visited by at least two separate and unrelated state agency inspectors for purposes of enforcing fire safety standards. The OSFM believes that benefits, including statewide consistency, arise from fire safety inspections being conducted by OSFM fire prevention inspectors enforcing adopted OSFM regulations. However, state employees holding positions as inspectors in other agencies that enforce their own fire safety regulations are not easily persuaded that their positions can be eliminated or their duties changed (personal experience of the author).

Relationship between the OSFM and Local Fire Authorities

To the surprise of many Illinois citizens and occupancy owners, the OSFM does not maintain authority over the operation of local fire departments or fire protection districts. Incident response, fire code enforcement, public education, and all other aspects of local fire agency delivery are not within the jurisdiction of the OSFM. The OSFM does however interact with local fire agencies and attempt to work with them in a cooperative manner. In addition to operating the state's fire personnel certification system and distributing training reimbursement grants to local fire departments, the OSFM often collaborates with local fire agencies relative to fire prevention and public education issues. However, specific to fire prevention enforcement, the OSFM does not authorize or empower local fire departments to conduct occupancy inspections on behalf of the OSFM. With only limited exceptions, the fire prevention laws and rules enforced by the OSFM are designed to work concurrently with local jurisdiction (J. Pavlou, personal interview, July 26, 1999). Therefore, if local fire service agencies adopt and enforce standards that are more stringent than those enforced by the OSFM, a property owner would be required to comply with the local rule as well as the state's requirements. When a true conflict arises between the application of state and local fire safety standards, the OSFM meets with local authorities to reach a compromise that will ensure fire safety (personal experience of the author).

Relevant to this research, there is currently no active program whereby the OSFM is informed of local fire prevention enforcement efforts. Therefore, the OSFM does not have knowledge of the types or numbers of occupancies being inspected by local fire or building department inspectors. Similar to other state agencies that conduct

fire safety inspections outside the control of the OSFM, local fire authorities enforce their adopted standards in many of the same occupancies as the OSFM's DFP. It is common to find that the fire prevention bureaus of municipal fire departments have conducted fire safety inspections duplicating the efforts of the OSFM at many occupancies within their jurisdiction including (a) day care centers, (b) self-service gasoline stations, (c) aboveground volatile liquid storage tank installations, (d) hotels and motels, (e) county fairgrounds, (f) hospitals, and (g) nursing homes.

Use of IFIRS

The OSFM DMS maintains the IFIRS. Over 890 local fire departments and fire protection districts participate in the IFIRS by regularly submitting fire incident report data to the OSFM. These data, along with a contracted newspaper clipping service are used to tally fire experience statistics used by the OSFM (K. Johnson, personal interview, May 25, 1999). Results of a thorough examination of IFIRS data relative to Illinois' fire experience in various occupancies is presented later in this research paper. However, an important item to note is that IFIRS data has never previously been used by the DFP to tailor fire prevention inspection priorities. Therefore, over 46,000 inspection hours are invested annually by the DFP in occupancies that have not been proven by any quantitative method to be a fire safety risk (J. Ahern, personal interview, June 3, 1999).

Relation to National Fire Academy SMOC Class

This research is being conducted as a required component of the *SMOC* course in the NFA's Executive Fire Officer Program (EFOP). The issues being studied are related to several concepts from the course. The "CMM" that is used extensively

throughout the course served as a road map for investigating pertinent issues at the OSFM. The *SMOC* course material contains several relevant passages to the current OSFM inspection priority issues being investigated in this research. The course instructional material notes that “Current trends are causing individuals in every industry to re-evaluate where they currently are, where they are headed, and whether or not that is the path they should be taking” (NFA, 1996, p. SM1-5).

The NFA *SMOC Student Manual* (1996) further recognizes that the governmental or public sector is no longer exempt from change. In fact, the text states “these organizations are often the hardest hit by change because they are the least accustomed to it” (p. SM1-6). Directly related to conditions affecting occupancy inspection priorities at the OSFM is another statement taken from the *SMOC* student manual:

> Recently, the public sector is coping with the same or similar influences as the private sector – downsizing, increased emphasis on outcomes instead of output, and shrinking budgets. In addition, increased awareness and involvement by the public, coupled with a growing intolerance for waste and misuse, is demanding that agencies readdress their philosophies about “business as usual”.
>
> (p. SM 1-6)

Phase I “Analysis” and Phase IV “Evaluation/Institutionalism” of the “CMM” (See Appendix B) were applied during this research to gain insight into current conditions, recognize alternatives, and recommend courses of action. Specifically, the “Evaluation Phase” of the “CMM” has been applied to evaluate the effectiveness of the current inspection program and offer recommendations for future modification. In accordance

with the change management tools presented by the “CMM”, the research attempts to (a) identify restraints and support for changing the current inspection priorities, (b) identify legal mandates that dictate where inspection efforts are concentrated, (c) examine labor agreement content that may affect changing the inspection process or priorities, (d) statistically identify those occupancy classifications within Illinois where inspection efforts might better serve the life safety needs of citizens, and (e) offer suggestions for improvement to the current inspection priorities and practices of the OSFM and the changes necessary to realize those improvements.

LITERATURE REVIEW

What is the Right Measure of Fire Loss?

Coleman and Granito (1988) recognized that evaluation of service delivery is essential to the operation of public fire service agencies. The authors identified the purpose of evaluation as “the regular collection of data and analysis of information about the efficiency and effectiveness of departmental service and other activities” (p. 254). The text went on to identify that the purpose of evaluation is to allow public managers and elected officials to make decisions relative to the improvement of program implementation, allocation of scarce resources, and to choose among programs and levels of various activities.

However, even when the purpose and importance of evaluating service delivery is recognized there remains a fundamental problem of determining the right measure to use. Writing primarily in relation to public fire safety education programs, Hall (1997b) described four principal measures of fire loss: (a) fire incidents - count each fire once, (b) deaths, (c) injuries, and (d) monetary loss. Hall further noted that in some settings,

two other measures may be of value: (e) environmental impact, and (f) continuity of operations, with these two measures being increasingly important in commercial settings. Hall wrote that most fire and life safety educators have a principal concern with saving lives, so deaths should be a measure of fire loss concern to them. However, he also made a compelling case for the use of other fire loss criteria in judging program delivery.

Hall (1997b) further identified that injuries are also a measure of fire loss often targeted by fire safety educators. He wrote that injuries are several times more common than deaths, and some injuries are extraordinarily expensive, painful, and tragic. He found that although most people value reducing the risk of death much more highly than reducing the risk of injury, injuries are more common. Therefore, injury statistics can provide significant hard evidence of a fire program's positive effects much sooner than the study of fire deaths.

Hall (1997b) also acknowledged that the public often seems far more upset by one fire that kills five people than by five fires that kill one person each. Therefore, decisions must be made whether service delivery intentions are to increase safety or to increase the "feeling of safety" by reducing public distress. Often, pleasing public opinion forces fire agencies to deliver programs that prevent large fires rather than programs likely to save people in circumstances where deaths actually occur. (See the separate "Literature Review" subsection in this research paper entitled "What Influences the Public and Politicians?").

Hall (1997b) went on to write that the identification of "trends" in fire loss data are of great importance. As an example, he noted that from a national perspective, total fire

deaths have been declining, and the risk of death from fire relative to the size of the population has been declining even faster. However, trends for fire deaths involving particular fire causes have shown different results. In another article, Hall (1997a) also discussed trends noting that if trends are not considered, then an analysis offers a mere snapshot of the fire problem when a moving picture is needed. Hall (1997a) identified that trends "help define whether a fire problem is getting better or worse and if the character of the fire problem is changing" (p. 11-28). When trend analysis is conducted, Hall (1997a) noted that if changes in the fire experience are occurring, they can be tracked to corresponding changes in product use, property use, fire prevention activities, codes and regulations, or other elements of the environment.

Writing in the NFPA's *Fire Protection Handbook,* Hall (1997a) also addressed the importance of "rates" as a measure of relative fire risk. He noted that rates are effective in analysis where the size of the group affected by the problem may change. Hall wrote that "Increased fire safety is best measured by the decline in the fire death rate" (p. 11-27). As an example, Hall noted that rural communities do not account for a majority of the country's fire deaths, but they have by far the highest fire death rates compared with communities of larger size. Person for person, their citizens are in the most danger of fire. Similarly, occupants of manufactured homes suffer substantially higher rates of fire fatalities per million population than do occupants of conventional one- and two-family dwellings. Because there are comparatively few manufactured homes, deaths there do not constitute a large share of the total fire fatality problem, but individuals living in older manufactured homes are at more risk than their counterparts elsewhere.

Hall (1997b) acknowledged that different measures of loss will yield different

priorities and multiple measures of loss can pull authorities in different directions. He also recognized that determining the proper measure of fire service program delivery often leaves more questions and issues than answers. However, Hall summarized by stating "although fire deaths should not be the only measure, because they take too long to show statistically significant effects, deaths should be regarded as the primary measure of success" (p. 2-15). He further stated that when extending the scope to include injuries, property damage, or some other objective, all such objectives should be treated as secondary to the risk of fire death. Furthermore, Hall advocated using at least a five-year baseline on the community's or organization's fire experience for analysis.

In a much earlier text, Bare (1977) reached a similar conclusion as Hall. In his text, *Fundamentals of Fire Prevention,* Bare wrote that the true task of fire prevention and protection is life safety first, property protection second.

Hall (1997b) raised an even more frustrating point when he noted that even after a general measurement of scale is chosen, more decisions are needed to select a specific measure within that scale. As an example, Hall offered that if fire deaths are chosen as a measure of fire loss, this can be translated into four very different measures: (a) deaths in fires, (b) number of fatal fires, (c) multiple-death fires, or (d) deaths in multiple fires. Counting fatal fires rather than total deaths reduces the emphasis on deaths occurring in multiple-death fires. Hall gave a specific example where this approach might make sense:

> Imagine a fire and life safety educator in Las Vegas in the early 1980s. The MGM Grand Hotel fire caused more deaths in one fire than the city experienced in all other fires combined in many years. In that kind of situation, counting deaths

> individually – and targeting programs accordingly – will mean devoting all educational resources to ensuring that the city never has another fire like the MGM Grand Hotel fire. This is a worthy goal, but it is not the only worthy goal. How many lives would be worth losing in ordinary home fires in order to ensure, say, that the odds against another MGM Grand-sized fire were a billion to one instead of only a hundred million to one? (p. 2-13)

Although different fire loss criteria may serve to measure the appropriateness or effectiveness of different fire prevention agency programs, the measurement of fire deaths does appear to be the most predominantly used indicator. The importance placed upon fire deaths as a relevant measure of a state's success in combating fire problems surfaces repeatedly in related literature. For example, the USFA National Fire Center's publication *Fire in the United States 1986 – 1995* (FEMA, 1998) contains national as well as state-by-state fire loss statistics. Although offering data relative to several aspects of each state's fire experience, the one parameter that is presented in tabular and graphic form for every state is "fire deaths". Furthermore, the OSFM's *1998 Annual Report* (OSFM, 1999a) implies that the measurement and reduction of annual fire deaths is the foremost indicator of OSFM success by presenting the information in conspicuous tabular format.

Therefore, examination of current literature suggests that the number of fire deaths - including examination of the fire death rate and fire death trends - is the most commonly applied measure of the success of fire agency program delivery. However, the ICMA publication *Managing Fire Services* offers information that brings the issue back into a larger perspective. Writing in this text, Coleman and Granito (1988) noted

that the United States is consistently at or near the top of the list in modern industrial nations that have a major problem with fire. They identified that this is true whether the measure is property loss, deaths, injuries, or number of fires per capita.

The Purpose of Fire Prevention Codes and Inspections

Fire prevention efforts in the United States began as early as 1631. In 1785 an ordinance enacted in Reading, Pennsylvania imposed fines on homeowners who experienced chimney fires. In 1807 Reading prohibited smoking cigars on the street after sunset. Fire prevention was also the first general topic discussed at the First Annual Conference of the National Association of Fire Engineers (the predecessor to the International Association of Fire Chiefs) held in Baltimore in 1873. (Robertston, 1995).

Robertson (1995) also wrote that since those modest beginnings fire prevention has come to be recognized as a science. However, as a matter of practical application, major improvements have come about mostly as the result of tragic fires at the cost of many lives and extensive property damage. The IFSTA text *Fire Inspection and Code Enforcement* (1987) identified that “Fire prevention inspections are the single most important non-fire fighting activity performed by the fire service” (p.5).

Bare (1977) wrote that the primary goal of a fire prevention bureau is to prevent fires before they start and to minimize fire and loss when a fire occurs. He noted that

> Whenever possible, a community fire prevention program should be a balance of enforcement and educational activities. If people are aware of the importance of the fire prevention program, the purpose of code regulations, and the necessity for enforcement of the code, then strict enforcement action will only be a

sometime thing. (p. 184)

According to the NFPA *Inspection Manual*, fire codes are the basis in law by which the likelihood of fires is minimized and by which, if a fire occurs, the duration and spread of the fire will be limited (Shaw, 1989). Code enforcement is employed in an effort to guarantee that structures, equipment, processes, and operations are maintained in a manner consistent with law. Shaw further stated that the purpose of conducting fire inspections is to limit the risk of life and property losses from fire. A fire prevention inspector does this by identifying and causing the correction of those conditions that contribute to the occurrence and spread of fire. More specifically, the text noted, the inspector's approach depends on the reasons for making the inspection and the responsibilities of the inspector or the inspecting authority.

Coleman and Granito (1988) further identified that fire prevention inspectors "help educate the occupants of buildings so they can avoid routine problems and understand complex solutions" (p. 38). They further wrote that the monetary effectiveness of fire prevention programs is difficult to measure, as one large fire can cost more than many small ones. However, they noted that it is not difficult to see that fires increase when fire prevention programs are cut back and they decrease when those programs are expanded.

Coleman and Granito (1988) further pointed out that attempts at reducing fire losses associated with the material aspects of U.S. society are carried out through codes and ordinances and inspections of properties for hazards. However, these efforts have not produced a complete solution to the fire problem. The authors noted "that the reality is, in most cases, buildings and materials do not start fires – people do" (p. 379).

The enforcement of fire prevention regulations has traditionally been accomplished primarily by relying on voluntary compliance. “Selling” fire prevention has been effective and continues to be the preferred method of enforcement. In terms of personnel resources, it is the most cost-effective method of achieving compliance.

In contrasting the purpose of fire codes with other types of regulations, Coleman and Granito (1988) wrote

> Primarily aimed at maintenance of protection features, such as alarm systems, sprinkler systems, occupancy limits, and means of egress, fire codes have fostered ongoing inspection routines by fire departments. Most other codes and standards are concerned with installation or construction, not maintenance. Thus, once the provisions of a particular code have been met, no additional inspections are required. (p. 390)

Robertson (1995) recognized that a number of activities that are actually “fire reactions” are considered ”fire prevention” practices by lay and professional people. The practice of home fire drills, for example, is usually associated with fire prevention programs although it is actually a fire reaction type program. Robertson wrote that one reason for this is that the same individuals generally promote both programs.

In addition, Robertson (1995) further noted that certain fire prevention concepts are not strictly related to the prevention of fire, but are more closely related to the prevention of the spread of fire. For example, wearing noncombustible clothing will not prevent the ignition of a match, but wearing such clothing does retard the possible spread of a fire that might be started on the clothing by the match.

Although there appears to be general agreement in the textual descriptions of the

purpose of fire prevention and code enforcement programs, there is a caution to be stated. Unless measures of the effectiveness of fire prevention programs are developed and exercised, the true purpose of fire prevention may be being overlooked by many responsible for it. In the classic work *Reinventing Government* Osborne and Gaebler (1992) addressed the issue by stating

> People often wonder why government programs live on for decades after they have become obsolete: why a state keeps inspecting meat long after the federal government begins duplicating its work; why HUD keeps a large urban renewal staff long after cities have quit doing much urban renewal; why California has 400 commissions that spend almost $2 billion a year. The answer, at least in part, is that no one outside of the bureaucracy can tell if these offices and commissions do anything worthwhile, because no one measures the results of their work. (p. 152)

Proving the Benefit of Fire Prevention Inspections

Schaenman, Hall, Schainblatt, Swart, and Karter (1979) recognized that there is an increased willingness and perceived need to devote more resources to fire prevention programs. Although their work is now 20 years old, it represents one of the few comprehensive examinations of measuring fire protection effectiveness. The authors indicated that no satisfactory method has been available to measure the effectiveness of such programs in preventing fires. There has been no way to know whether increased resources, often sought for these programs, would produce the desired results. They went on to write that the failures of fire prevention (e.g., deaths and injuries) are recorded, but corresponding successes (e.g., fireground saves) are

not.

Schaenman et al. (1979) further found that the only absolute method for determining the effect of fire prevention enforcement is by comparing the fire rate in similar occupancies over time. Even then, it must be decided if the occupancies measured are truly similar. Therefore, the only true way to measure fire rates is to analyze the fire experience in occupancies for years before an inspection program is instituted, and then at some time after it has been in place. The authors also noted that a fire prevention inspection program may reduce fire rates in ways that are not sensitive to the frequency of inspections. For example, the knowledge that inspections are conducted periodically may produce a continuing level of fire prevention awareness and corresponding action that does not diminish as the time since the last inspection increases. This ongoing effect can only be estimated by comparing fire rates before and after a program is initiated or by comparing communities with and without inspection programs.

In one of the only identifiable full-scale studies of the methods that lead to successful fire prevention programs, Hall, Koss and Schainblatt (1979) concluded that the analysis of civilian fire casualties showed that most casualties occur in ones and twos and cannot be prevented once the fire starts. Further, they determined that fire rates appeared to be substantially lower in cities that annually inspected all or nearly all public buildings. Cities in which a substantial share of the public buildings went several years between inspections, or were not regularly inspected at all, tended to have higher fire rates.

In his EFOP applied research paper, Lea (1993) wrote that the purpose of his

paper was to identify any currently available methodologies designed to measure the validity of fire codes and the enforcement of those codes through plan reviews and recurrent inspections. He identified that the problem in measuring productivity is due to the lack of a substantive product. He questioned how you can measure the outputs of a fire prevention program, noting that if a fire did not occur or was substantially reduced in size or intensity, it cannot be measured. Lea pointed out that such studies would be difficult to conduct due to the legal constraints placed upon a given jurisdiction. Specifically, the law imposes a duty to provide equal and consistent enforcement of all laws within a given jurisdiction. It is therefore impossible to set up a typical scientific study due to the inability to set up a base line control group by which to measure the results of an inspection program.

Lea (1993) further identified a general absence of information pertaining to the evaluation of the effectiveness of fire prevention programs with the exception of the previously noted *Fire Codes Inspections and Fire Prevention: What Methods Lead to Success?* by Hall et al. (1979). Lea concluded that annual fire inspections consistently performed every year result in a significant reduction in the number and severity of fires experienced by a jurisdiction in terms of monetary loss and in injury to the citizens of the jurisdiction.

Robbins (1994) wrote of the importance of public fire organizations recognizing the affect of their fire prevention programs and being able to balance the benefits with inconveniences. He wrote:

> Just as customers will take their business where they are well treated, businesses will also locate in areas that are conducive to their success. Code

> enforcement and other municipal services are part of the environment a company evaluates when making a decision on where to get started or relocate. The way codes are enforced can greatly enhance the fire prevention effort and the business manager's perception of the fire department. (p. 12)

The Need to Periodically Reevaluate Fire Prevention Enforcement Priorities

In their work *Reinventing Government*, Osborne and Gaebler (1992) addressed the concept of organizational flexibility and adaptability. They wrote that "Today's environment demands institutions that deliver high-quality goods and services, squeezing ever more bang out of every buck. It demands institutions that are responsive to customers and offer choices of non-standardized services" (p. 15). They further noted that entrepreneurial leaders do away not only with obsolete regulations, but with obsolete programs. A typical business, they noted, is forced to regularly winnow out some of its products and services because they no longer sell. However, in government, managers have no incentive to winnow out their product mix. They simply add more and more services and regulations until finally a fiscal crisis or tax revolt forces a massive cutback. Advocating the tracking of program results and how they affect citizens (customers), Osborne and Gaebler stated that "bureaucratic programs, for all their rules and red tape, keep very little track of what actually happens to the people they're serving" (p. 129).

Making a point that fire prevention efforts and occupancy inspections should be periodically reevaluated, Hall and Cote (1997) wrote that of the many occupancy classes that had tremendous risk of fire death when the NFPA was born, several have nearly eliminated life loss from fire and have achieved nearly all that can be achieved by

fire protection after ignition occurs. Others have moved a long way in that direction but still have pockets where code compliance remains spotty. Still others have accomplished the development of adequate codes for life safety but have major gaps in enforcement and compliance that still leave thousands of people at risk.

Hall and Cote (1997) further noted that people who die in fires, often die in either the kinds of fires that codes do not reach or the properties that codes do not reach due to lack of adoption or lack of enforcement. As examples of the inappropriateness of painting all occupancy classifications with one broad brush, they wrote that for schools and hospitals, codes now reach nearly everywhere. These properties are tightly controlled. However, nursing homes and the lodging industry are not quite so tightly controlled, but are very broadly compliant. Both have industry associations that have broad membership and are sensitive to fire safety. Both industries have difficulty in exerting control over properties on the fringes of the industry, such as board-and-care homes. Places of assembly have the problem of widespread non-compliance far more than do hotels and nursing homes. Proportionally fewer properties belong to national chains, that in other industries often lead the move to greater fire safety. There is also more employee turnover in these facilities, which hampers enforcement efforts because educating owners and managers about fire safety is a gradual, incremental process that has to start all over whenever a change takes place.

Lathrop (1991) wrote that codes and standards are living documents. They grow in maturity based on fire experience, observations and research of those responsible for them. He identified that the best codes and standards are continually updated with new information that allows them to adapt to an ever-changing world.

Coleman and Granito (1988) identified that a jurisdiction's fire prevention plan should be designed to respond to the changing conditions in the community. It should be modified if projected or unexpected changes occur that affect the fire protection system or if the programs that have been selected as part of the plan are not producing the desired results (goals and objectives). The authors advocated that these plan updates should become part of ongoing management activities.

Writing in *Fire Service Administration*, Grant and Hoover (1994) addressed the concept of "environmental scanning" to meet the changing duties of a public organization in serving its citizens. Environmental scanning, they explained, is "the technique by which fire officers identify and examine technical, social and political information, inside and outside the organization, to determine the current and potential trends that may affect the organization" (p. 223). The primary value of environmental scanning is preparedness, as the information gathered can be used to prepare alternative strategies for dealing with the impact of changes. Most appropriately, Grant and Hoover noted that "fire departments exist to provide services to the community on the basis of what it needs, not on the basis of what the fire department or its members want to provide" (p. 275).

NFPA Standard 550 *Guide to the Fire Safety Concepts Tree* (1995) cautions users of the *Guide* that "fire safety is not a static concept, but evolves with the expansion of our knowledge of the nature of fire and with the imagination of the fire safety practitioner" (p. 550-4). In *Setting the Standard for Excellence*, O'Connor (1998) recognized similar concepts when he wrote that the task of fire inspection has become increasingly complex over the last 20 years. He recognized that we know a lot more

about the way fires develop and spread. Codes, standards, and systems we use to prevent, detect, and contain fires have become infinitely more sophisticated. All of these changes have had a dramatic impact on the fire inspector. O'Connor summarized that "In addition to being a code enforcer, today's fire inspector must also be part detective, part reporter, part technical consultant, part missionary, and part salesperson" (p. 117).

Measuring Outputs vs. Outcomes (Efficiency vs. Effectiveness)

The 1992 Osborne and Gaebler work *Reinventing Government* devoted much discussion to the subject of public organization efficiency versus effectiveness. The work recognized that there is a vast difference between measuring efficiency and measuring effectiveness. Efficiency is a measure of how much each unit of output costs. Effectiveness is a measure of the quality of that output: how well did it achieve the desired outcome? When we measure efficiency, we know what it is costing us to achieve a specified output. When we measure effectiveness, we know whether our investment is worthwhile. Efficiency and effectiveness are important. However, when public organizations begin to measure their performance, they often measure only their efficiency. The authors identified that although the public certainly wants efficient government, they want effective government even more. The work indicated that "There is nothing so foolish as to do more efficiently something that should no longer be done" (p. 351).

Osborne and Gaebler (1992) further noted that because they do not measure results, bureaucratic governments rarely achieve them. Consequently, with so little information about results, bureaucratic governments reward their employees based on other things - their longevity, the size of budget and staff they manage, and their level of

authority. Therefore, “employees assiduously protect their jobs and build their empires, pursuing larger budgets, larger staffs, and more authority” (p. 139). They wrote that this legacy has endured because the ultimate test in government is not performance, but reelection. Private organizations focus on results because they will go out of business if essential numbers go negative. However, governments do not go out of business. Failure in government is not failure to achieve results, it is failure to secure reelection. Therefore, politics focuses on perceptions and ideology, not performance. Politicians are reelected based on how the voters and interest groups perceive them, not on how well their government provides services.

Osborne and Gaebler (1992) concluded that

> Typically, public agencies are not entirely clear about their goals, or are in fact aiming at the wrong goals. When they have to define the outcomes they want and the appropriate benchmarks to measure these outcomes, this confusion is forced into the open. People begin to ask the right questions to define the problem they are trying to solve, and to diagnose that problem anew. (p. 147)

Similarly, in *Managing Fire Services* Coleman and Granito (1988) wrote that program results may be analyzed as outputs and outcomes. The distinction, they noted, is important in practical management. Outputs are what a department does; outcomes are the consequences of that action (or inaction). The authors recognized that results-orientated management requires that outputs be tangible and quantifiable; for example, in terms of number of inspections completed, number of calls answered, and so on. Outcomes – the consequence of actions – are harder to define, but they need to be taken into account by management. Outcomes tell whether a program accomplished

what was intended in the community. For example, completing inspections may or may not result in reduced incidence of fire.

Osborne and Gaebler (1992) recognized the need to do quantitative measurement and qualitative evaluation of public program delivery. They pointed out that good managers can get enormous insight into performance by looking at relevant numbers, but they can get equally valuable insight by spending time observing the program, agency, or provider; talking with workers; and listening to customers.

The publication *Fire Death Rate Trends: An International Perspective* recognized that quantifying fire safety is a difficult task. Although the number and rate of fire deaths are certainly indicative of relative fire safety, they are also the result of a nation's overall fire safety environment. Five crucial components that contribute to a nation's overall fire safety environment were identified: (a) the quality and distribution of fire fighting resources, (b) the amount of active and passive fire protection in the built environment and its contents, (c) the amount of fire prevention activities undertaken, (d) the societal acceptability of fire, and (e) the fire safety behavior of the population. (FEMA, 1997a).

Watts (1997) recognized that the disparity between outputs and outcomes is evident even in code requirements. He wrote that most building codes maintain only a tenuous relationship between life safety requirements and fire safety objectives. For example, he stated "the number of exits has an intuitively positive correlation with life safety, but no explicit relationship and no functional association for determining cost-benefit" (p. 9-11).

The Influence of Catastrophic Fires on Code Development and Enforcement

Discussing fire prevention code development in *Introduction to Fire Prevention*

Robertson (1995) wrote “in the realm of fire, it is a thing mothered by necessity and sired by great tragedy” (p. 8). He and other authors have chronicled major fires that have occurred through the years and their relation to the development of fire safety regulations and procedures in the United States.

The history of fire prevention code development and enforcement is littered with after-the-fact reactions to disastrous incidents. Illinois, and the nation, changed exiting requirements for public assembly occupancies after 602 died in the Iroquois Theater fire in downtown Chicago in 1903. Fire prevention code enforcement was stiffened for elementary and secondary schools after the 1958 fire in Our Lady of the Angels grammar school on Chicago’s West Side killed 93. Boston’s 1942 Cocoanut Grove fire, in which 492 nightclub occupants were killed, resulted in changes for fire safety criteria pertaining to interior finish requirements and led to widespread adoption of the *Building Exits Code*, that later evolved into the *LSC*. In 1949 the St. Anthony’s Hospital fire in Effingham, Illinois resulted in 74 fire deaths and forced changes in allowable health care occupancy construction standards (Teague, 1991; Hall & Cote, 1997).

Brannigan and Carter (1998) wrote that some of the American fire service’s greatest progress has occurred just after someone’s town was devastated or many lives were lost. Similarly, the publication *Fire and Life Safety Educator* (IFSTA, 1997) pointed out that there have been many fires that killed large numbers of people. These disasters resulted in the establishment of building and fire prevention codes that have been highly effective in reducing subsequent fire incidents and losses.

Hall (1997a) justified the interest in large-scale disastrous fires by noting that the purpose of statistics is to answer important questions that will help indicate what is

needed for fire safety. An interest in major fires, Hall wrote, is justified by the view that fire codes and standards ought to be able to prevent any really large incidents from occurring. This is what leads to the phenomenon of one bad fire leading by itself to a set of code changes, because it only takes one fire of significant severity to indicate that an objective as stringent as preventing all very large fires has not been met. Hall further noted that this sequence of events is especially likely to occur if the one bad fire occurs in a place, or under circumstances, never previously associated with really bad fires; because, in that case, the one bad fire will serve as a sign to many that a particular class of properties, equipment, or activities is not as safe as everyone thought it was.

Hall (1997a) also noted however, that most fire deaths and other fire losses do not occur in big fires or even in the kinds of places and situations where big fires occur. Big multiple-death fires occur in high-occupancy places like hotels and dormitories or nightclubs. However, most fire deaths occur in low-occupancy places, such as dwellings or individual apartment units. Frustrated by the public's primary concentration on large-scale tragic fire incidents Shouldis (1990) wrote

> In nearly two decades the American fire service has not changed the public's indifference or ignorance toward fire with conventional means. Thus home fires still kill thousands in the United States every year….because fire deaths usually occur in small numbers, they do not draw the attention of the mass media. (p. 71)

Ramachandran (1988) identified that it is important to consider not only the number of deaths but also whether they occur singularly or as the result of catastrophes involving many deaths. Catastrophes normally have social and political consequences

that will not be present in an equal number of deaths occurring singularly (in separate events). Addressing the issue in terms of *disutility*, he noted that the disutility associated with a multiple death fire would be high and hence not desirable. A small probability of a catastrophic loss of life is worse than a larger probability of a smaller loss of life, given that the expected number of fatalities is the same for each case.

What Influences the Public and Politicians

Hall (1997b) wrote that much of the public worries about fire risks to people like themselves more than they worry about fire risks to people in other social groups. Therefore, programs targeted towards comparatively small high-risk groups may draw less public support than programs that make people with average-to-low risk even safer. Hall further noted that although this may seem like a purely philosophical or ethical question, most fire safety educators are able to operate only because other people decide to give them funding and other resources. A program designed with an eye to the special concerns of the people who control the resources is more likely to obtain the resources it needs for success.

Cote and Grant (1997) pointed out that safety is dependent upon risk, and the degree of safety achieved depends on how much willingness there is to pay to eliminate the risk. Total elimination of some risks would be exorbitant, and elimination of all risk is not feasible, even apart from cost. They went on to state that public priorities do not always follow patterns of risk either. The public wants, most of all, to be protected from fire risks associated with strangers, even though they are much more at risk from themselves and their families and friends. Risks are less acceptable when they are unfamiliar or involuntary, hence the tendency to focus on strangers. Homes and private

vehicles account for more than 90% of all fire deaths, but they account for much less than 90% of people's exposure measured by time. The public worries about fire risks to children, even though school-aged children are the lowest-risk age group in the population.

In *Reinventing Government* Osborne and Gaebler (1992) recognized that in government the ultimate test for managers is not whether they produce a product or a profit – it is whether they please the elected politicians. Because politicians tend to be driven by interest groups, public managers – unlike their private counterparts – must factor interest groups into every equation. They further point out that the majority of legislators and public executives have no idea which programs they fund are successful and which are failing. Referring to politicians they wrote

> When they cut budgets they have no idea if they are cutting muscle or fat. Lacking objective information on outcomes, they make their decisions largely on political considerations. Large, powerful organizations – whether public agencies or private contractors – make the most noise and have the best connections, so they escape relatively unscathed. Smaller, more entrepreneurial organizations take the hits. (p. 147)

Comparing public agencies and private businesses, Osborne and Gaebler (1992) wrote that most public agencies do not get their funds from their customers as businesses do. Therefore, businesses in competitive environments learn to pay enormous attention to their customers. Public agencies get most of their funding from legislatures, city councils, and elected boards. Most public agency customers are captive, and short of moving, have few alternatives to the services their government

provides. Therefore, managers in public sectors learn to ignore customers. The customers that public managers aim to please are the executive and the legislators – because that's where they get their funding. Elected officials, in turn, are driven by their constituents – in most cases, by organized interest groups.

Osborne and Gaebler (1992) recognized a disheartening fact about the political support for fire prevention programs:

> Prevention is hard to sell in a political environment. Where leaders have embraced it, they usually have been driven by unavoidable financial or political pressures. Prevention is not nearly as attractive to politicians as a visible response to crisis. Prevention is quiet, but politicians who mount all-out attacks on symptoms generate public publicity. (p. 235)

Illinois Laws Applicable to Fire Prevention

Some fire prevention inspections carried out by the DFP are mandated by the Illinois legislature. Enabling legislation (laws that allow the OSFM to adopt or develop standards and rules to accomplish desired conditions) and prescriptive legislation (laws that contain specific criteria to be enforced) have been promulgated by the Illinois General Assembly over the years in an effort to promote fire safety for Illinois citizens and business owners. Any complete evaluation of the current inspection program of the OSFM's DFP must identify these laws to understand, at least in part, why the DFP inspects some particular occupancy classifications that might not be otherwise targeted through quantitative analysis of fire incident data. In truth however, the review reveals that few Illinois laws, including those that are prescriptive about the subject to be regulated, detail how enforcement programs are to be administered or how often

inspections are to be conducted. (Dates associated with the listed laws represent the last year the legislation was updated, even though original legislation may have been issued several years, or in some cases, several decades earlier).

Enabling legislation

The most encompassing of Illinois laws relating to fire prevention enforcement is the Illinois Fire Investigation Act (1975). This law provides that

> The Office of the State Fire Marshal, and the officer of cities, villages, towns and fire protection districts by this Act, charged with the duty of investigating fire, shall, under the direction of the OSFM, inspect and examine at reasonable hours, any premises, and the buildings and structures thereon, and if such dangerous condition or fire hazard is found to exist as specified in the first paragraph of this Section, and the rules herein referred to are not applicable to such dangerous condition or fire hazard, shall order the dangerous condition removed or remedied, and shall so notify the owner, occupant or other person interested in the premises. (p. 1)

Although the law is non-specific in the types of occupancy classifications to be inspected by the OSFM it has often been cited as the authority to inspect virtually any facility in the state unless specifically prohibited by some other legislation or court decision.

The Illinois Space Heating Safety Act (1986) was passed by the legislature in response to a mid 1980s rash of fatal Chicagoland fires that resulted from misuse of kerosene fueled heaters. Although allowing enforcement by other authorities, the Act specifically names the OSFM as being responsible for developing and enforcing rules

that will accomplish the general criteria recognized in the law. The law pertains to the use of kerosene heaters within specific occupancy classifications, but does not mandate that the OSFM conduct regular inspections to determine compliance.

The Illinois Liquefied Petroleum Gas Act (1990) empowers the OSFM with the duty to make, adopt and enforce rules and regulations governing the storage, transportation, sale, dispensing, and use of liquefied petroleum gases. In response to the Act, the OSFM has adopted appropriate NFPA standards for enforcement at LP-Gas installations. Although charging the OSFM with responsibility for the assurance of safety at LP-Gas installation sites, the legislation is not specific in regards to the frequency of inspections at liquefied petroleum gas installations or facilities.

Similarly, the Illinois Gasoline Storage Act (1990) and Illinois Gasoline Receptacle Act (1990) offer general empowerment for the OSFM to develop, adopt, and enforce rules and regulations pertaining to the storage of flammable and combustible liquids. The previously identified OSFM DPCS is responsible for enforcement of the Act's requirements in relation to the underground storage of liquids. The OSFM's DFP has developed administrative rules that, in accordance with the Act, prescribe application procedures for new aboveground flammable or combustible liquid storage tanks. However, the criteria and the frequency of inspection of such installations, is not detailed in the legislation.

Following a financially disastrous fire in 1991 in a telecommunications switching facility in Hinsdale, Illinois, the Illinois legislature passed the Telecommunications Facility Fire and Emergency Act. The Act authorizes the OSFM to work in conjunction with the Illinois Commerce Commission and the Illinois Emergency Management

Agency to promulgate rules. Specifically, the Act authorizes the agencies to "adopt joint rules on the provisions of adequate fire protection and emergency notification systems at telecommunications service facilities in Illinois" (Illinois Telecommunications Facility Fire and Emergency Act, 1991, p. 1). The Act does not however, prescribe the frequency of OSFM telecommunication facility inspections.

Prescriptive legislation

Pertaining to the issue of fireworks manufacturing, sale, and use, the Illinois General Assembly has passed the Illinois Fireworks Regulation Act (1991) and the Illinois Fireworks Use Act (1981). Both acts are very specific in detailing the duties of the OSFM in regulating Class "C" fireworks sale and use, as well as permitting displays of Class "B" fireworks. However, concerning the performance of actual occupancy inspections, the Act contains no prescriptive action for the OSFM.

The Illinois General Assembly, concerned with past studies that indicated a number of fatal fires initiated in upholstered furniture, passed the Illinois Furniture Fire Safety Act (1991). The act is very prescriptive in terms of identifying the types of occupancies in which upholstered seating furniture is to be regulated, and in-fact identifies the specific test and inspection standards to be enforced by the OSFM. However, the Act does not mandate OSFM inspection frequency in any of the regulated occupancy classifications.

The Illinois Public Building Egress Act (1990) was passed by the legislature as the direct result of Chicago's Iroquois Theater fire. The Act requires that

> All public buildings used for churches, school houses, operas, theaters, lecture rooms, hotels, public meetings, town halls or which or shall be used for any

> purpose whereby a collection of people may be assembled together for religious worship, amusement or instruction, shall be so built that all doors leading from the main hall shall be so swung upon their hinges and constructed that said doors shall open outward. (p. 1)

The Act goes on to state that the criteria shall be enforced by the OSFM, with specific rules and regulations specifying minimum exit dimensions and number of exits required to be developed by the agency. The OSFM used the Act as partial support for its 1988 adoption of the NFPA *LSC*. However, as with several other Illinois acts, this law prescribes criteria, but does not detail OSFM inspection frequency.

The Illinois Smoke Detector Act (1987) and Illinois Facilities Requiring Smoke Detectors Act (1987) give specific details about the number, location and installation methods for several Illinois occupancy classifications that require the presence of smoke detection devices. However, the laws do not state that the OSFM is solely responsible for their enforcement, but rather serve to empower fire and law enforcement authorities at state, county, and municipal levels with the right to require compliance.

The Illinois Fire Equipment Distributor and Employee Regulation Act (1989) was an effort by the Illinois General Assembly to regulate companies doing business in the portable fire extinguisher and fixed fire suppression system businesses. The Act requires the OSFM to license companies and individual employees involved in this line of work, as well as inspect fire extinguisher and fire extinguishing system installations performed by the companies. The frequency of OSFM inspections is not defined.

Who Dies in Fires?

Fire deaths have been identified as one of the most important measures of the

effectiveness of a fire prevention program (see the subsection “What is the Right Measure of Fire Loss?” in this research paper). This being true, it follows that it is important to identify what causes most deadly fires and who most often dies in fires.

According to the International Fire Service Training Association publication *Fire and Life Safety Educator* (IFSTA, 1997) there is an old saying in the fire service – the three main causes of fire are men, women, and children. One look at all the commonly listed causes of fires indicates that human carelessness is to blame. Children playing with matches, the careless use of smoking materials, and misuse of flammable liquids are only a few examples of potentially dangerous human behavior. The text noted that if you examine all fire causes you find a wrong human behavior of some sort, either accidental or intentional, behind most fires.

Shouldis (1990) noted that most fire deaths do not occur in catastrophic incidents that dominate news headlines. Rather, he stated that fire deaths usually occur in small numbers, not drawing the attention of the mass media. It is for this reason, he stated, that for nearly two decades the American fire service generally has not changed the public’s indifference or ignorance toward fire by conventional means. Thus home fires still kill thousands in the United States every year.

An article that appeared in the *Journal of the American Medical Association* (*JAMA*) described a study by the Centers for Disease Control and Prevention (CDCP) that analyzed death certificate data from U.S. vital statistics mortality tapes and matched that information with the CDCP’s Behavioral Risk Factor Surveillance System. Not surprisingly, the study concluded that because 81% of fire-related deaths occurred in homes, strategies that emphasize residential fire prevention probably would result in

the largest reduction in fire-related deaths (Marshall et al., 1998).

In a related *JAMA* article, a study of 190 fire deaths resulted in findings that indicated 78 (41%) of those killed were found to be home alone and 69 (36%) were intoxicated as measured by blood alcohol content. Those younger than 5 and older than 64 were found to be the most vulnerable. Also, those with disabilities or impaired by alcohol are particularly vulnerable ("Deaths Resulting," 1998). Hall (1997b) writing in the *Fire Protection Handbook* confirmed this information when he noted that typically, most fire victims never get as far as trying to escape. They were asleep, impaired by drugs, alcohol, or disability, or they were too young or too old to act effectively.

Appendix A presents information from an NFPA *Fire Journal* article entitled "Fire Loss State by State" (Welch, 1999). The table allows examination of state-by-state fire death rates with factors that correlate to these deaths including the percentage of the population (a) living below the poverty level, (b) living in rural areas, (c) living in housing built before 1940, (d) over the age of 18 who smoke, and (e) over the age of 25 without a high school education. Appendix E more strikingly presents a correlation between fire deaths and the related social conditions presented in Appendix A. Appendix E summarizes Welch's information by identifying the 15 states with the highest fire death rates and those having the highest percentage of people (a) over age 25 without a high school education, (b) below the poverty level, and (c) over age 18 who smoke. Not surprisingly, many of the states that appear in the top 15 for fire death rates also appear at the top of the list for the identified factors.

The FEMA publication *Socioeconomic Factors and the Incidence of Fire* (1997b) identified that virtually every study of socioeconomic characteristics has shown that

lower levels of income are either directly or indirectly tied to an increased risk of fire. This work supported Welch's conclusions by stating that the three variables most effective in explaining variations in fire rates are (a) parental presence, or the percentage of children under the age of 18 who live with both parents; (b) poverty, defined as the percentage of persons whose income fell below the poverty line; and (c) under-education, or the percentage of persons over age 25 who had fewer than 8 years of schooling.

The publication *Fire in the United States 1986 – 1995* (FEMA, 1998) offered additional information pertinent to fire deaths. It explained that the elderly and the very young are at the highest risk. Children under the age of 5 continue to have double the national average fire death rate. Elderly people – over 70 – have one and one-half to four times the national average fire death rate, depending on how old they are, with the risk increasing sharply for people over 80. Men are twice as likely to be killed in fires than women – a fact that has been true for as long as NFIRS statistics have been kept. The reasons for this are not completely understood, but theories include the greater likelihood of men being intoxicated, a greater presence of males in dangerous industrial occupations, and the greater likelihood for men to attempt to fight a fire or go back to rescue someone. The FEMA report also importantly notes that the poor are more vulnerable to fire.

All of these facts were confirmed in an NFPA *Fire Journal* article titled "Who Dies in Fires in the United States?" (Conley & Fahy, 1994). This article also concentrated on the high correlation between fire death victims and those who are mentally or physically handicapped, as well as those living below the poverty level.

The OSFM's *1998 Annual Report* (1999) offered that, similar to the national experience, in Illinois children and the elderly are often the groups most affected by fire. However, it was also recognized that Illinois' middle aged were disproportionately affected by fire. Of those killed by fire in Illinois during 1998, nearly 14% of the victims were between the ages of 35-39. Individuals 35 years and older accounted for 68% of Illinois' 1998 reported fire deaths.

The Illinois Fire Experience Over the Last Decade

The most analytical study of Illinois' fire experience over the past decade is obtained by examination of IFIRS data. As previously identified in this research, the IFIRS collects fire incident response data from 890 Illinois fire departments. Although not providing a record of all Illinois fires because some departments do not submit their response data, the IFIRS allows an in-depth examination of the state's fire experience. Furthermore, IFIRS data allows identification of specific occupancy classifications and fire loss information pertaining to those occupancies including (a) number of fires, (b) deaths, (c) injuries, and (d) dollar loss.

Appendix I summarizes the Illinois fire experience from 1989 through 1998. The data presented in the table is based upon an extensive examination of IFIRS data for the occupancy classifications inspected by the OSFM's DFP. The data is introduced in this "Literature Review" section for presentation only. The data is examined and considered further in the "Results" and "Discussion" sections of this research.

Future Illinois Demographic Trends

Several sources referenced within this research have identified that people (and their misdeeds) are the source of most fire prevention problems. If this is true, then it

certainly would appear prudent to determine if projections for the future anticipate any significant changes in the number and characteristics of the people to whom the OSFM will provide fire prevention services. Osborne and Gaebler (1992) recognized that a common public agency fault is the absence of anticipation of future problems when they wrote

> Our ship of state is like a massive ocean liner, with all the luxuries above deck but no radar, no navigation systems, no preventive maintenance below. Instead of anticipating the problems and opportunities of the future, we lurch from crisis to crisis. Our political system is future-blind. (p. 221)

This concept was highlighted by Osborne and Gaebler (1992) in a quote of a public official who summed up the problem with public organizations by stating "We wait until there's a mess on our hands and then say 'Now what do we do?' instead of thinking, 'Okay, what's coming down the road? Lets plan for this and anticipate it." (p. 229).

Addressing immigration as a fire protection and fire prevention issue, Grant and Hoover (1994) wrote in *Fire Service Administration* that the rate of immigration continues to grow in the United States. More immigrants, 8 to 10 million, are projected to enter this country in the late 1990s than in the 1980s when 7 million arrived. These immigrants will come from Mexico, the Philippines, Vietnam, Korea, India, China, the Dominican Republic, Jamaica, Iran, Laos, Taiwan, and eastern Europe. These immigrants predominately head for California, New York, Texas, Florida, and Illinois. The authors wrote that fire officials must be cognizant of such influxes of immigrants in designing and implementing fire service delivery programs.

Specifically, Grant and Hoover (1994) indicated that more workers in major businesses are immigrants and the numbers are continuing to increase. These individuals do not have the same educational background in fire safety and awareness that results from fire prevention efforts in U.S. schools. Thus, immigrant workers may not be aware of many of the safety standards that must be met or the environmental dangers that are present on the job site. As a result, fire codes may be violated by business people or workers who are not aware of fire safety or other requirements when making decisions.

Recognizing that it is the very young and very old that are most vulnerable to fire (see the subsection of this research "Who Dies in Fires?") it is important to explore how these age groups will be affected by future Illinois population changes.

Table 2

Illinois Population Growth Estimates

Year	Population (,000)
2000	11,897
2005	11,979
2010	12,087
2015	12,223
2020	12,413
2025	12,652

Note. U.S. Census Bureau population estimates are based on projected birth rate

trends that consider the ethnic make-up of the current population as well as consideration of immigration and migration data.

U.S. Bureau of the Census statistics indicate that Illinois is expected to experience only minor overall population growth over the next quarter of a century. As Table 2 indicates, total state population is expected to increase only 6.3 % during this time period. This is a much slower rate than in past decades (U.S. Census Bureau, 1999).

Although total population will remain relatively constant, the make-up of that population will change significantly. A study of expected Illinois demographic changes over the next 25 years was conducted by Illinois State University (ISU). The study, entitled *Illinois Population Projections*, indicated that although white and black populations are expected to grow at relatively the same slow rate as the overall population, the number of Hispanics is projected to more than double between 1995 and 2020. Asians and Pacific Islanders are expected to grow at 43% (ISU, 1999).

Furthermore, because of low birth and death rates, the ISU project indicated that the Illinois population will slowly age over the next 25 years. As the baby boom reaches age 65 after 2015, the population will age fairly quickly and the proportion of elderly will increase. Significant increases are expected in the very elderly – 85 years old and above. Geographically, the counties surrounding Chicago and the East St. Louis areas will be fastest growing, while many of the more rural counties of northwestern and southeastern Illinois are expected to decline in population over the next 25 years (ISU, 1999). Similar population forecasts were presented in the state government study *Illinois Population Trends* (Illinois Bureau of the Budget, 1997).

Fire Prevention Inspections in Residential Occupancies

In 1973, the landmark fire protection report *America Burning* was published by the National Commission on Fire Prevention and Control. That reported concluded that residential inspections, used as educational opportunities as well as for identifying hazards, could save thousands of lives a year. The report recommended that annual home inspections be undertaken by every fire department in the nation. The report also endorsed making federal financial assistance to fire departments contingent upon implementation of home inspection programs (N.C.F.P.C., 1973). Despite these recommendations, Gallahar (1994) found that since the publication of *America Burning*, the urgency of conducting home fire safety inspections has been lost. Gallahar surveyed 26 fire departments as part of his EFOP applied research project and concluded that three-fourths of fire departments surveyed did not conduct home inspections, even though they have been found to be effective in reducing fire deaths, injuries, and monetary loss. Karter (1998), in his *NFPA Fire Journal* article “1997 Fire Loss in the U.S.”, concluded that with home fire deaths accounting for 83.1% of all fire deaths, fire safety initiatives targeted at the home remain the key to reducing the overall fire death toll.

Identifying that fire deaths occur predominately in single- and two-family dwellings begs the question of why state and local fire agencies do not concentrate more prevention efforts in these occupancies. In *Introduction to Fire Prevention*, Robertson (1995) addressed the ongoing controversy created when a governmental organization attempts to regulate single- and two-family dwellings. Addressing the issue of residential sprinkler criteria, he wrote that “the concept that a man’s home is his

castle has made this type of regulation difficult to implement" (p. 36). Robertson further noted that many home builder's groups have strongly opposed any measure that would bring about an increase in the construction cost of new dwellings. Home builders feel that even a minor increase in cost will reduce the number of people who are able to buy new homes.

Schaenman (1994) recognized that it has long been true that European communities have much lower fire death rates and fire incident rates per capita than do their counterparts in the United States. One of the most important of Schaenman's findings was that European countries and industrialized countries of the Pacific Rim devote much more attention to prevention of fires and containment of fires than we do in the United States – with particular emphasis on residential safety. For example, Dutch codes require homes to have fire-rated doors, enclosed stairways, and provide two means of exit from each room. By investing more in home safety, Schaenman noted that the Dutch attack the problem where most fatalities occur. Coupled with their natural carefulness the Dutch achieve one of the lowest fire death rates per capita in the world. The U.S. fire death rate is up to 400% higher per capita than theirs. Schaenman also recognized that Austrians are about tied with the Dutch for the distinction of having the lowest fire death rate among the industrialized nations on a per capita basis. They have strong standards for building fire protection into homes, similar to the Dutch.

Schaenman (1994) also argued that areas of growing population, with associated new home construction, are not necessarily safer than existing, older communities. He wrote that "Old homes in the U.S. are in many ways safer than new homes. Most of the U.S. population is living in more modern flimsier-built, lower ceiling, open doorway, light

wood framed structures loaded with plastic" (p. 44). In relation to fire prevention in the residential community, Schaenman summarized that each jurisdiction must choose a package of prevention approaches that works for its demographic characteristics and fire problem. He stated that key is the approach used to improve home fire safety, because 80% of fire deaths occur in the home.

Bender (1997) wrote that despite the fact that 80% of lives lost to fire occur in one- and two-family dwellings and apartments, home inspections traditionally have not been mandatory because of what he deemed "unfounded concerns" associated with the rights of citizens to ensure the sanctity of their homes. He noted that for years many fire departments have inspected homes on a voluntary, by-invitation, or planned basis and many have been successful in reducing home fire-loss experience. He suggested that when such programs cannot be comprehensive, they should target high-fire rated neighborhoods.

Contradicting advice to that suggested by Bender was found in *Introduction to Fire Protection Law* (Rosenbauer, 1978). That text reviewed a relevant Supreme Court case that pertains to a governmental authority conducting home inspections. Rosenbauer explained that the case of *Camara v. Municipal Court of the City of San Francisco* hinges on the right of private citizens to refuse to permit entry of governmental inspectors and to require such inspectors to obtain a search warrant, thus subjecting the purposes and inspectional procedures of the governmental agency to judicial review. Rosenbauer noted that the case addresses an individual's constitutional right to privacy vs. the protection of society as a whole from fire. Arguments were presented by authorities that the general enforcement of safety codes satisfies

"probable cause" to inspect properties as required by the Fourth Amendment to the Constitution. However, the Supreme Court found that the Fourth Amendment bars prosecution of a person who has refused to permit a warrantless code-enforcement inspection of his personal residence.

Rosenbauer (1978) summarized the advice of legal experts and the NFPA relative to conducting inspections in light of this Supreme Court decision. He suggested that fire prevention inspection programs be designed so (a) inspections are conducted on the basis of a geographical approach to proceed through a district on a building-by-building basis to demonstrate that particular occupancies were not singled-out for enforcement; (b) a search warrant is obtained in the rare cases when owners object to an occupancy inspection; (c) inspection staff are adequately identified by name, badge, and uniform; (d) inspection staff explain the purpose of the inspection; and (e) inspection staff request permission of the owner or person in charge to carry out the inspection. Rosenbauer further suggested that fire prevention inspection organizations develop formal, written inspection procedures spelling out how, when, where, and what inspections are to be carried out, and maintain an extensive record system to be able to demonstrate that particular occupancies or owners were not singled-out for enforcement.

The IFSTA manual *Fire Inspection and Code Enforcement* (1987) recognized that many state and federal courts have handed down decisions that protect the right of privacy of owners of private dwellings where no known or suspected fire hazard exists. Insistence on fire inspection under such conditions has been labeled an unreasonable search. Resultantly, the manual identified that many model codes exempt single- and

two-family dwellings when identifying the duty of fire officials to inspect structures within their jurisdictions.

In Illinois, the adoption of the NFPA *LSC* for statewide enforcement is done in a manner that discourages enforcement in private residential occupancies. *LSC* criteria is enforceable only as “recommendations” and not “requirements” in single- and two-family dwellings in accordance with the Illinois Administrative Code. Although not prohibiting advisory inspections of single- and two-family residences, the adoption language certainly limits the authority of the OSFM to achieve compliance in these occupancies (Illinois Administrative Code, 1993).

Analytical Methods to Decide Fire Inspection Priorities

Reacting to an inability to conduct all required fire prevention inspections, Harvey (1995) wrote that the Boulder, Colorado Fire Department devised a method whereby inspection priorities could be assigned to various buildings. Essentially, the formula-based priority system that Boulder developed takes into account several factors including (a) occupancy classification, (b) occupant load, (c) level of occupancy, (d) time of normal occupancy, (e) gross square footage, (f) impairment potential, (g) commercial cooking presence, (h) fuel load, and (i) the presence of windows. Further factoring is done based upon the presence of fire detection or suppression systems. Harvey noted that the system was developed on a subjective rather than scientific basis, through the input of city fire prevention and suppression officials, a fire protection engineer, and others.

Writing in the *SFPE Handbook of Fire Protection Engineering*, Watts (1988) reviewed the concept of fire risk assessment schedules, including the insurance rating

schedule. He wrote that risk assessment can essentially be broken into four categories: (a) narratives, (b) checklists, (c) schedules, and (d) theoretic methods. Explaining the benefits and drawbacks of risk assessment by each method, Watts noted that narratives do not attempt to evaluate the fire risk quantitatively, but rather a risk is judged acceptable if it complies with published recommendations. A limitation of this method is that the approach does not adequately account for conditions of human activity. Checklists, although comprising valuable tools for identifying fire risk factors, do not distinguish among the importance of these factors. In general, Watts noted, a long checklist on the order of 50 fire protection factors contains items that are readily visible or measurable but not necessarily comparable. A short checklist, on the other hand, is usually comprised of more conceptual features that are difficult to measure. What is usually lacking is the systematic approach to the generation of a checklist.

Watts (1988) indicated that fire risk schedules, in general, assign values to selected variables based on professional judgement and past experience. The selected variables represent positive and negative fire protection features and the assigned values are then operated on by some combination of arithmetic functions to arrive at a single value. This single value can be compared with other similar assessments or to a standard. The most commonly used insurance rating schedule in the U.S. is the Insurance Services Office (ISO) “Commercial Fire Rating Schedule-Survey”, that is now the property of a subsidiary corporation, the ISO Commercial Risk Services, Inc. Growing interest in analytical fire risk assessment and an increasing database has lead to use of more sophisticated mathematical techniques. Theoretic methods manipulate fire protection variables according to recognized theoretical principles. Among these

approaches are computer simulation, linear regression, network analysis, and stochastic modeling.

Watts (1988) explained that in 1960, M. Gretener of the Swiss Fire Prevention Service began to study the possibility of an arithmetic evaluation of fire risk in buildings. His premise was that determining fire risk by statistical methods based on loss experience was no longer adequate. As a result, the Gretener method has been developed and used in Switzerland and Austria. The appeal of the approach is that it begins with the explicit concept of risk as the expectation of loss given by the product of hazard possibility and the hazard of severity.

PROCEDURES

Evaluative research, that included examining historical perspectives, was conducted through several avenues including literature review, personal correspondence, personal interviews, IFIRS data analysis, and use of survey instruments. The procedures for conducting this research employed the "Analysis Phase" and "Evaluation Phase" of the "CMM" presented in the NFA's *SMOC* course (See Appendix B).

Definitions and Clarification of Selected Terms

CMM – Acronym for the "Change Management Model". A major component of the National Fire Academy's *Strategic Management of Change* course. Phase I "Analysis" and Phase IV "Evaluation/Institutionalism" of the "CMM" in combination with the Academy's Executive Fire Officer Program *Operational Policies and Procedures* served as the basis for the procedures used to conduct this research.

Enabling Legislation – legislation granting authority to an agency to promulgate

administrative rules, adopt regulations or write ordinances to address a particular concern. Enabling legislation differs from prescriptive legislation in the sense that enabling legislation does not usually contain specific criteria to be applied, but more simply identifies an issue to be corrected or regulated and allows the empowered agency responsible for enforcement to develop specific rule language.

Fixed property use code - The term used by the NFIRS and IFIRS to identify the three digit number code entered into an incident report to designate the type of the occupancy at which an incident occurred. The term broadly equates to the designation of "occupancy classification" within the NFPA *LSC*.

IFIRS - The Illinois Fire Incident Reporting System. Essentially, the IFIRS is a copy of the National Fire Incident Reporting System (NFIRS) adopted for use in Illinois. Illinois has made no specific modifications to the NFIRS program.

Grandfathering – the practice of allowing existing occupancies or conditions to remain despite the fact they may represent violations in accordance with newly adopted codes or standards. Most model fire prevention and building codes are applicable only to construction or alteration features conducted after the adoption date of the code and therefore "grandfather-in" existing conditions. The NFPA *LSC* that is adopted and applied statewide by the OSFM does not grandfather existing occupancies or conditions but rather imposes separate fire safety criteria to new and existing occupancies. Therefore, even occupancies existing before the *LSC's* adoption are subject to compliance with applicable fire safety criteria.

Life Safety Code – NFPA Standard 101® the *Life Safety Code* (*LSC*). This is not a mandated standard of the Federal government, but rather an NFPA standard that

addresses fire protection design, construction, and operating criteria. The *LSC* is only enforceable as law, rule, or ordinance if the authority having jurisdiction has adopted it. The standard has in fact been adopted by hundreds of municipalities and several state fire authorities. The *LSC* is the applicable standard for fire prevention and safety in Illinois.

NFIRS – The National Fire Incident Reporting System. The data collection program overseen by the USFA's National Fire Data Center. NFIRS is currently used by fire departments in 42 states. It is estimated that approximately one half of all U.S. fire incidents are reported to the USFA through the NFIRS system, making it the largest database of fire incidents in the world.

NFPA – The National Fire Protection Association. Publishers of the *LSC*. Contrary to the mistaken belief of many, this organization is not a Federal agency and NFPA standards and codes are not enforceable unless adopted by an authority in a particular jurisdiction. The NFPA, being the premier fire safety information resource in the world, also serves as the source of many statistics and reports referenced within the research document.

Occupancy Classification – a term used in the application of the NFPA *Life Safety Code* to designate the use of a structure. The term equates to the designation of "fixed property use code" used in the NFIRS and IFIRS.

Prescriptive Legislation – legislation that not only grants authority to an agency to promulgate rules addressing a desired subject, but also contains specific criteria or parameters to be included in those subsequently developed rules, ordinances, or adopted standards. Prescriptive legislation differs from *enabling legislation* in that

prescriptive legislation normally is more detailed in its intent and specific about the manner in which outcomes are to be achieved.

SMOC – Acronym for the National Fire Academy's *Strategic Management of Change* course. The *SMOC* course revolves around presentation of the "Change Management Model" (CMM). Elements of Phase I "Analysis" and Phase IV "Evaluation and Institutionalism" of the "CMM" were used as a guide to conduct this research (See Appendix B).

Literature Review

Literature searches were initiated at the National Emergency Training Center's (NETC) Learning Resource Center (LRC) in April 1999 during the author's attendance at the National Fire Academy's *SMOC* course. Additional searches were conducted within the public library systems of the city of Chicago and villages of Bartlett and Schaumburg, Illinois. The private libraries of the University of Illinois at Chicago and the author's alma maters, the Illinois Institute of Technology and Roosevelt University, were also consulted. Extensive searches were also conducted on-line through internet search engines to identify published documents, web-sites, organizations, and newsletters with content relative to the subject of fire prevention code enforcement and its relation to the reduction of fires and fire deaths. The author's private collection of fire prevention and code enforcement publications as well as past annual reports of the OSFM and other fire prevention agencies were also examined.

Personal Interviews and Correspondence

Personal interviews and written correspondence were conducted with experts in various applicable fields. Personal interviews were conducted with Illinois Deputy State

Fire Marshal Jack Ahern. Mr. Ahern is responsible for fire prevention code development and program delivery on a statewide basis in Illinois. He was interviewed on May 24, 1999, May 26, 1999 and June 3, 1999.

Ms. Kay Johnson, who serves as the current coordinator of the Illinois OSFM's IFIRS program, was interviewed on May 26, 1999. Follow-up written correspondence was also conducted with Ms. Johnson on May 28, 1999. Personal correspondence was also conducted with Ms. Donna Bartlett, administrative assistant with the Illinois OSFM's DMS – Fire Statistics Section, on May 26, 1999. Ms. Johnson and Ms. Bartlett offered insight into the operation of the IFIRS and conducted extensive IFIRS fixed property use code searches to offer valuable historical data relative to the Illinois fire experience in various occupancies over the past decade.

OSFM Deputy Director Dan Williams was interviewed on May 26, 1999. Mr. Williams offered insight into OSFM contractual obligations and personnel issues. Mr. John Pavlou, OSFM General Legal Counsel, offered information relative to Illinois laws and past court decisions applicable to fire prevention code enforcement. Mr. Pavlou was interviewed on July 26, 1999. Ms. Connie McCaslin was interviewed on May 27, 1999. Ms. McCaslin serves as the OSFM's Director of Personnel and supplied information relative to OSFM DFP inspector work conditions, benefits, and labor contract obligations. Written correspondence and requests for information were also made to several organizations including the NFPA, the National Association of State Fire Marshals (NASFM), and the Society of Fire Protection Engineers (SFPE).

IFIRS Data Analysis

At the author's written request the Fire Statistics section of the OSFM's DMS

provided computerized print-outs of all IFIRS reported fires for the past decade sorted by occupancy classification. Specific occupancy classifications were identified through application of the IFIRS – and NFIRS – "fixed property use codes" as identified in the USFA's *National Fire Incident Reporting System Handbook* (FEMA, 1989). The data provided information including the number of fires, fire deaths, fire injuries, and dollar loss for each IFIRS fixed property use code for each of the past 10 years. The resulting hundreds of pages of documents were then examined by the author to identify the fire experience in occupancy classifications that are inspected by the OSFM's DFP. Also, fixed property use codes that represent occupancy classifications that are not inspected regularly by the DFP but indicated elevated numbers in one or more of the noted parameters were examined. Fire experience data relative to the specific occupancy classifications of interest were then entered into tables in Microsoft Excel 97 to facilitate tabulation and comparison. Results of this examination and comparison of IFIRS data are presented in Appendix I.

Survey Instruments

A survey instrument was developed to collect information from state fire agencies across the nation. The survey served to collect data relative to the inspection priorities and fire experience in other states for comparison to OSFM statewide code enforcement and inspection programs. The survey requested objective information from each state pertaining to, amongst other items (a) the type of occupancies that were inspected, (b) the frequency of inspections, (c) if any records of the effectiveness of fire prevention inspections had ever been compiled, (d) how inspection priorities were decided, and (e) if changes had been made relative to state inspection priorities over

the past 5 years.

The survey was entitled *Survey of State Fire Agencies – Fire Prevention/Code Enforcement Inspections* (See Appendix F). The survey was mailed to the state fire marshal's office (or the recognized fire enforcement authority) of each state in the United States. The survey instrument was first reviewed by coworkers of the author in the Illinois OSFM for clarity of content and functionality of design. It was not however, field tested on sample groups. The elimination of sample testing was based on consideration of the content and nature of the surveys. The survey questions are objective rather than subjective in nature. The surveys request factual and quantitative data rather than personal feeling or opinion. All of the information requested in the surveys could have otherwise been obtained by examining the rules, standards, and records of each individual state's fire authority. Use of the survey instruments saved time and effort that would have been necessary to request such documents through freedom-of-information procedures from each individual state.

The surveys were originally mailed on May 12, 1999. To encourage responses, each survey was covered by an original (not a photocopy) letter on Illinois OSFM stationary (See Appendix G). Furthermore, in addition to the cover letter and survey instrument, each mailing included a stamped, self-addressed envelope to accommodate return mailing to the author. Agencies that had not responded by July 1, 1999 were mailed another survey package, under a second cover letter that again requested their response (See Appendix H). This second mailing again included a stamped, self-addressed envelope to the author.

Also, when a survey answer appeared contradictory in comparison to other

information offered in the response, the author re-contacted state authorities by telephone or written correspondence for clarification. Due to time constraints imposed by EFOP applied research project guidelines, August 20, 1999 was established as a cut-off date for collection of survey response information. State agencies that had not responded to either the first or second survey mailing by August 20, 1999, or returned their survey after that date, were considered non-respondents.

The content of returned surveys was entered into a table-format database using Microsoft Excel 97. Tables were developed to compile survey information from state fire authorities, NFPA studies, and historical IFIRS data. (See Appendixes A, E, and I as well as Tables J1, and J2). All tabular information was then imported into Microsoft Word 97 format for inclusion in this report.

Assumptions and Limitations

An expected limitation of the research was that some states have not adopted and do not use the NFIRS. Therefore, fire database information was not available from these states. Furthermore, because of an identified absence of comprehensive statewide fire incident data, many survey respondents answered general survey questions but did not provide detailed fire experience data.

Survey results were further limited by a number of other factors. The first was an assumption that individuals with sufficient knowledge of the subject to complete the survey answered all survey questions accurately. This appears not to have always been true. Some surveys indicated apparent conflicting information in the answers offered. When errors were suspected in survey responses, follow-up telephone contact was made with the person who had completed the survey. Although this process worked

well to clarify discrepancies, it cannot be assumed that completely accurate information was contained in other surveys where conflicting answers were not obvious enough to require follow-up telephone contact.

Another identified survey limitation was that some state agencies returned two completed copies of the survey instrument, but with differing responses. This could have resulted from two scenarios: (a) The survey form had been duplicated within the state, and assigned to more than one person to provide a response; or (b) The first survey that was received by the agency may have been in the mail back to the author when a second survey was mailed to that state because of an assumed no-response from the agency. In the cases where multiple surveys were returned from the same agency with differing information, telephone contact was made with respondents and clarification of discrepancies was attempted.

Some returned surveys contained sporadic unanswered questions. In such cases, comparison with other responses contained in the same survey allowed determination of the reason for this exclusion. However, when it was not possible to determine intent by cross-matching blank question responses with other survey responses, assumptions were made that the information was not available, did not apply, or the respondent was unaware of the correct response.

In addition, survey responses from some agencies indicated that the state was in the process of rule or procedure modification at the time of the survey. Therefore, assurance of the accuracy of results can only be made as of the exact date of survey completion. Rules, inspection procedures, and resultant inspection priorities of state fire agencies may now be in place that are significantly different from those existent at the

time of the survey.

The research project was also limited by time. The six month submission criteria of the EFO program did not allow for expansion of research into related issues including (a) correlating known occupancy classification fires with more specific information such as the number of clients served, time of the fires, staffing available at the time of the fire, the degree of code compliance present, and whether the occupancy was licensed or unlicensed; (b) comparison of whether there was a reduction of the fire and fire death rate in occupancies complying with performance-based code criteria rather than prescriptive code requirements; (c) a study of the political and social influences impacting each individual state's occupancy licensing regulations and fire safety inspection priorities; and (d) whether the occupancies experiencing fires and fire deaths had received previous OSFM DFP inspections. These subjects warrant further investigation and offer material for expansion of this research in the future by the author or others.

RESULTS

In answer to the specific research questions

1. In what occupancy classifications does the OSFM concentrate fire prevention inspections and what has been the fire experience in those occupancies?

Table C1 presents data pertaining to the type and number of occupancies inspected by the OSFM in 1998. Appendix I presents data that summarize the fire experience in Illinois occupancies, including those regularly inspected by the OSFM, over the past 10 years.

2. In what occupancy classifications are fires and related losses occurring or

increasing in Illinois?

Appendix I presents data that summarize the fire experience in Illinois occupancies over the past 10 years. Overwhelmingly, the majority of reported Illinois fires occur in single- and two-family dwellings, followed by apartment buildings. Correspondingly these two occupancy classifications account for 95.5% of all fire deaths and 82.3% of all fire injuries reported in non-vehicular Illinois fires in the last decade. However, other occupancy classifications require notice. Hotel and motel occupancy fires resulted in 33 deaths in Illinois over the past decade. Although relatively low in comparison to the total number of fire deaths in other residential occupancies (i.e., single- and two-family dwellings and apartment buildings), when compared with the number of actual fires in hotels and motels, the fire death rate per fire is the highest for any occupancy classification. The fire death rate in Illinois hotel and motel occupancies was almost double that in either single- and two-family dwellings or apartments over the past 10 years.

Residential board and care home occupancies accounted for only 3 fire deaths in the last decade in Illinois. However, similar to hotel and motel occupancies, the fire death rate per fire was almost twice that of either single- and two-family dwellings or apartment buildings. Restaurant occupancies also indicated a surprising 20 fire deaths in the state over the past decade. Although the death rate per fire, and the total dollar loss per fire was relatively low in restaurant occupancies over this time period, the 20 reported fire deaths rank restaurants as the fifth most deadly occupancy classification. Storage occupancies taken as a general classification accounted for 32 fire deaths (the fourth highest for any occupancy classification behind only single- and two-family

dwellings, apartments, and hotels/motels).

In terms of fire related injuries, residential occupancy classifications represent a large percentage of the total based upon the high percentage of fires in these occupancies. However, industrial and storage occupancies were the locations of the next highest fire injury totals. In terms of the number of fire injuries per fire occurrence, LP-gas tank facilities, nursing homes, and hotels and motel occupancies led the state.

In terms of total dollar loss, fires in storage occupancies trail only single- and two-family dwelling and apartment building fires for total loss in Illinois over the last 10 years – with an aggregate loss of over $310 million. Industrial occupancies followed storage occupancies with a total decade fire loss of over $186 million. In terms of dollar loss per fire, aboveground flammable liquid storage tank facilities led the list, with a loss of $51,415 per fire at these facilities - more than doubling that at any other. Second in terms of dollar loss per fire were industrial occupancies ($24,083).

3. What prior history has led to the current inspection priorities of the OSFM?

The research indicated that current OSFM inspection priorities have been determined by (a) agency management interpretation of often antiquated state legislation that requires the OSFM to ensure fire safety across the state – without dictating specific occupancy classifications to be inspected; (b) reaction to one-time or infrequent catastrophic fires that have garnered public and media attention (i.e., inspection of all state telecommunications offices as the result of one catastrophic fire in such an occupancy); and (c) concern for public opinion about fire safety in occupancies regardless of the quantitative data indicating a low fire experience in such occupancies (i.e., day care centers, day care homes, and occupancies involved in handling or

storage of flammable liquids).

The research also revealed that conspicuously absent from the list of determining factors for OSFM fire prevention inspections is any quantitative analysis of IFIRS data. Although detailed fire incident reports are completed and submitted to the OSFM by 890 Illinois fire departments, the agency has not used the resulting fire experience information to tailor fire prevention enforcement programs.

Worth noting is the absence of residential inspections (i.e., single- and two-family dwellings and individual apartments) in the OSFM fire prevention enforcement program. This is despite what has become common knowledge not only amongst fire service personnel, but also the general public and media - that residential occupancies are by far the leading location of fires, fire deaths, fire injuries, and total dollar loss in Illinois, as in the nation. The OSFM, similar to almost every other fire prevention enforcement agency in the state and indeed the nation, does not conduct even informational inspections in such occupancies. This policy has its origins in the manner in which the *LSC* is adopted in Illinois. Illinois' adoptive rule language stipulates that *LSC* criteria serves as "recommendations" rather than requirements in single- and two-family dwellings. Past court decisions protect the rights of home and apartment owners from warrantless entry. Also, concerns over selective enforcement may be raised if only "some" and not all of these occupancies are inspected. In addition to these legal concerns about inspecting single- and two-family homes the sheer magnitude of numbers is prohibitive to code enforcement. All of these factors have resulted in a policy decision by the OSFM to forgo code enforcement inspections in single- and two-family dwellings and individual apartments.

4. Have fire agencies in other states attempted to analyze their inspection priorities and if so, what can be learned from those organizations?

Surveys of other state fire agencies revealed that similar to the OSFM, few states have conducted analysis of their fire prevention inspection effects or priorities. Although 95.0% (38 of 40) of responding state fire authorities indicated that their organization conducted fire prevention or code enforcement inspections, only three states (Maryland, Ohio, and Wyoming) indicated that they use NFIRS or other fire experience database information to determine what occupancies should be inspected. Only 34.2% (13 of 38) of the states that conduct code enforcement inspections answered that they had made any modification concerning the type of occupancies inspected by their state programs within the past five years. Also, only 31.6% (12 of 38) of the states that conduct code enforcement inspections indicated that they used NFIRS – or other fire experience database information – to measure the effectiveness of their fire prevention enforcement programs.

None of the responding states indicated that they conduct regular enforcement inspections in single-and two-family homes. Alabama indicated that such occupancies are investigated upon receipt of complaint and Montana answered that such inspections are conducted – but did not address frequency or whether such inspections were advisory or mandatory. In addition, Oregon indicated that such occupancies are inspected, but only upon request of another state agency when a home-based business occupancy (i.e., home day care) is to be conducted in a residence.

5. If fires and related losses are indicated to be low or decreasing in the occupancies inspected by the OSFM, how can it be determined if this is the result of the

inspection effort or an event that would be realized in the absence of code enforcement inspections?

The research analyzed IFIRS data for the past decade pertaining to occupancy classifications inspected on a regular basis by the OSFM DFP. That analysis revealed that in the majority of occupancy classifications being inspected, no significant downtrend in the fire experience was recognized. Although true that the overall number of fires and fire deaths have declined in Illinois over the past decade, this is primarily the result of decreased fire events in single- and two-family dwellings and apartment buildings that dominate fire experience data. As has been addressed in this research, neither of these occupancy classifications are inspected on a regular basis by the OSFM. Declining totals in reported dwelling and apartment building fires may be attributed to other factors – possibly the state's residential smoke detector law, and vigorous public education at the local level, but not OSFM enforcement.

In the majority of the occupancy classifications inspected on a regular basis by the OSFM, there was no recognizable downtrend in either the annual number of fires, fire injuries, or fire deaths. This was found to be true for (a) day care centers, (b) residential board and care homes, (c) adult education facilities, (d) self-service gasoline stations, (e) telecommunications offices, (f) aboveground storage tank sites, and (g) LP-gas storage tank sites.

Moderate declines in fire rates were noticed in nursing homes and hospitals in recent years. However, these are two occupancy classifications where the OSFM has curtailed regular inspections over the past three years as the result of IDPH licensing inspections that duplicated *LSC* enforcement efforts. In hotel and motel occupancies,

which are inspected by the OSFM as a secondary priority to other work, there has been a noticeable decrease in the total number of fires over the past decade. However, the annual number of fire deaths in Illinois hotels and motels has not been altered to any significance.

Furthermore, significant declines in the number of fires have been realized in many occupancy classifications that are not inspected on any regular basis by the OSFM. Included amongst these are (a) industrial occupancies, (b) storage occupancies, (c) business offices, (d) college dormitories and fraternity or sorority houses, and (e) secondary schools. Examination of the data indicated little to no decrease in the fire deaths in these same occupancy classifications over the past decade.

One feasible method of addressing whether fires and fire death rates are being affected by regular fire prevention inspections is to compare Illinois occupancy fire data to that of other states that do not conduct inspections in the same types of occupancies. Understandably such a method does not provide any absolute proof of the effectiveness or non-effectiveness of inspections. It does not consider demographic or geographical differences between states, or the presence of inspections by either other state agencies or local fire departments. However, it is reasonable to assume that at least to some degree, annual fire prevention inspections by the OSFM would result in a lower number of fires and fire death rates than are witnessed in identical occupancies in states that do not practice such inspections.

To examine this issue, data submitted by surveyed state fire agencies was analyzed. States in the Midwest, geographically close to Illinois, that had included inspection as well as fire experience data for all occupancies in their returned surveys

were examined. The results indicated that for several occupancy classifications inspected at least annually in Illinois, there was no significant difference in fire and fire death rates compared with states that do not conduct regular inspections. For example, Illinois conducts annual fire prevention inspections in self-service gasoline stations with a resultant relatively low number of fires and fire deaths. However, the states of Indiana, Iowa, and Kansas only conduct self-service station inspections if a specific complaint is received, and the Minnesota State Fire Marshal's Office does not conduct any inspections in these occupancies. Yet, none of the states reported any fire deaths in self-service stations in their surveys and the number of fire incidents appear to be commensurate with those in Illinois. The same fact is true of aboveground storage tank sites, and LP-gas tank installations in the same states.

Similar results were seen when other occupancy classifications were examined in these states. For example, adult education facilities are inspected annually in Illinois by the OSFM. However, in Indiana, Iowa, and Minnesota such inspections are not conducted. None of the states reported a single fire death in these occupancies. The same is true of telecommunications facilities.

6. Can the OSFM identify social or demographic factors to assist in prioritizing future fire prevention inspections?

An abundance of information was found pertaining to social factors and their relation to fire. Specifically, Appendixes A and E present data that correlates state fire death rates with social conditions, including (a) population, (b) median household income, (c) percentage living below the poverty level, (d) percentage living in rural areas, (e) percentage living in housing built before 1940, (f) percentage of the

population over the age of 18 who smoke, and (g) percentage of the adult population without a high school education.

Examination of the data indicates that fire deaths are positively correlated to low-income families, the presence of smokers, and under-educated occupants. Rural areas have exaggerated fire death rates when compared with an equal number of fires in urban and suburban areas. The age of the building stock does not have as significant of an effect upon fire deaths as the above noted factors.

Relevant to Illinois, demographic projections indicate that although overall state population is expected to grow at a relatively slow pace over the next 25 years, there will be an influx of immigrants – primarily of Hispanic, Asian and Pacific Island origin. If current trends continue, these immigrants will include a high percentage of people identified by the research as high fire death risks – smokers, and low- or under-poverty income levels. Furthermore, although possibly possessing education levels at or above that of the average Illinois citizen, language barriers, combined with the absence of adequate fire safety education in these foreign countries, may represent fire risk concerns.

Also, demographic projections identified in the research indicate that Illinois' population will age fairly quickly over the next two decades with significant increases in the very elderly – 85 years old and above. Many literary sources referenced in this research identified the escalating risk of fire death with increases in population age – especially those over 85 years. Geographically, collar counties surrounding the Chicago and East St. Louis areas are expected to grow the quickest.

7. If necessary to modify the inspection priorities of the OSFM, what restraints

and barriers can be identified with the change process?

The research identified several possible restraints or barriers to the modification of inspection priorities of the DFP. These include (a) DFP fire inspectors are unionized and protected by a written labor contract. Changing the type of occupancies inspected, or inspection frequencies may be considered a modification to work conditions that would require collective bargaining; (b) State legislators and the general public are unduly influenced by media reports of catastrophic fire events. Although such events may be extremely infrequent in certain occupancy classifications, media concentration on such events leaves hard-to-change impressions upon people. As the research revealed, the true job of a politician is to be reelected. Therefore, decisions are not always based upon quantitative data and despite analytically solid proof, changing occupancy inspection programs may be politically unfeasible; (c) Fire enforcement agencies in other states, similar to the Illinois OSFM, lack fire database evaluation of their inspection programs. Without a shared effort in multiple states, or backing from national organizations to force a change towards more residential-type occupancy inspections, the OSFM runs the risk of being designated a “radical” agency amongst its peers – a fate not always conducive to long-life for the agency’s administrator; and (d) Special interest groups would certainly have a stake in supporting, but also opposing particular occupancy inspection programs. The OSFM has learned in past rulemaking efforts that groups representing day care owners, health care organizations, prison rights advocates, and supporters of private educational institutions have strong public influence.

DISCUSSION

Interpretation

This research confirmed facts that have long been suspected or "felt" by OSFM administrators, but heretofore remained unproven. Specifically, the OSFM DFP devotes hundreds of inspection-hours to the enforcement of fire prevention standards in many occupancy classifications where the effort has little effect on fire experience from a quantitative standpoint (See Table C1 and Appendix I).

The fact that one-time, or at least low frequency catastrophic fires often dictate inspection priorities and code development was identified by several authors (Brannigan & Carter, 1998; Cote & Grant, 1997; Hall & Cote, 1997; Osborne & Gaebler, 1992; Robertson, 1995; and Teague, 1991). This concept is evident in Illinois when reasons for OSFM inspections of telecommunications switching facilities, adult educational classrooms, and public assembly occupancies are examined. Previous Illinois fires in the Hinsdale Illinois Bell Telephone Company switching station, Our Lady of the Angels School, and the Iroquois Theater influenced inspection priorities in each of these occupancy classifications respectively.

Furthermore, this research brings to the forefront a hopefully persuasive argument for re-direction of the OSFM DFP inspection workforce towards more residential-type occupancy classifications where fires, fire injuries, and fire deaths are prevalent in Illinois (See Appendix I). The long-standing reluctance of the fire service, be it on the local, county, or state basis, to conduct inspections in primarily residential occupancies, is a crippling decision in the war to reduce fire deaths in this country. Interviews with OSFM General Counsel Pavlou confirmed the findings of Rosenbauer

(1978) and the IFSTA text *Fire Inspection and Code Enforcement* (1987) relative to the difficulty of conducting fire prevention inspections in private dwellings.

The results of the survey of state fire authorities were not surprising. It was suspected, even before objective survey results proved it, that similar to Illinois, other state fire authorities typically inspect occupancies that (a) have the reason for their inspection rooted in antiquated fire safety standards or laws; (b) are typically also inspected by local fire department inspectors; and (c) are perceived to be fire safety risks based upon one-time, or a small number of tragic fire events in past history that resulted in multiple death or high media exposure fires.

What is somewhat more disturbing is the fact that similar to Illinois, other state fire authorities do not take adequate advantage of the fire data being generated by the NFIRS (See Table J1). Multiple sources identified by this research noted the importance of measuring and tracking governmental agency work efforts including Grant and Hoover, (1994); Hall and Cote, (1997); and Osborne and Gaebler, (1992). The NFIRS, in place for 20 years now in its current form, allows identification on a regional, state, and national basis of the current fire experience problem. Fire inspection authorities having jurisdiction can easily identify the location, occupancy classification, time of day or night, and number of deaths or injuries for virtually all reported fires within their jurisdiction (FEMA, 1997c). Yet, only three responding states (Maryland, Ohio, and Wyoming) indicated that their fire prevention inspection programs, and specifically the types of occupancies inspected, are tailored to results obtained by conducting a study of NFIRS information (See Table J1).

Similarly, the research identified that there are accurate predictors of high fire

death rates amongst the general population. Specifically, those individuals or groups who are under-educated, earn low or below-poverty level income, and have a high incidence of adult smokers are most vulnerable to fire. Furthermore, the very young and the very old are most susceptible to fire. These factors were identified by several sources referenced in the research including the FEMA publications *Fire in the United States 1986-1995* (1998) and *Socioeconomic Factors and the Incidence of Fire* (1997b) as well as the *Fire Journal* article "Who Dies in Fires in the United States" (Conley & Fahy, 1994); and Welch's *Fire Journal* article "Fire Loss State by State" (1999) - which was used to develop Appendixes A and E of this research. Yet, the priority of OSFM occupancy inspections are not purposefully tailored to target any of these specific groups. Although inspections may involve occupancies that include individuals who fall into one or more of the high-risk groups, this is not the result of purposeful program design.

One of the hardest concepts to work with is the argument that the reason the NFIRS database does not indicate a fire problem in a particular occupancy is in-fact because that occupancy type is frequently inspected by fire prevention personnel rather than because it is an inherently fire safe occupancy. This is consistent with what Lea (1993) identified when he questioned how an agency could measure the output of a fire prevention program. For example, certain occupancy classifications including self-service gasoline dispensing stations, aboveground storage tank facilities, adult education occupancies, and telecommunications office facilities were of particular interest in this study. As described in the research, the OSFM conducts thousands of annual inspections in these occupancy classifications throughout the state (See Table

C1). The IFIRS database indicates an extremely safe fire experience record in these occupancies, with a low number of fires and fire deaths in the last 20 years. Some would argue that the reason for this excellent fire safety record is the very fact that they receive annual OSFM fire prevention inspections. However, this research indicated, by comparison to data from neighboring states that conduct no such annual inspections in these same occupancy classifications, that the same or lower fire and fire death rates may be realized without inspections.

Implications

Enforcement authorities, often faced with limited resources, need to examine myriad factors when determining inspection and public education priorities. State and municipal fire authorities are often charged with the fire safety of all occupancies within their jurisdiction. Whether to concentrate inspection personnel in schools, hospitals, nursing homes, day care facilities, multi-family housing, or public assembly occupancies is usually a decision subject to political, budgetary, and statistical debate. Just as code enforcement authorities use statistical fire database information to justify increases in field personnel or to launch new inspection initiatives, so must they be willing to relax prescriptive code requirements or inspection programs when those same statistics indicate the absence of a fire problem in a particular occupancy classification.

It must also be considered that regardless of occupancy classification, many identified references pointed to the fact that it is people and their actions that are at the root of most fire safety problems (Coleman & Granito, 1988; Hall, 1997a; and Robertson, 1995). Although repeated enforcement of fire prevention standards by authorized field inspectors can arguably reduce the risk of multiple fire deaths in

particular occupancy classifications, it must be questioned whether code enforcement efforts only – without stronger public education efforts - will have an effect in reducing fire deaths that occur in ones or twos.

The argument often presented by inspectors, that fire deaths or injuries are low in the occupancies that they inspect simply as the result of their inspections, appears to have been discredited by this research – at least in some occupancy classifications. The research has shown that corresponding fire and fire death rates in the same occupancies in neighboring states that do not conduct such inspections compare favorably with those in Illinois where thousands of inspection hours are spent at such occupancies.

As the EFOP *SMOC* course material indicated, change is often difficult to accomplish – especially when the magnitude or scope of the change is large. Any major modification of the OSFM's inspection priorities would be subject to internal and external sources of resistance. Even with sufficient data analysis, there is no guarantee that necessary changes would be acceptable to the OSFM inspection force, politicians, local fire departments, business owners, or the public. The change management methods presented and endorsed in the "CMM" would certainly be put to the test in any major revamping of the inspection priorities of the OSFM DFP.

Understandably, the research identified that not all inspection priorities can be determined by purely analytical methods. Political, social, legal and "agency survival" aspects must be equally considered. However, current OSFM DFP inspection priorities could be more appropriately structured to satisfy these factors, while simultaneously addressing the fire safety of Illinois citizens from a quantitative viewpoint.

RECOMMENDATIONS

Based upon this research the following recommendations are made

1. The OSFM should make use of IFIRS data when prioritizing fire prevention inspections for the DFP. The research revealed that local Illinois fire departments are required by state statute to submit fire incident data to the OSFM. Although 890 Illinois fire departments make such submittals, the OSFM has never used that collected data to quantitatively examine the effect of fire prevention enforcement. Over 20 years of Illinois fire experience and OSFM occupancy inspection data is available for cross-examination. The data allows multiple parameters (e.g., fires, fire deaths, fire injuries, and total fire dollar loss) to be analyzed in a variety of meaningful forms (e.g., rates, trends, and totals). Such analysis would make changes to fire prevention enforcement programs more easily defendable to state administrators, politicians, business owners, OSFM fire prevention inspector union representatives, and the general public.

2. The Illinois OSFM needs to better educate state legislators relative to current fire safety problems and hazards in an effort to modify and replace either antiquated or non-descriptive legislation that currently requires the inspection and regulation of facilities that never were, or are no longer, high-risk occupancies. The statistical analysis referred to in Recommendation #1 would provide the data necessary to support this effort.

3. Fire prevention code enforcement inspections of some occupancies should be discontinued by the OSFM. This recommendation results from the fact that other Illinois agencies have been performing fire safety inspections within these occupancies, using the state-adopted NFPA *LSC*, with satisfactory results. These occupancy classifications

include (a) nursing homes, (b) hospitals, and (c) ambulatory treatment centers.

4. Fire prevention code enforcement inspections of some occupancies should be conducted less frequently by the OSFM as the result of IFIRS data indicating a low number of fire incidents, fire deaths, and fire injuries. Included amongst these are (a) self-service gasoline stations; (b) unattended gasoline self-service stations; (c) telecommunications switching stations; (d) adult education facilities, and (e) horse racing tracks. At the same time, examination should be made relative to reducing inspection frequency in certain occupancy classifications that data analysis indicates have not been fire risks on a statistical basis, but may pose more controversial political and social outcry if inspections are curtailed or postponed. These include (a) day care centers, (b) day care homes, (c) private educational occupancies, and (d) large public assembly occupancies.

5. The OSFM fire prevention workforce should be redirected into occupancy classifications where IFIRS data indicates a high number of fire incidents and fire deaths. Included amongst these are (a) hotel and motel occupancies – especially concentrating on those that are not benefiting from national chain safety and fire inspection programs, (b) residential board and care homes serving occupants who are in need of personal care services, and (c) single-room occupancy lodging houses that offer sleeping and living space on a rented or transient basis.

6. The OSFM should consider the implementation of a residential-based fire safety program to combat the continuing fire and fire death problem in single- and two-family dwellings and apartment buildings. Either by shifting the efforts of DFP field personnel from enforcement to public education or by causing legislative, policy and

procedural changes necessary to allow residential code enforcement inspections, the emphasis of the OSFM must be redirected into residential occupancy classifications if Illinois fire death totals are to decrease below current levels.

7. The OSFM should begin to tailor fire prevention enforcement and education efforts with consideration of anticipated demographic changes. Specifically, studies indicating the aging of Illinois' population over the next 20 years should be addressed.

8. The OSFM needs to develop a system to track municipal fire department inspections. If it can be identified that certified local fire inspectors conduct regular code enforcement duties in particular occupancy classifications, OSFM inspections can be conducted less frequently or possibly eliminated within those occupancies. This will allow the OSFM to concentrate inspection personnel of the DFP in other occupancies based upon the priorities established by the other recommendations of this research.

9. The OSFM should consider the use of quantitative methods or "formula-based" inspection priorities to objectively reduce inspection frequencies in selected occupancy classifications. Although IFIRS data can be employed to identify a reduced fire experience in general occupancy classifications, occupancies within each classification can be further distinguished by applying an objective fire risk evaluation. Such an evaluation should consider (a) number of occupants, (b) height of the structure, (c) physical and mental condition of the occupants, (d) the presence of automatic fire suppression and detection systems, and (e) past inspection and fire history relative to an occupancy. This recommendation lends itself to future research projects to determine the appropriate weighting of various protection features to be used in calculating inspection frequencies.

10. The OSFM should employ the methodology presented in the NFA's *SMOC* "CMM" to accomplish changes recommended by this research. The phases of the "CMM" model – "Analysis, Planning, Implementation, and Evaluation/Institutionalism" – allow a structured and proven approach to accomplishing effective and lasting changes in organizations. This research analyzed reasons for current enforcement priorities and evaluated the effectiveness of the OSFM inspection program. Future research efforts must concentrate on development of a specific DFP plan for change in accordance with the "CMM".

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Appendix A – State-by-State Fire Experience Data

State	Population (millions)[a]	Fire deaths[a]	Fire deaths per million people	Median household income ($,000)[a]	% living below poverty level[b]	% living in rural areas[c]	% of housing built before 1940[c]	% over 18 who smoke[d]	% without high school education[d]
Alabama	4.29	106	24.7	30.3	16.4	39.6	9.3	24.5	22.4
Alaska	0.61	17	28.1	52.8	10.2	32.5	3.0	25.0	7.9
Arizona	4.43	40	9.0	31.6	15.9	12.5	3.2	22.9	17.4
Arkansas	2.51	63	25.1	27.1	15.3	46.5	9.4	25.2	23.1
California	31.86	210	6.6	38.8	17.9	7.4	10.7	15.5	19.3
Colorado	3.82	17	4.5	40.9	9.0	17.6	13.0	21.8	12.4
Connecticut	3.27	37	11.3	42.1	10.8	20.9	25.5	20.8	16.0
Delaware	0.72	14	19.4	39.3	8.3	27.0	14.3	25.5	15.6

State	Population (millions)[a]	Fire deaths[a]	Fire deaths per million people	Median household income ($,000)[a]	% living below poverty level[b]	% living in rural areas[c]	% of housing built before 1940[c]	% over 18 who smoke[d]	% without high school education[d]
Florida	14.40	148	10.3	30.6	14.9	15.2	3.7	23.1	18.6
Georgia	7.33	185	25.2	32.5	14.0	36.8	8.1	20.5	21.2
Hawaii	1.18	12	10.1	41.8	8.7	11.0	6.7	17.8	16.3
Idaho	1.19	6	5.1	34.7	12.0	42.6	15.9	19.8	14.3
Illinois	11.85	188	15.9	39.5	12.4	15.4	27.1	23.1	15.6
Indiana	5.83	110	18.9	35.2	13.7	35.1	24.2	27.2	18.1
Iowa	2.85	39	13.7	33.2	10.7	39.4	35.0	23.2	13.3
Kansas	2.58	37	14.3	32.6	14.9	30.9	24.5	22.0	11.9
Kentucky	3.88	84	21.6	32.4	18.5	48.2	15.9	27.8	24.6
Louisiana	4.34	111	25.6	30.3	25.7	31.9	10.6	25.2	24.3

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State	Population (millions)[a]	Fire deaths[a]	Fire deaths per million people	Median household income ($,000)[a]	% living below poverty level[b]	% living in rural areas[c]	% of housing built before 1940[c]	% over 18 who smoke[d]	% without high school education[d]
Maine	1.24	16	12.9	34.7	9.4	55.4	34.9	25.0	14.2
Maryland	5.06	35	6.9	44.0	10.7	18.7	15.5	21.2	15.3
Massachusetts	6.09	68	11.2	39.5	9.7	15.7	38.9	21.7	14.1
Michigan	9.73	129	13.2	39.2	14.1	29.5	20.8	25.7	14.0
Minnesota	4.65	45	9.7	40.9	11.7	30.1	24.5	20.5	12.1
Mississippi	2.71	95	35.0	26.7	19.9	52.9	8.6	24.0	22.5
Missouri	5.36	107	19.9	34.2	15.6	31.3	20.4	24.3	19.1
Montana	0.88	13	14.8	28.7	11.5	47.5	21.8	21.1	11.4
Nebraska	1.65	17	10.3	34.0	8.8	33.9	30.7	21.9	14.0
Nevada	1.60	11	6.9	38.5	11.1	11.7	2.9	26.3	14.6

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State	Population (millions)[a]	Fire deaths[a]	Fire deaths per million people	Median household income ($,000)[a]	% living below poverty level[b]	% living in rural areas[c]	% of housing built before 1940[c]	% over 18 who smoke[d]	% without high school education[d]
New Hampshire	1.16	9	7.8	39.4	7.7	49.0	27.1	21.5	14.9
New Jersey	8.00	77	9.6	47.5	9.2	10.6	24.6	19.2	15.1
New Mexico	1.71	25	14.6	25.1	21.1	27.0	8.1	21.2	22.0
New York	18.10	213	11.7	35.4	17.0	15.7	35.3	21.5	20.0
North Carolina	7.31	165	22.6	35.6	14.2	49.6	9.9	25.8	21.6
North Dakota	0.64	9	14.0	31.4	10.4	46.7	24.7	22.7	17.4
Ohio	11.16	137	12.3	34.1	14.1	25.9	25.8	26.0	13.8
Oklahoma	3.29	73	22.2	29.1	16.7	32.3	12.4	21.7	14.8
Oregon	3.20	40	12.5	35.5	11.8	29.5	16.8	21.8	15.3
Pennsylvania	12.00	188	15.6	34.9	12.5	31.1	35.1	24.2	17.6

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State	Population (millions)[a]	Fire deaths[a]	Fire deaths per million people	Median household income ($,000)[a]	% living below poverty level[b]	% living in rural areas[c]	% of housing built before 1940[c]	% over 18 who smoke[d]	% without high school education[d]
Rhode Island	0.99	2	2.0	37.0	10.3	14.0	34.0	24.7	22.5
South Carolina	3.72	109	29.3	34.7	13.8	45.4	8.5	23.7	22.7
South Dakota	0.74	11	14.9	29.5	14.5	50.0	30.4	21.8	14.4
Tennessee	5.30	169	31.8	30.8	14.6	39.1	10.2	26.5	23.9
Texas	19.10	261	13.7	33.1	19.1	19.7	7.1	23.7	21.5
Utah	2.02	12	5.9	37.0	8.0	13.0	13.5	13.2	10.5
Vermont	0.59	8	13.7	32.4	7.6	67.8	36.5	22.1	15.6
Virginia	6.67	102	15.3	39.2	10.7	30.6	11.0	22.0	18.7
Washington	5.52	50	9.1	36.7	11.1	23.6	15.7	20.2	11.2
West Virginia	1.82	34	18.7	25.2	18.6	63.9	23.7	25.7	22.7

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State	Population (millions)[a]	Fire deaths[a]	Fire deaths per million people	Median household income ($,000)[a]	% living below poverty level[b]	% living in rural areas[c]	% of housing built before 1940[c]	% over 18 who smoke[d]	% without high school education[d]
Wisconsin	5.15	65	29.0	40.0	9.0	34.3	28.5	21.8	12.9
Wyoming	0.48	4	8.3	30.9	9.3	35.0	15.6	22.0	8.7
Average		74.5	15.3	34.6	13.1	31.8	18.7	22.7	16.8
Maximum		261	35.0	52.8	25.7	67.8	38.9	27.8	24.6
Minimum		2	2.0	0.0	7.6	7.4	2.9	13.2	7.9

Note. Data from “Fire Loss State-by-State,” by K.L. Welch, 1999, *NFPA Fire Journal 93,* p. 106-115.

a = Population, median household income, and fire deaths are all 1996 data. b = Percentage of population below poverty level and percentage of adults who smoke are based on 1994 data. c = Percentage of housing units built before 1940 and the percentage of the population living in rural areas are from 1990 data.

d= Percentage of adults without a high school education is taken from 1997 data.

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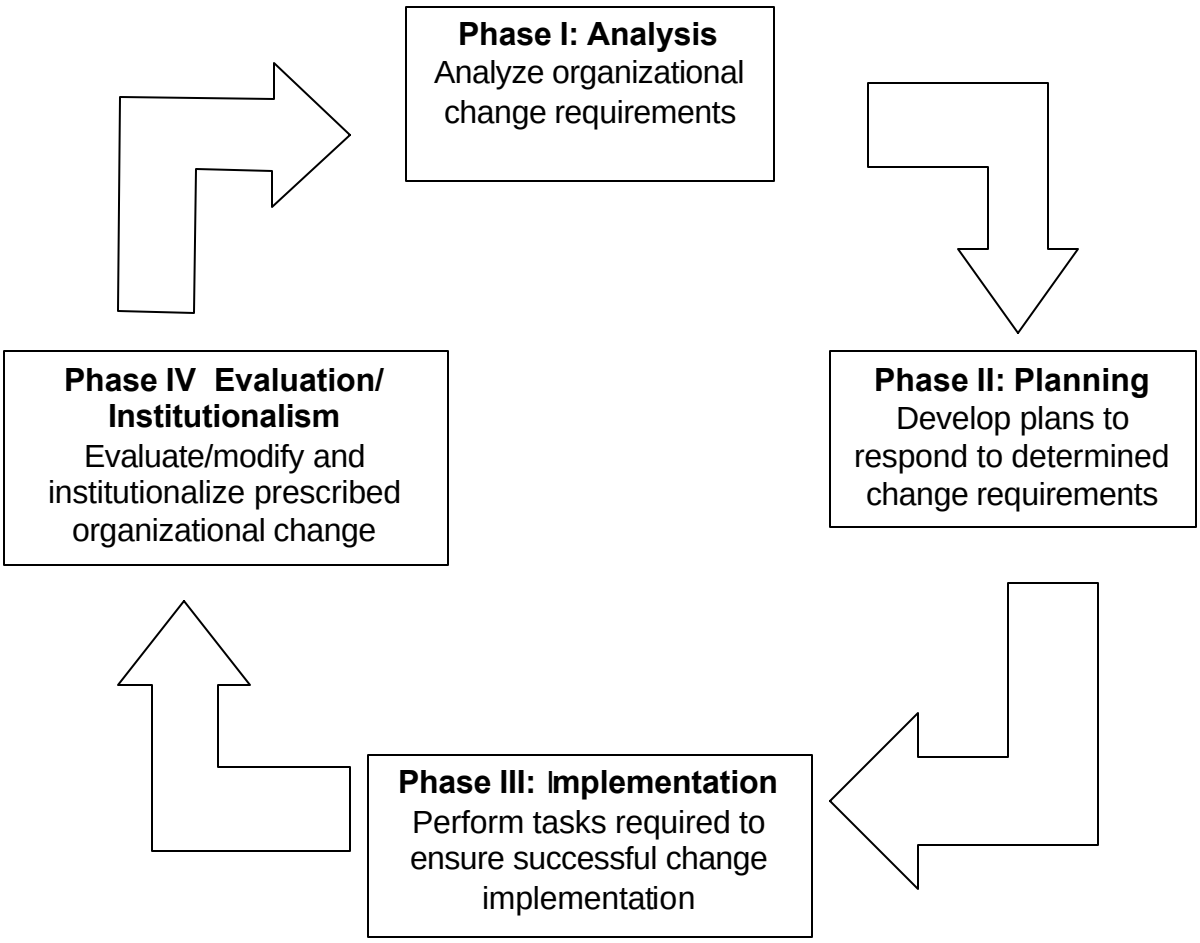
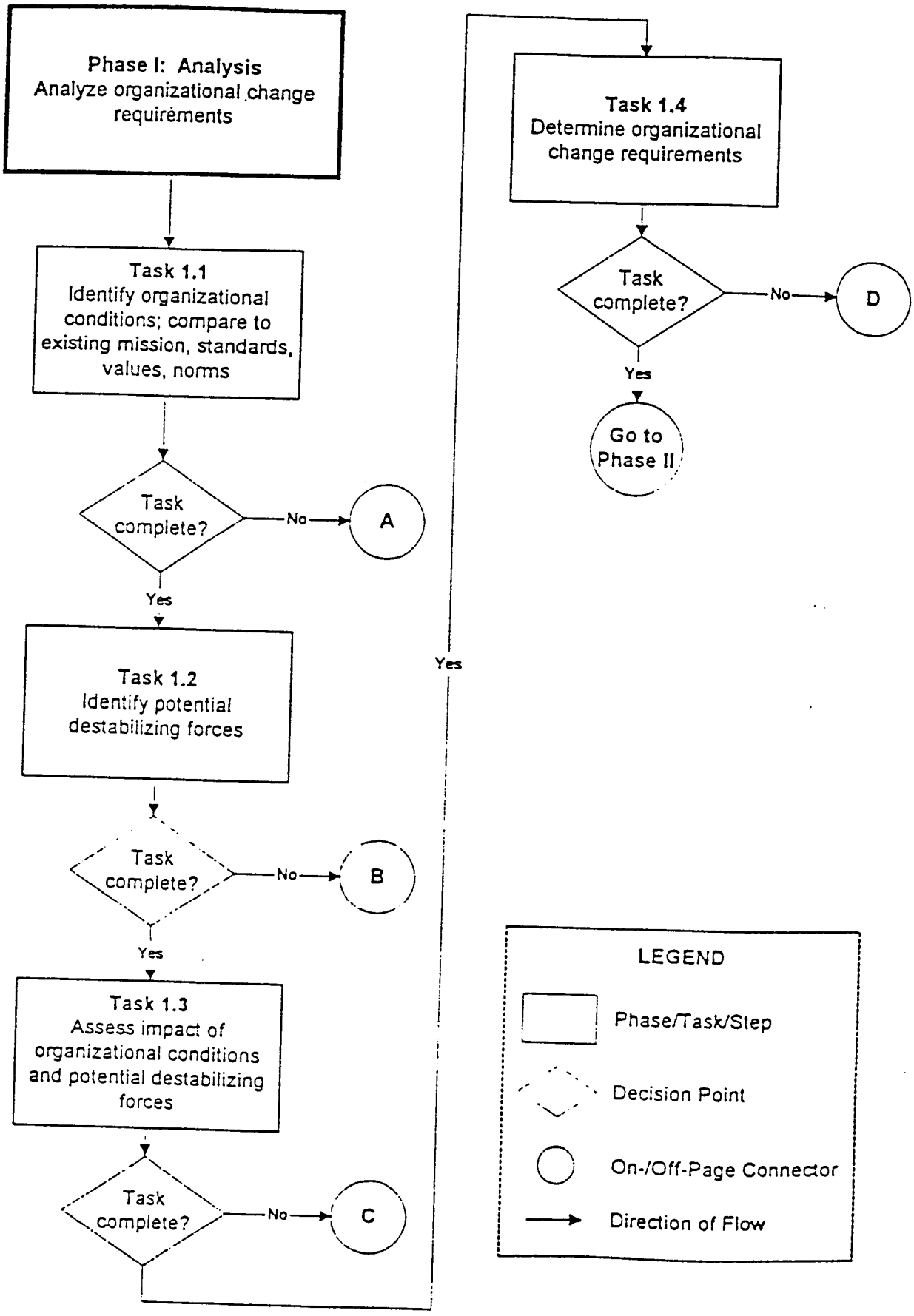
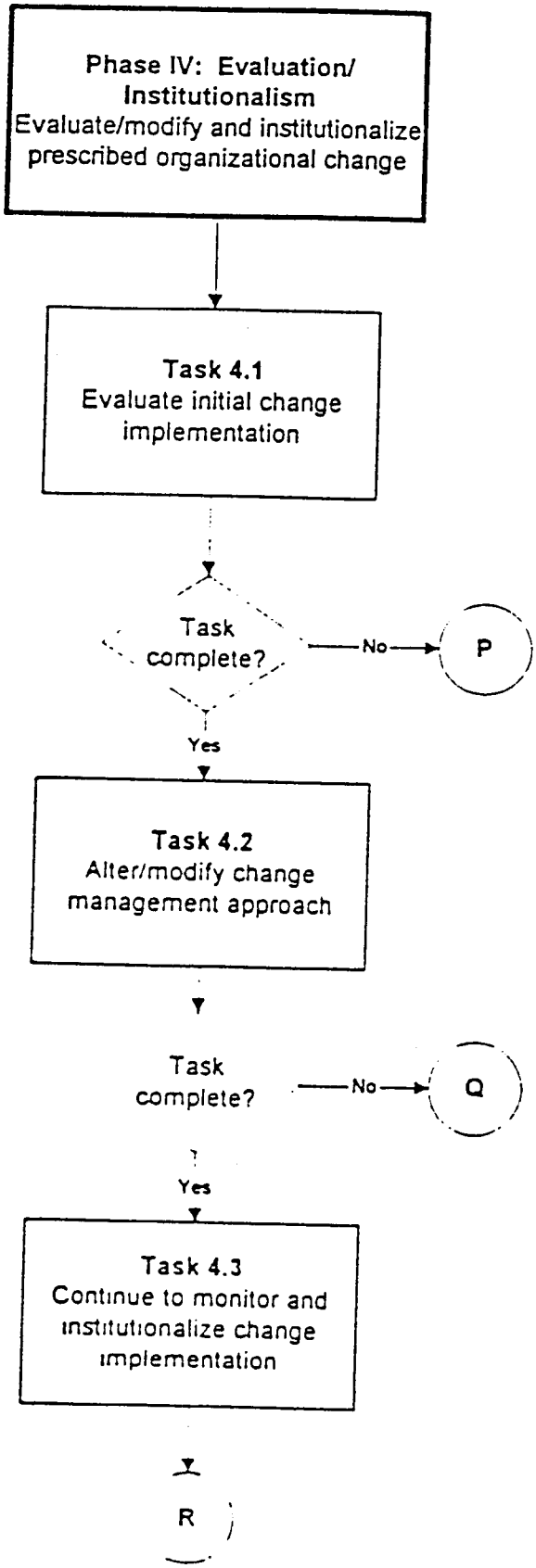
APPENDIX B - The NFA SMOC Change Management Model



APPENDIX - CHANGE MANAGEMENT MODEL



APPENDIX - CHANGE MANAGEMENT MODEL



Appendix C OSFM Occupancy Inspections and Applicable Fire Safety Rules

Table C1

1998 OSFM Fire Prevention Inspections by Occupancy Classification

Occupancy or facility classification	Inspections
Aboveground Bulk Liquid Storage Tanks	733
Aboveground Fuel Dispensing Storage Tanks	1,151
Adult Day Care Centers	95
Ambulatory Care Centers	2
Business Offices[a]	611
Child Day Care Centers	3,675
Educational Facilities[b]	753
Group and Family Day Care Homes	150
Horse Racing Tracks	217
Hospitals	44
Hotels and Motels	1,138
Industrial	33
Liquefied Petroleum Gas Tanks	155
Nursing Homes	57
Prisons	885
Public Assembly Facilities	229
Residential Buildings[c]	643
Residential Board & Care Homes	1,295

table continues

Occupancy or facility classification	Inspections
Self Service Gasoline Stations	2,325
State/County Fairs	3,647
Storage Facilities	17
Telecommunications Offices	165
Unattended Self-Service Gasoline Stations	101
Total	18,121

Note. Data from *1998 Division of Fire Prevention Annual Activity Report* (OSFM, 1999b). Adapted with permission of OSFM.

a = Business offices inspected are primarily adult vocational schools that under *LSC* classifications are designated as businesses rather than educational occupancies. b= Educational facilities includes private educational occupancies but does not include any Illinois public elementary or secondary schools. c = Residential building inspections result from requests from the Illinois Department of Human Services to inspect community integrated program locations. In accordance with *LSC* classifications, if such facilities are occupied by three or fewer residents, they are classified as Single- and Two-Family Residential occupancies rather than Residential Board and Care Homes.

Table C2

Applicable Illinois Fire Safety Laws, Rules, and Adopted Model Codes

Occupancy classification or facility type	Applicable standards
Aboveground liquid storage tanks	Title 41 IAC 160 "*Storage, Transportation, Sale and Use of Gasoline and Volatile Oils: Rules and Regulations Relating to General Storage"* and Title 41 IAC 180 *"Storage, Transportation, Sale and Use of Gasoline and Volatile Oils"*
Ambulatory health care centers	NFPA *LSC*
Business offices	NFPA *LSC*
Day care centers (adult and child)	NFPA *LSC* with Illinois modifications
Day care homes (adult and child)	NFPA *LSC* with Illinois modifications
Educational facilities	NFPA *LSC*
Hospitals	NFPA *LSC*

table continues

Occupancy classification or facility type	Applicable standards
Hotels and motels	NFPA *LSC*
Industrial	NFPA *LSC*
Liquefied petroleum gas tank installations	Title 41 IAC 200 *"Storage, Transportation, Sale and Use of Liquefied Petroleum Gas"* that adopts NFPA Standard 58 *"The LP-Gas Code"*
Mercantile	NFPA *LSC*
Nursing homes	NFPA *LSC*
Parimutuel horse racing tracks	Title 41 IAC 150 "*Race Track Rules for Fire Safety*".
Prisons	NFPA *LSC*
Residential board and care homes	NFPA *LSC*
Self-service gasoline stations	Title 41 IAC 170 *"Storage, Transportation, Sale and Use of Petroleum and Other Regulated Substances"*

table continues

Occupancy classification or facility type	Applicable standards
State and county fairs	NFPA *LSC,* NFPA Standard 102 *Grandstands, Folding and Telescopic Seating, Tents and Membrane Structures*, and cooperative agreement rules between the OSFM and the Illinois Department of Agriculture.
Storage	NFPA *LSC*
Telecommunications switching offices	Title 83 IAC Chapter I, Subchapter f, Part 785 *"Joint Rules of the Illinois Commerce Commission, the Office of the State Fire Marshal, and the Illinois Emergency Management Agency: Fire Protection and Emergency Services for Telecommunications Facilities"*
Unattended self-service gasoline stations	Title 41 IAC 170 *"Storage, Transportation, Sale and Use of Petroleum and Other Regulated Substances"*

Note. Information from Division of Fire Prevention *Policy and Procedures Manual* (OSFM, 1998). Chicago, IL. (p. 6-1 – 6-10). NFPA *LSC* is the National Fire Protection Association's *Life Safety Code*. IAC is Illinois Administrative Code.

Appendix D - Other Illinois Agencies Conducting Fire Safety Inspections

Agency	Type of occupancy regulated or inspected	Fire safety criteria or standards applied
Alcohol and Substance Abuse	Residential treatment centers, Residential substance-abuse programs	Various editions of the NFPA *LSC* and agency developed criteria
Children and Family Services	Day care centers, Day care homes Foster homes	Agency developed standards and the *State Smoke Detector Act*
Corrections	Prisons	1991 NFPA *LSC* and agency developed criteria
Human Services	Community Integrated Living Arrangements	Various editions of the NFPA *LSC* and agency developed criteria

table continues

Agency	Type of occupancy Regulated or inspected	Fire safety criteria or standards applied
Public Health	Nursing homes, Ambulatory care centers, Hospitals	Various editions of the NFPA *LSC* combined with agency directives

Note. From examination of cooperative agreements between the OSFM and other State of Illinois agencies, Illinois Administrative Codes, and Illinois Statutes. NFPA LSC = National Fire Protection Association *Life Safety Code*.

Appendix E Correlating Factors for State Fire Death Rates

Fire deaths per million people[a]	% over 25 who have a high school education[b]	% below the poverty level[c]	% over 18 who smoke[d]
Mississippi	Kentucky	Louisiana	Kentucky
Tennessee	Louisiana	New Mexico	Indiana
South Carolina	Tennessee	Mississippi	Tennessee
Wisconsin	Arkansas	Texas	Nevada
Alaska	West Virginia	West Virginia	Ohio
Louisiana	South Carolina	Kentucky	North Carolina
Georgia	Rhode Island	California	West Virginia
Arkansas	Mississippi	New York	Michigan
Alabama	Alabama	Oklahoma	Delaware
North Carolina	New Mexico	Alabama	Louisiana

table continues

Fire deaths per million people	% over 25 who have a high school education	% below the poverty level	% over 18 who smoke
Oklahoma	North Carolina	Arizona	Arkansas
Kentucky	Texas	Mississippi	Maine
Missouri	Georgia	Arkansas	Alaska
Delaware	New York	Kansas	Rhode Island
Indiana	California	Florida	Alabama

Note: Data from “Fire Loss State-by-State,” by K.L. Welch, 1999, *NFPA Fire Journal 93,* p. 106-115.

a = Data in column 1 “Fire deaths per million” in descending order. b = Data in column 2 “% over 25 who have a high school education” in ascending order. c = Data in column 3 “Percentage below the poverty level in ascending order. d = Data in column 4 “% over 18 who smoke” in ascending order.

Appendix F - Survey of State Fire Agencies

SURVEY OF STATE FIRE AGENCIES
FIRE PREVENTION/CODE ENFORCEMENT INSPECTIONS

State: _____ Agency: _____

1. Does your agency conduct fire inspections / code enforcement in occupancies?

☐ Yes ☐ No (If "No", Questions #2-7 will not apply, please proceed to Question #8).

Explain/Comment: _____
_____
_____

2. How many personnel conduct fire prevention / code enforcement inspections for your agency? _____

Explain/Comment: _____
_____
_____

3. How is it decided which occupancy classifications your agency inspects? (Check all that apply or please explain)

☐ Mandated by law
☐ Decided by agency management
☐ Interagency agreements with other state licensing agencies
☐ NFIRS database indicating a fire safety problem in a particular occupancy classification
☐ Fire incident database other than NFIRS indicating a fire safety problem in a particular occupancy classification
☐ Other

Explain/Comment: _____
_____
_____

4. Do personnel who conduct fire prevention / code enforcement inspections also share responsibility for fire investigation work?

☐ Yes ☐ No

Explain/Comment: _____
_____
_____

5. Where does your agency conduct fire prevention / code enforcement inspections in your state:

☐ **All areas of the state**
☐ **Unincorporated areas only**
☐ **Only where requested by local fire departments**
☐ **Only in areas where the local fire department has not adopted an appropriate code**
☐ **State owned buildings only**
☐ **Other**

Explain/Comment: _____
_____
_____

6. Have any different facility or occupancy types been added to, or deleted from, your regular inspection priorities during the past five years?

☐ Yes ☐ No

Explain/Comment: _____
_____
_____

7. Has your agency ever conducted a statistical analysis via NFIRS data or another fire incident database to determine the effect of code enforcement relative to the number of fires or fire casualties in particular occupancies that your agency inspects?

☐ Yes ☐ No

Explain/Comment: _____
_____
_____

8. Has your state/agency adopted any of the following model codes for enforcement on a statewide basis? (Check all that apply):

☐ NFPA 1 Fire Prevention Code (Edition: _____)
☐ NFPA 101 Life Safety Code (Edition: _____)
☐ SBCCI Standard Building Code (Edition: _____)
☐ SBCCI Standard Fire Prev. Code (Edition: _____)
☐ BOCA National Building Code (Edition: _____)
☐ BOCA Fire Prevention Code (Edition: _____)
☐ ICBO Uniform Fire Code (Edition: _____)
☐ ICBO Uniform Building Code (Edition: _____)

Explain/Comment: _____
_____
_____

9. Does your state participate in the National Fire Incident Reporting System?

☐ Our state does not formally participate in the NFIRS process
☐ Some fire departments use the NFIRS process, but state statistics are not collected
☐ Some fire departments use the NFIRS process, and fire statistics are collected by our agency
☐ All fire departments are required to use the NFIRS process, and fire statistics are collected by your agency

Explain/Comment: _____
_____
_____

10. If possible, please answer the following specific questions relative to fires in your state:

	LAST YEAR	**LAST 3 YEARS**	**LAST 5 YEARS**	**LAST 10 YEARS**
Number of Fires	_____	_____	_____	_____
Number of Fire Injuries	_____	_____	_____	_____
Number of Fire Deaths	_____	_____	_____	_____
Total Dollar Loss Due to Fire	_____	_____	_____	_____

11. If information could be provided in answer to Question #10 above, what was the source of this information:

☐ Statewide statistics based upon local fire departments reporting through the NFIRS system
☐ Statewide statistics based upon local fire departments reporting via a modified NFIRS program
☐ Statewide statistics based upon a fire reporting system particular to your state
☐ Other

Explain/Comment: _____
_____
_____

OTHER COMMENTS:

_____
_____
_____
_____
_____
_____
_____
_____

PLEASE SEE THE TABLE ON THE FOLLOWING PAGE AND SUPPLY INFORMATION IF POSSIBLE.

Survey Completed By: _____ _____ _____
Name Title Date

Fire Inspections Conducted by Your Agency

Occupancy Type	Check if inspections are conducted (Blank = No)	Frequency of inspection **A** = Annual **S** = Semi-Annual **T** = Every Two Years **Other** – Write in	Number of occupancies of this type inspected annually by your agency	Number of annual fires in this occupancy classification in your state	Number of annual fire deaths in this occupancy classification in your state
Self Service Gasoline Stations	☐				
Unattended Self Service Stations	☐				
Liquefied Petroleum Gas Tanks	☐				
Aboveground Flammable Liquid Tanks	☐				
Underground Flammable Liquid Tanks	☐				
Day Care Centers	☐				
Day Care Homes	☐				
Prisons	☐				
Telecommunications Offices	☐				
Residential Board & Care Homes	☐				
Nursing Homes	☐				
Hospitals	☐				
Apartments	☐				
Single/Two Family Dwellings	☐				
Elementary Schools	☐				
Secondary Schools	☐				
Adult Education Facilities	☐				
Industrial Occupancies	☐				
College Classrooms	☐				
College Dormitories	☐				
College Fraternity / Sorority Houses	☐				
Public Assembly					
Convention & Trade Centers	☐				
Sports Stadiums	☐				
Restaurants	☐				
Movie Theaters	☐				
Horse Racing Tracks	☐				
Auto Racing Tracks	☐				
Other:	☐				

APPENDIX G - Cover Letter For State Fire Agency Survey

May 12, 1999

NAME
AFFILIATION/POSITION
ADDRESS
CITY, STATE, ZIP

To Whom It May Concern,

I am employed by the Office of the Illinois State Fire Marshal as a fire protection engineer. I am also a student in the National Fire Academy's Executive Fire Officer Program (EFOP). To fulfill a requirement for the completion of the program, as well as supply the Illinois OSFM with necessary information, I am conducting research relative to (a) how state fire agencies determine the types of occupancies in which they conduct code enforcement inspections, and (b) the effect on overall fire safety of fire prevention code enforcement inspections in various occupancies. As part of this effort, **I am requesting your agency's assistance by completing the attached survey form.**

I am especially interested in whether your agency uses the National Fire Incident Reporting System (NFIRS) or other quantitative database to prioritize the types of occupancies where inspection efforts are concentrated. Subsequently, I am attempting to determine if there is an identifiable relation between fire prevention code enforcement inspections and reductions in the number of fires or fire deaths in particular occupancies.

It is the intent of my research to identify the type of inspection work being conducted in other states, and assist the Office of the Illinois State Fire Marshal in determining appropriate types and frequency of fire prevention code enforcement inspections to have the maximum effect on reducing Illinois' fire incident and fire death rate.

To this end, I Would appreciate your assistance in completing the enclosed survey.

I have enclosed a stamped pre-addressed envelope and I would appreciate it if you would return the enclosed survey to me. If the self-addressed label has in some manner been damaged or removed from the envelope, please return the information to:

Kenneth Wood
Office of the State Fire Marshal
100 West Randolph Street Suite 11-800
Chicago, IL 60601

I appreciate your assistance with this project. If you feel that it would be beneficial to contact me via telephone, fax, or e-mail, those numbers are indicated below.

Respectfully,

Kenneth Wood, P.E.
Fire Protection Engineer
Division of Fire Prevention

Phone: 312/814-3456
Fax: 312/814-3459
e-mail: Kwosfm@aol.com

APPENDIX H Follow-up Cover Letter to Survey Non-respondents

July 15, 1999

NAME
AFFILIATION/POSITION
ADDRESS
CITY, STATE, ZIP

To Whom It May Concern,

In May of this year I forwarded correspondence to your agency that included a survey pertaining to the rules and procedures of your state applicable to residential home day care occupancies. **As of this date no response has been received.** In the event that the original mailing was misplaced, I have enclosed another blank copy of the survey.

As with the original mailing, I have enclosed a stamped, self-addressed envelope for return of the survey. Also, I have also enclosed the original correspondence that explains my work in depth, and offers contact numbers if necessary.

I appreciate your agency's assistance with the matter and look forward to receiving your reply.

If the self-addressed label has in some manner been damaged or removed from the envelope, please return the information to:

Kenneth Wood
Office of the State Fire Marshal
100 West Randolph Street Suite 11-800
Chicago, IL 60601

Respectfully,

Kenneth Wood
Fire Protection Engineer
Division of Fire Prevention

Phone: 312/814-3456
Fax: 312/814-3459
e-mail: Kwosfm@aol.com

Appendix I TenYear Illinois Fire Experience by Occupancy Classification

Occupancy or facility classification	Fires	Deaths	Injuries	$ Loss (000)[a]	Deaths per fire (x 1,000)	Injuries per fire (x 1,000)	$ Loss per fire[a]
Aboveground Storage Tanks	121	0	5	6,221	0.00	41.32	51,415
Adult Education Facilities	134	0	6	267	0.00	44.78	1,992
Apartments	66,847	531	4,060	320,714	7.94	60.74	4,797
Business Offices	3,288	3	70	33,332	0.91	21.29	10,137
College Classrooms	549	0	10	1,845	0.00	18.21	3,362
College Dormitories	881	0	41	785	0.00	46.54	890
College Fraternities/Sororities	270	0	19	1,212	0.00	70.37	4,487
Convention and Trade Centers	103	0	4	978	0.00	38.83	9,494
Day Care Centers	166	0	6	235	0.00	36.14	1,413
Elementary Schools	2,568	0	62	3,167	0.00	24.14	1,233
Hospitals	1,560	2	114	4,623	1.28	73.08	2,963
Hotels and Motels	2,134	33	234	13,647	15.46	109.65	6,394
Industrial Occupancies	7,741	8	528	186,428	1.03	68.21	24,083

table continues

Occupancy or facility classification	Fires	Deaths	Injuries	$ Loss (,000)	Deaths per fire (x 1,000)	Injuries per fire (x 1,000)	$ Loss per fire
Liquefied Petroleum Gas Tanks	11	0	2	121	0.00	181.82	11,002
Long-Term Hotels and Motels	129	0	7	251	0.00	54.26	1,947
Mentally Handicapped Institutions	487	0	17	412	0.00	34.91	846
Movie Theaters	64	0	2	119	0.00	31.25	1,868
Nursing Homes	1,471	1	225	2,321	0.68	152.96	1,578
Prisons	301	0	23	1,283	0.00	76.41	4,262
Residential Board and Care	224	3	17	1,740	13.39	75.89	7,768
Restaurants	5,964	20	106	69,399	3.35	17.77	11,636
Self Service Gasoline Stations	4,321	5	41	14,626	1.16	9.49	3,384
Secondary Schools	1,297	0	104	6,967	0.00	80.19	5,371
Single- Two-Family Dwellings	128,961	1,031	5,503	1,753,047	7.99	42.67	13,593
Sports Stadiums	215	1	1	1,057	4.65	4.65	4,916
Storage Occupancies	35,945	32	400	310,071	0.89	11.13	8,626
Telecommunication Offices	46	0	4	567	0.00	86.96	12,328

table continues

Occupancy or facility classification	Fires	Deaths	Injuries	$ Loss (,000)	Deaths per fire (x 1,000)	Injuries per fire (x 1,000)	$ Loss per fire
Unattended Self Service Stations	176	1	5	1,034	5.68	28.41	5,878
Total	35,945	1,671	11,616	2,736,471	6.28	43.67	10,288

Note. From data provided to the OSFM through the IFIRS from 1989 through 1998 inclusive.

a = Data in column 4 “$ Loss” and column 8 “$ Loss per fire” represent actual dollars and are not adjusted for inflation.

APPENDIX J - Results of Surveys of State Fire Agencies

Table J1

State Inspection Programs and Data Collection Systems

State	Does state agency conduct inspections?[a]	Number of inspection personnel	How is it decided what to inspect?[b]	Where does agency conduct inspections?[c]	Have occupancy types that are inspected been modified in last 5 years?[d]	Have NFIRS statistics been used to study the effect of inspections?[e]	Does the state participate in the NFIRS?[f]
Alabama	Y	15	B[g]	A	N	N	PC
Alaska	Y	10	B, C	D	Y	Y	A
Arizona	Y	14	A	E[h]	N	N	P
Arkansas	Y	25	A,B	A	N	N	A
California	-	-	-	-	-	-	-
Colorado	Y	2	A	O[i]	N	N	PC
Connecticut	Y	12	A,B,C	C,E	N	Y	A
Delaware	-	-	-	-	-	-	-
Florida	Y	28	A,C	E	Y	Y	PC

table continues

State	Does state agency conduct inspections?	Number of inspection personnel	How is it decided what to inspect?	Where does agency conduct inspections?	Have occupancy types that are inspected been modified in last 5 years?	Have NFIRS statistics been used to study the effect of inspections?	Does the state participate in the NFIRS?
Georgia	Y	21	A	A	Y[j]	N	PC
Hawaii[k]	Y	10	A	A	Y	N	A
Idaho	Y	4	O[l]	A,C	N	N	A
Illinois	Y	25	A,B,C	A	N	N	A[m]
Indiana	Y	24	A	A	Y	N	A
Iowa	Y	12	A, C	A	Y	N	A
Kansas	Y	16	A,B,C	D[n]	N	Y	A
Kentucky	-	-	-	-	-	-	-
Louisiana	Y	72	A,B,C	A	N	N	N
Maine	Y	6	A,C	A	Y	N	A

table continues

State	Does state agency conduct inspections?	Number of inspection personnel	How is it decided what to inspect?	Where does agency conduct inspections?	Have occupancy types that are inspected been modified in last 5 years?	Have NFIRS statistics been used to study the effect of inspections?	Does the state participate in the NFIRS?
Maryland	Y	32	A,B,C,D [o]	A	Y	N	A
Massachusetts	Y	6	A	A	N	N	A
Michigan	Y	22	A,C	A	N	N	A
Minnesota	Y	31	A,C[p]	A	N	Y	A
Mississippi	Y	15	A	C,E	N	N	PC
Missouri	Y	12	A,C	A	Y	N	N
Montana	Y	10	A,B,C	D	N	N	A
Nebraska	Y	30	A,B,C	A	N	Y[q]	A
Nevada	Y	9	A,C	A	N	N	PC
New Hampshire	Y	12	A,B	A	N	N	A
New Jersey	-	-	-	-	-	-	-

table continues

State	Does state agency conduct inspections?	Number of inspection personnel	How is it decided what to inspect?	Where does agency conduct inspections?	Have occupancy types that are inspected been modified in last 5 years?	Have NFIRS statistics been used to study the effect of inspections?	Does the state participate in the NFIRS?
New Mexico	Y	7	A	A	N	N	PC
New York	-	-	-	-	-	-	-
North Carolina[r]	N						PC
North Dakota	Y	6	A,B,C	O[s]	Y	N	P
Ohio	Y	24	A,B,D	A,E	N	Y[t]	A
Oklahoma	Y	9	A,B,C	A	Y	Y	A
Oregon	Y	19	A	A	N	Y	N
Pennsylvania	N						-
Rhode Island	-	-	-	-	-	-	-
South Carolina	-	-	-	-	-	-	-
South Dakota	Y	8	A,B,C	O[u]	N	N	A

table continues

State	Does state agency conduct inspections?	Number of inspection personnel	How is it decided what to inspect?	Where does agency conduct inspections?	Have occupancy types that are inspected been modified in last 5 years?	Have NFIRS statistics been used to study the effect of inspections?	Does the state participate in the NFIRS?
Tennessee	Y	23	A,B,C	A	N	N	PC
Texas	-	-	-	-	-	-	-
Utah	Y	5	A	O[v]	N	N	PC
Vermont	-	-	-	-	-	-	-
Virginia	-	-	-	-	-	-	-
Washington	Y	9	A,C	A	Y	Y	N
West Virginia	Y	20	A	A	N	Y	A
Wisconsin	Y[w]	5	A	A	N	N	PC
Wyoming	Y	9	A,B,C,D	A	Y	Y	PC

Note. All data from 1999 survey of state fire authorities by author. A "-" represent unreported data. Blank spaces represent data that is not applicable.

table continues

a = In reference to column 2 “Does state agency conduct inspections?”: Y = Yes, N = No. b = In reference to column 4 “How is it decided what to inspect?”: A = mandated by law. B = decided by agency management. C = interagency agreements with other state licensing agencies. D = NFIRS database indicating a fire safety problem in a particular occupancy classification. E = fire incident database other than NFIRS indicating a fire safety problem in a particular occupancy classification. O = other. c = In reference to column 5 “Where does agency conduct inspections?”: A = all areas of the state. B = unincorporated areas only. C = only where requested by local fire departments. D = only in areas where the local fire department has not adopted an appropriate code. E = in state owned buildings only. O = other. d = In reference to column 6 “Have occupancies that are inspected been modified in last 5 years?: Y = yes. N= no. e = In reference to column 7 “Have NFIRS statistics been used to study the effect of inspections?”: Y = yes. N = no. f = In reference to column 8 “Does the state participate in the NFIRS?”: A = all fire departments required to participate. P = partial participation by some of the fire departments in the state but data is not collected. PC = partial participation by some of the fire departments in the state and data is collected by the state agency. N = no, the state does not participate. g. Alabama conducts inspections based upon specific requests or complaints. h. Arizona also conducts inspections in county buildings and public schools. i. Colorado conducts inspections in 3 state regulated gaming casinos and in areas of the state without certified inspectors. j. Georgia added fire extinguisher service companies to the occupancy inspection list in the last 5 years as the result of new legislation. k. Hawaii’s survey was completed by the Honolulu Fire Department , which serves 73.3% of the state’s population. There is no formal state fire agency in Hawaii. l. Idaho conducts inspections

table continues

in all areas of the state if requested by a local fire department – except in single- and two-family dwellings. m. Illinois law requires all local fire departments to report NFIRS statistics to the OSFM, however the law is not enforced and not all departments report. n. Kansas will also conduct inspections in any area at the request of the local fire department. o. In Maryland, complaints receive priority for inspections. p. Minnesota also conducts inspections based upon complaints and inspections of fire suppression systems in areas without municipal authority. q. Nebraska answered “Yes” pertaining to use of NFIRS, but added - not extensively. r. North Carolina’s State Fire Marshal’s office does not conduct inspections. Local fire departments are empowered to do inspections. s. North Dakota conducts inspections in some state buildings, and also in schools and places of public assembly. t. Ohio indicated that NFIRS statistics have been used for legislative study purposes. u. South Dakota conducts inspections in all areas of the state, but only specific occupancies: schools, day care centers, prisons, aboveground fuel and LP-gas storage sites. v. Utah conducts inspections in all areas of the state, but only specific occupancies: state buildings, colleges and universities, schools, hospitals and at the request of local fire departments. w. Wisconsin does not conduct field inspections except for new construction of limited occupancy classifications. The state provides funding support for local fire departments to conduct inspections.

Table J-2

State-by-State Frequency of Occupancy Inspections

State	Self-service stations	LP-Gas tanks	Aboveground tanks	Day care centers	Day care homes	Prisons	Telecommunications	Board and care	Nursing homes	Hospitals	Apartments	Single/Two family	Elementary schools	Secondary schools	Adult education	Industrial	College classrooms	College dormitories	College frat/sororities	Convention centers	Sports stadiums	Restaurants	Movie theaters	Horse racing tracks
Alabama	C	N	C	C	C	A	C	R	R	R	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Alaska	N	N	N	T	T	T	N	T	T	T	T	N	T	T	N	N	N	T	N	N	N	T	T	N
Arizona	N	I	I	N	N	A	N	N	N	N	N	N	A	A	N	N	A	A	A	N	N	N	N	N
Arkansas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
California	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colorado	O	O	O	N	N	N	N	N	O	O	N	N	O	O	N	N	N	N	N	N	N	N	N	N
Connecticut	-	-	-	A	A	A	-	A	A	A	A	-	T	T	T	-	-	A	A	D	D	D	D	-

table continues

State	Self-service stations	LP-Gas tanks	Aboveground tanks	Day care centers	Day care homes	Prisons	Telecommunications	Board and care	Nursing homes	Hospitals	Apartments	Single/Two family	Elementary schools	Secondary schools	Adult education	Industrial	College classrooms	College dormitories	College frat/sororities	Convention centers	Sports stadiums	Restaurants	Movie theaters	Horse racing tracks
Delaware	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Florida	N	N	N	N	N	A	N	A	N	N	N	N	N	N	N	A	A	A	N	N	N	N	N	N
Georgia	A	A	A	N	N	B	N	I	I	I	I	N	I	I	I	I	I	I	I	I	I	I	I	N
Hawaii[a]	T	N	N	T	T	T	T	A	T	T	T	N	A	A	T	T	T	T	T	T	T	T	T	N
Idaho	N	N	C	C	C	C	N	C	N	C	N	N	C	C	C	N	N	N	N	N	N	N	N	N
Illinois	A	I	I	A	R	A	A	R	R	R	C[b]	N	N	N	A	C	C	N	N	C	C	C	C	A
Indiana	C	C	C	A	N	A	E	C	T	T	E[c]	N	A	A	E	E	E	E	E	A	A	E	A	A
Iowa	C	C	C	A	N	A[d]	N	S	A	R	C	N	T	T	N	N	T	T	T	C	C	C	C	C
Kansas	S	S	S	A	S	A	N	A	A	A	N	N	A	A	A	N	A	A	N	N	N	N	N	N
Kentucky	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

table continues

State	Self-service stations	LP-Gas tanks	Aboveground tanks	Day care centers	Day care homes	Prisons	Telecommunications	Board and care	Nursing homes	Hospitals	Apartments	Single/Two family	Elementary schools	Secondary schools	Adult education	Industrial	College classrooms	College dormitories	College frat/sororities	Convention centers	Sports stadiums	Restaurants	Movie theaters	Horse racing tracks
Louisiana	I	-	I	A	A	B	C	A	A	A	C	-	A	A	A	C	A	A	A	C	C	C	C	C
Maine	C	N	I	A	T	D	N	A	A	A	N	N	N	N	N	N	N	N	N	N	N	N	A	N
Maryland	R	R	R	A	A	A	N	A	A	A	N	N	A	A	A	N	A	A	A	A	A	A	A	A
Massachusetts	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Michigan	N	N	N	N	N	I	N	S	A	A	N	N	I	I	I	N	I	N	N	N	I	N	N	N
Minnesota	N	N	I	R	R	A	N	A	A	A	N	N	D	D	N	N	N	N	N	N	N	N	N	N
Mississippi	N	S	N	R	R	S	N	R	R	N	N	N	R	R	N	N	R	R	N	N	N	N	N	N
Missouri	N	N	N	A	A	S	N	N	A	A	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Montana	S	S	S	A	A	A	S	A	A	S	S	S	A	A	A	S	S	S	S	S	S	S	S	N
Nebraska	S	S	A	B	B	A	E	B	A	A	E	N	E	E	E	E	E	E	E	E	E	E	E	E

table continues

State	Self-service stations	LP-Gas tanks	Aboveground tanks	Day care centers	Day care homes	Prisons	Telecommunications	Board and care	Nursing homes	Hospitals	Apartments	Single/Two family	Elementary schools	Secondary schools	Adult education	Industrial	College classrooms	College dormitories	College frat/sororities	Convention centers	Sports stadiums	Restaurants	Movie theaters	Horse racing tracks
Nevada[e]	A	A	A	A	A	A	N	A	A	A	N	N	A	A	A	A	A	A	N	A	N	A	A	N
New Hampshire	S	S	S	S	S	S	S	S	S	S	S	N	S	S	S	S	S	S	S	S	S	S	S	S
New Jersey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Mexico	N	N	S	S	S	S	N	S	S	S	S	N	S	S	S	S	S	S	S	S	S	S	N	S
New York	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Carolina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Dakota	N	I	T	C	C	N	N	N	N	N	N	N	D	D	N	N	N	N	N	N	N	N	E	N
Ohio	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oklahoma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

table continues

State	Self-service stations	LP-Gas tanks	Aboveground tanks	Day care centers	Day care homes	Prisons	Telecommunications	Board and care	Nursing homes	Hospitals	Apartments	Single/Two family	Elementary schools	Secondary schools	Adult education	Industrial	College classrooms	College dormitories	College frat/sororities	Convention centers	Sports stadiums	Restaurants	Movie theaters	Horse racing tracks
Oregon	A	I	I	A	C[f]	A	N	A	A	A	N	R[g]	T	T	T	A	T	T	N	A	A	A	A	A
Pennsylvania[h]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhode Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Carolina	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota	N	S	S	S	N	S	N	N	N	N	N	N	S	S	N	N	N	N	N	N	N	N	N	N
Tennessee	-	I	-	A	A	A	-	A	-	-	C	-	E	E	A	-	C	C	C	-	-	-	-	-
Texas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Utah[i]	N	N	N	N	N	C	N	N	N	C	N	N	C	C	C	N	C	C	N	N	N	N	N	N
Vermont	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

table continues

State	Self-service stations	LP-Gas tanks	Aboveground tanks	Day care centers	Day care homes	Prisons	Telecommunications	Board and care	Nursing homes	Hospitals	Apartments	Single/Two family	Elementary schools	Secondary schools	Adult education	Industrial	College classrooms	College dormitories	College frat/sororities	Convention centers	Sports stadiums	Restaurants	Movie theaters	Horse racing tracks
Virginia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Washington	N-	N	N	I	N	N	N	A	A	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
West Virginia	N	N	C	A	A	T	N	A	A	A	C	N	A	A	N	C	C	C	C	N	N	C	C	N
Wisconsin[j]	A	A	A	A	A	A	A	A	A	A	A	N	A	A	A	A	A	A	A	A	A	A	A	A
Wyoming	N	N	A	A	N	A	N	N	N	N	N	N	A	A	A	N	A	A	N	I	I	I	I	-

Note. Data are from 1999 survey of state fire authorities by author. A = inspections conducted annually. B = inspections conducted semi-annually. C = inspections conducted upon receipt of complaint. I = inspection conducted upon installation or new construction only. D = inspections conducted every three years. E = inspections conducted as time permits – not according to any predetermined frequency. N = inspections are not conducted in this occupancy classification. R = inspection conducted upon request from another state licensing agency. O = inspections are conducted by other state

table continues

agencies. S = survey indicated that inspections are conducted, however frequency was not given. T = inspections conducted every two years. V = random or spot-check inspections are conducted but not according to any pre-determined frequency. A "-" represents unreported data. Blank spaces indicate information that is not applicable.

a. Hawaii's survey was completed by the Honolulu Fire Department that serves 73.3% of the state's population. There is no formal state fire agency in Hawaii. b. Only the common areas of apartment buildings are inspected in Indiana. c. Only the common areas of apartment buildings are inspected in Illinois when a complaint arises. Adopted criteria are applicable only as recommendations, not required standards, in individual living units. d. Prisons are inspected in Iowa every 18 months. e. The Nevada State Fire Marshal's Office also inspects all casinos on an annual basis. f. Day care homes receive consultations, not code enforcement inspections in Oregon. g. Single- and two-family residences will be inspected upon request in Oregon. h. Pennsylvania does not conduct inspections of occupancies. i. The "C" in Utah's survey results represents "upon complaint" as it does elsewhere in this table. However, Utah's written explanation indicated that these occupancy classifications may also be done upon new construction or remodeling. j. The state of Wisconsin does not conduct field inspections except for new construction of limited occupancy classifications. The state provides funding support for local fire departments to conduct inspections. Wisconsin law requires that local fire departments annually inspect all occupancy classifications listed.