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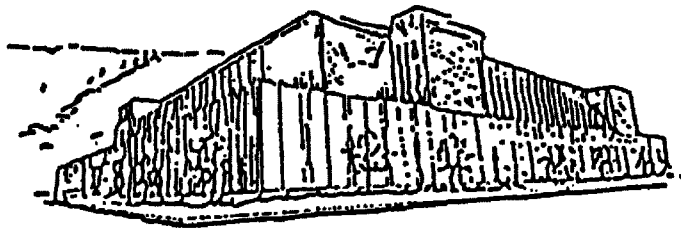
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**ASSESSING THE NEED FOR A NATIONWIDE LICENSING PROGRAM
FOR FIRE PROTECTION EQUIPMENT**

by

Anita Holoubek Varone

B.S. Eastern Montana College, 1974

presented in partial fulfillment of the requirements

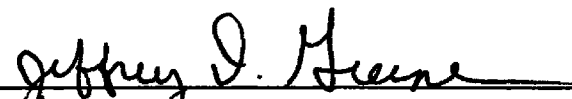
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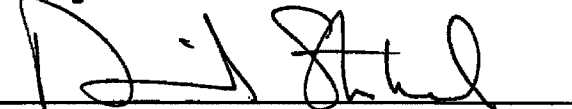
Master of Public Administration

University of Montana

1995

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TABLE OF CONTENTS

Chapter I - Introduction

Statement Of The Problem 1

State Licensing Program Characteristics and
Problems 11

Inconsistent Language Between States 12

The Difficulty of Understanding State Regulations 13

Are Regulations Enforced and Do They Assure
Competence? 16

Methodology 18

Chapter II - Data Assessment

Equipment Failure Rates 24

Fatality and Injury Rates 26

Chapter III - Summary, Recommendations, and Conclusion

Summary 29

Recommendations 31

Conclusion 33

Appendix 1 - Request For Information 35

Appendix 2 - Detector Performance In Structure Fires -
1992 (By state) 36

Appendix 3 - Sprinkler Performance in Structure Fires -
1992 (By state) 37

Appendix 4 - Fatality Rate By State - 1992 38

Appendix 5 - Injury Rate By State - 1992 39

Bibliography 40

LIST OF TABLES

Table

1.1	State Regulation Status	21
2.1	Detector Performance - 1992	25
2.2	Sprinkler Performance - 1992	25
2.3	Fatalities 1992	26
2.4	Injury Rate - 1992	26
2.5	Summary of Findings	28

CHAPTER I
INTRODUCTION

Statement Of The Problem

No national program for fire protection equipment licensing currently exists. Each state has decided for itself whether to license fire protection equipment and what regulations to impose. Although state bureaus have been in existence since the turn of the century, regulation of fire protection equipment and the people that install and service the equipment is relatively new. For example, in 1911 the Montana legislature created an office of the state fire marshal but did not give it the authority to regulate fire protection equipment.¹ The statute imposed a tax on fire insurance companies doing business in the state of one percent "on the fire portion of the direct premiums on such risks received during the calendar year next preceding after deducting cancellations and return premiums".² The revenues were earmarked to maintain the State Fire Marshal Fund.

The duties and responsibilities of the bureau expanded considerably through the years. Original investigative responsibilities were increased to include inspection, code development and adoption, code interpretation, fire

¹En.Sec.1, Ch.148, L.1911, Montana Codes Annotated.

²Sec. 50-3-109, 1993, Montana Codes Annotated.

investigation and inspection, fire prevention, and fire information collection programs. In 1967, the Fire Marshal Bureau was statutorily mandated to create, regulate, and manage a fire protection licensing program.³ The program initially served four regulatory functions:

1. It required businesses that sold fire extinguishers to purchase a sales permit.
2. It required all businesses involved in selling fire protection equipment, of any kind, to purchase a license. The application for the license reported kind(s) of fire protection the company was engaged in (i.e., service and/or installation of fire sprinkler systems, fire suppression systems, and fire alarm systems).
3. It required individuals to pass tests devised by the Fire Marshal Bureau staff. Tests were developed for many aspects of fire protection including installation and service. For example, if an individual installed and/or serviced hood suppression systems in restaurants, they were required to pass a specific test designed for that type of equipment. If an individual was in the business of installing and servicing fire sprinkling systems in schools, a test was designed for that type of equipment. Once the test was passed, the individual was issued a Certificate of Registration. No specific training or education was required. On-the-job training was not considered - an individual could actually walk off the street, with no training, pass the test and be licensed to install the product. Product knowledge played no part in the process.
4. It required facility inspection and made provision for suspension, revocation, or fines for those that failed to comply with the rules.

Businesses were required to renew their licenses and sales permits every two years. Continuing education was not

³En.82-1202.1 by Sec. 3, Ch.229, L. 1967, Montana Codes Annotated.

required once a Certificate of Registration was issued although the Uniform Fire Codes, revised every three years, regulates installation and service of all fire protection equipment products sold in the United States.⁴

Initially, the program was seriously mismanaged. Businesses were not inspected to assure that appropriate equipment was installed or that the business was an authorized dealer of any product. Subsequent to the issuance of a license and sales permit, the business was allowed to maintain, purchase, sell, and operate as it saw fit. Complaints were frequent but rarely investigated. Although renewal was required every two years, no procedure or policy was established to monitor the renewal process. From 1972 to 1993 no business was contacted or reviewed to assure compliance⁵.

For more than twenty years individuals carrying a Certificate of Registration were given free reign to install and service equipment. Even though technology advanced through the years, no additional training or testing was required. In many cases fire protection equipment has advanced so significantly that formal education is necessary for an individual to correctly install or service the product.

⁴Uniform Fire Code (International Fire Code Institute, 1991 Edition), iii.

⁵Department of Justice, Office of the Fire Prevention and Investigation Bureau, personal research conducted by the author of documents and logs, 1972-1993.

Furthermore, a Certificate of Registration was issued only once. Renewal consisted of submitting \$5 along with perfunctory information (i.e., change in address, physical characteristic changes, or employer changes).⁶

Testing became a major factor in mismanagement. The original tests were never updated to include code revisions or address new technological developments. Consequently, by 1976 the tests being used were obsolete. Most individuals failed to pass the first time the tests were taken because they were based on outdated standards.

It is important to recognize the mind-set of the fire service during this period. The general rule was to "put the wet stuff on the red stuff" and to catch the individuals that set fires. Licensing, inspection, and prevention were not viewed as positive deterrents to fires. Deputy State Fire Marshals in Montana were encouraged to channel their energies toward investigation, arrest, arraignment, and conviction of arsonists. Other mandated responsibilities were largely ignored.⁷

Although mandated in the statute, licensing and facility inspections were not given a high priority. Montana State

⁶Certificate of Registration Renewal, 1992, Montana Fire Prevention and Investigation Bureau, Montana Department of Justice, Helena.

⁷Nevada State Fire Marshal Ray Blehm, (Montana State Fire Marshal 1988-1992, City of Billings, Montana Fire Marshal 1970-1988, interview by author, 27 May 1994, Helena, telephone interview.

Fire Marshals did not encourage staff to prepare or present prevention programs. Regulating the license program and monitoring the efficacy of suppression systems was simply not done. As a result, schools, prisons, state buildings, day care centers, homes for the developmentally disabled, and university buildings were rarely inspected for compliance. It was not unusual for a facility to go without inspection for more than twenty years. Many fire protection systems were installed that never functioned properly. Although the Department of Commerce Building Codes Bureau inspected new construction, existing buildings and new buildings not in the jurisdiction of the state or city/county law were not monitored.⁸

Montana became a mecca for fire protection businesses due to the lack of governmental enforcement. In more than twenty years few licenses, certificates of registration, or sales permits were suspended or revoked. Businesses operated in Montana that were not licensed or certified. Other business persons travelled through Montana with no fear of enforcement. They were confident they could operate without interference from the government⁹.

⁸Sec. 50-60-201 through 50-60-302, 1993, Montana Code Annotated.

⁹Personal knowledge of the author based on documents and log research in the office of the Fire Prevention and Investigation Bureau.

The most common group of operators that travelled through the state were known as "rag and taggers". These people sold, installed, and serviced portable fire extinguishers. They would go into a business (or door to door) selling their wares. They placed extreme competitive pressure on long-established entities by under cutting all local fire protection dealers. They serviced fire extinguishers in their vans. The gold service included discharging the old chemical, checking for leaks, pressurizing, and recharging. The actual service included wiping off the outside of the extinguisher, changing and updating the tag to indicate service had been completed, and rehangng. No service took place.¹⁰

These operators spent approximately a week in one location and then moved on. By the time it was discovered that an extinguisher was inoperable, the service provider could not be located. Not only did property loss result but injury and death was also a consequence of this deceitful practice.

During the 1970's the consequences of fire and potential prevention programs became a national issue with the publication of a study ordered by Congress. America Burning (1973) addressed the fire problem in the United States. As a result of the study, the National Fire Information Council

¹⁰Nevada State Fire Marshal Ray Blehm, (Montana State Fire Marshal 1988-1992, City of Billings, Montana Fire Marshal 1970-1988), interview by author, 27 May 1994, Helena, telephone interview.

(NFIC) was formed and directed to collect national data on all fires that occur in the country.¹¹ Although not federally mandated, the program was widely endorsed. More than forty states currently participate in the program and submit data to the NFIC.

The data base grew through the years. Researchers at the United States Fire Administration began studying trends based on annual information. It became apparent that a need existed for more comprehensive and regulated inspection and more effective licensing programs. Over the last twenty years state fire marshals and the fire services began to realize that inspection and licensing needed to be addressed. However, their role as "hero" in the physical sense was widely revered and protected. They were not eager to become inspectors -- the prospect was demeaning to career firefighters and supervisors alike. They relished their national image of running through flames and emerging unscathed. Acknowledging and accepting responsibility for prevention was difficult for the fire service¹².

Recognizing that licensing was a necessary component to assure fire protection, the Montana Legislature enacted

¹¹America Burning (National Commission on Fire Prevention and Control, 1973), citing National Workshop - Tyson's Corner, Virginia, America Burning Revisited (Federal Emergency Management Agency, United States Fire Academy, 1987).

¹²Department of Justice, Office of the Fire Prevention and Investigation Bureau, personal research conducted by the author and experience.

statutes to provide development and administration for a licensing program in 1993. The Montana fire service was no different than most other states. They resented the notion that statistics proved the need for anything. They believed that fire was inevitable and that their sole purpose was to douse flames and pull bodies -- living and dead -- from the rubble. They did not support the idea of any kind of licensing program.¹³

The Montana Fire Marshal Bureau developed the licensing program because they were mandated to do so. They reasoned that once it was developed the responsibility ended there and would either magically go away or be lost in the shuffle of more important responsibilities. Fewer than one hundred fires were investigated each year by the Bureau and only one major conviction ever resulted from those investigations.¹⁴

The Bureau ignored its mandated responsibilities until 1988 when two people perished in a motel in Salt Lake, Montana due to a malfunctioning heater.¹⁵ Investigation by local officials and attorneys representing the family indicated that the motel (which was more than forty years old) had never been inspected and did not contain smoke detectors. A short time

¹³Nevada State Fire Marshal.

¹⁴Fire Prevention and Investigation Bureau Investigation Log, 1977 through 1992, Fire Prevention and Investigation Bureau, Helena.

¹⁵Fire Prevention and Investigation Bureau Fatality Report, 1988, Fire Prevention and Investigation Bureau, Helena.

later, another individual staying in a motel in Butte nearly perished in an incident that mirrored the Saltese incident.¹⁶

The Fire Marshal Bureau, which is under the direction of the Law Enforcement Services Division of the Montana Department of Justice, was ultimately held accountable. Then Attorney General, Marc Racicot, appointed a Fire Prevention and Investigation Advisory Council in 1992 and directed it to study the fire service in Montana. For more than a year the Council studied statutes that funded and provided direction for the Bureau. It found that insurance taxes collected to fund fire prevention, licensing, investigation, and inspection were consistently misdirected to non-fire agencies through the General Fund.¹⁷ Mismanagement of the licensing program and low staffing levels were the predominant problems cited by the Advisory Council. Based on the recommendations of the Advisory Council, legislation was passed in 1993 that updated the program and provided additional funding.¹⁸

Administrative rules were developed based on information received from other states and the results of the Advisory Council deliberations. Analysis revealed that each state licensing program differed significantly. Some states

¹⁶Montana Fire Incident Reporting System, 1989, Montana Fire Prevention and Investigation Bureau, Helena.

¹⁷Report of The Fire Prevention and Investigation Advisory Council (Fire Prevention and Investigation Bureau, 1992), 2.

¹⁸Section 50-39-101 through 50-39-107, 1993, Montana Codes Annotated.

regulated "ad infinitum" whereas others regulated little or not at all. The most prominent finding from the information collected was that it appeared the collection of fees was more important than confirming the knowledge and skill of the licensee.

Montana decided to approach the licensing program by requiring the individual to provide verification that recent manufacturer, national, or other approved training took place. Moreover, Montana required each individual to provide documentation of annual continued education. Additionally, arrangements were made for bureau staff to inspect business facilities to assure that adequate equipment, supplies and code books were in each establishment. Each business was required to carry \$500,000 - \$1,000,000 general liability insurance (depending on the kind of product being sold, serviced and installed) and either Workers' Compensation or Independent Contractor Exemption.

Requiring the individual to provide training documentation to the Fire Prevention and Investigation Bureau, rather than preparing and administering tests, allowed staff time to actually visit and inspect the facility. As a result of this change, every applicant facility is inspected prior to being issued a license. Additionally, the onus of providing training documentation is the responsibility of the applicant; should fraudulent credentials be submitted and identified, a legal issue ensues with the individual rather than the Bureau

bearing the responsibility of applicant knowledge. The purpose of this paper is to assess the need for national standards for fire protection equipment. The sections that follow discuss state licensing program characteristics and problems, language inconsistency between states that result in one term having several meanings, and the difficulty of understanding state regulations.

State Licensing Program Characteristics And Problems

This section reviews licensing requirements pertaining to fire protection equipment dealers in the United States to gain a picture of their characteristics and to identify problems that might indicate the need for implementing national standards. Data were gathered by surveying state fire program managers across the country. A state program manager is an individual who is a member of the National Fire Information Council (NFIC) and is responsible for managing their respective state fire incident data collection system and supplying data to the United States Fire Administration.¹⁹

¹⁹ The NFIC is a congressionally mandated national fire data collection organization that is funded by the United States Fire Administration (an arm of the Federal Emergency Management Agency). State participation is voluntary and specialized fire data have been collected since 1972. Forty three states and 36 metropolitan areas (with populations of more than 500,000) participate by collecting and submitting fire data to the federal government. Nevada and North Carolina are currently planning to become members. Additionally, more than a dozen federal and private organizations are associate members. Associate members may attend conferences and participate on committee activities, but they cannot vote.

The NFIC uses the National Fire Protection Agency coding system to code scenarios. Additionally, the incident report collects data about fire protection installations. The data base is of interest to this study because it will be used to compare fire incidence, injuries, and fatalities in states that provided fire protection equipment information.

Inconsistent Language Between States

Information was gathered from statutes or administrative rules provided by the state program managers of the NFIC. Requirements for each state, including terminology, differ significantly except in the area of portable fire extinguishers. Fire protection in one state does not necessarily mean the same thing in another state. Additionally, some kinds of systems are combined, partially or totally, and named something else.²⁰

²⁰ For example, the licensing systems in Idaho and Massachusetts are referred to as "Fire Protection Sprinkler Systems". The definitions, however, refer to different types of systems. The Idaho definition is "...an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. This installation includes a water supply, such as a gravity tank, fire pump, reservoir or pressure tank and/or connection by underground piping to a water supply. The portion of the sprinkler system above ground is a network of specially sized, or hydraulically designed, piping installed in a building, structure or area, generally overhead, and to which sprinklers are connected in a systematic pattern. The system includes a controlling valve and a device for actuating an alarm when the system is in operation. The system is usually activated by heat from a fire and discharges water over the fire area."

Considerable confusion exists regarding terminology within the industry and among the regulators and equipment manufacturers. As a result, the terminology used in regulations are state-specific. Although terms may be the same, the meaning varies among states.

The Difficulty of Understanding State Regulations

Although the states in this study regulate various kinds of fire protection systems, understanding the information is difficult. California and Texas characteristics appear simple. California licenses automatic fire extinguishing systems and portable fire extinguishers.²¹ Texas licenses fire extinguishers, fire detection and alarm devices, and fire protection sprinkler systems.²² The simplicity ends there.

The Massachusetts definition of the same name reads "...the installation of all fire protection and fire control systems, including both overhead and underground water mains, fire hydrants and hydrant mains, standpipes and hose connections to sprinkler systems, sprinkler tank heaters, back flow preventers, air lines and thermal systems, hot water fire protection systems and standpipes connected to sprinkler systems."

²¹ California Department of the State Fire Marshal, California Automatic Fire Extinguishing Systems Laws and Regulations and California Portable Fire Extinguisher Laws and Regulations, (Sacramento, CA.: The California State Fire Marshal, 1986).

²² Texas Commission on Fire Protection, Fire Protection Sprinkler Systems and the Sprinkler Rules, Fire Extinguishers and the Fire Extinguisher Rules, and Fire Protection Sprinkler Systems and the Sprinkler Rules, (Austin, TX: Government Printing Office, 1993).

Both states' requirements are cumbersome and difficult to understand.²³

Conversely, while Utah's and Georgia's characteristics appear to indicate extensive regulation, Utah simplified the licensing process for both automatic fire suppression systems and portable fire extinguishers. License requirements and explanations are condensed in less than six pages each and specifically spells out the licensing process. Four kinds of licenses are offered for portable fire extinguishers and two for automatic fire suppression systems. The language is simple, concise, and appears to maintain safety standards.²⁴

²³ California provides two books that explain the law and regulations, one 104 pages in length and the other 38. Five types of licenses are offered for portable fire extinguishers and three for automatic fire extinguishing systems. Each requires a specific and different application process, fee schedule, educational level, testing procedure, and the kinds and sizes of piping and equipment requirements.

Texas publishes three texts that appear to over-regulate and specify cumbersome and confusing regulations. The book on fire detection and alarm devices explains two kinds of licenses and two kinds of certificates with renewal fees ranging from 1 to 90 days and 91 days to two years. Additionally, it breaks down each renewal to certificates, branch office certificates, and technical and planning superintendent licenses.

The Texas book on fire extinguishers provides for eight separate licenses with definitive requirements. While the text on sprinkler systems provides for two kinds of licenses, it confuses the renewal process by escalating fees dependent on time frames: 1-90 days (certificate = \$1350, license = \$262.50), 91-365 days (certificate = \$1800, license = \$350), and 366 days to two years (certificate = \$2700, license = \$525). The lengthy narrative in these three publications is relatively simple to understand compared to California's requirements.

²⁴ Utah State Fire Marshal, Administrative Rules of Utah, (Salt Lake City, UT: Government Printing Office, 1994), R710-1 through R710-7.

Georgia licenses portable fire extinguishers, engineered and pre-engineered fire suppression systems, and kitchen/restaurant systems. All other states require significant testing to receive a license. Most include some combination of written, oral and practical tests. Georgia has simplified the licensing process by requiring individuals to provide documentation that they have passed the National Institution for Certification in Engineering Technologies (NICET) (for engineered and pre-engineered fire suppression systems) and the National Association of Fire Equipment Distributors (NAFED) (for portable fire extinguishers). NICET is a nationally recognized organization whose purpose is to certify individuals that meet standards determined by a consensus of industry professionals. NAFED is a similar organization that encompasses portable fire extinguisher education, testing and application.²⁵ Georgia has accomplished what few other states have through simplification. Georgia has transferred the responsibility to the individual to provide documentation they are qualified in the area in which they are applying for a license.

In 1993 the Montana legislature passed statutes similar to those enacted in Georgia. Montana, however, simplified the process even further by providing four licenses, one each for

²⁵ Georgia Commissioner of Insurance, Rules and Regulations for Installation; Inspection; Recharging, Repairing, Servicing and Testing of Portable Fire Extinguishers or Fire Suppression Systems, Atlanta, GA: Government Printing Office, 1992).

fire alarm systems, special agent fire suppression systems, fire extinguishing systems, and portable fire extinguishers. Licenses are not broken down within the groups as they are in other states. NICET documentation is required for all applicants. It is simple to understand and places the responsibility on the applicant to provide not only NICET verification, but proof of liability and Workers' Compensation insurance.²⁶

Are Regulations Enforced and Do They Assure Competence?

The danger that exists when so many different kinds of licenses are available for a given product is that businesses and individuals are more likely to apply for the cheapest and easiest license available and then use the license to perform a variety of installation and inspection services. The public is generally not knowledgeable of the kinds of licenses required for particular phases or kinds of product facilitation. When an individual displays a license to a prospective client, it is often accepted as certification. Most people do not closely inspect a license and may not understand exactly what service the license holder is authorized to perform. Closer inspection may reveal the licensee is qualified to conduct inspections when the

²⁶ The Fire Prevention and Investigation Bureau, Administrative Rules of Montana, Helena, MT: Government Printing Office, 1993).

individual may actually be hired to install a complete system. Additionally, it may not be understood that the license is limited. What Montana and Georgia have done is require individuals to be trained in all phases prior to licensing. Montana set up an apprentice program to accommodate individuals who are in training and working on NICET certification.

Some states provide up to eleven different kinds of licenses for fire protection equipment -- licenses within licenses. This type of system is often complicated and confusing. The public cannot be assured a licensee actually working on a facility is adequately trained to perform the work. Additionally, the industry is confused regarding the kind(s) of license(s) that may be required and many unknowingly operate illegally.

When a project is bid, licensing is usually a requirement of the process. Unless the contractor is knowledgeable of the requirements, merely providing a photocopy of a legal-looking document will often suffice. States that issue several licenses within the context of fire protection equipment cannot expect a contractor to understand the intricacies of each license. License holders often do not understand exactly what service they are licensed to perform.

The diversity of the kinds and varieties of fire protection equipment that are regulated and the accompanying licenses, sub-licenses, fees, renewal schedules and other

various requirements indicate consistency only in the fact that confusion is the norm rather than the exception. A spectrum of qualifications and restrictions exist among states. While similarity exists in some instances, no two states provide or require the same information or skills and obtaining a license does not guarantee competence.

Methodology

The purpose of this research is to assess the need for national standards for fire protection equipment. Federal regulations, similar to occupational safety (i.e. OSHA) regulations, would provide greater consistency in enforcement, but would they in fact increase fire protection? To answer this question, the research measures high, medium and low regulation states to determine if high regulation states that heavily regulate fire codes have better outcomes than states with weak regulation.

The criteria used to determine high and low regulation states were separated into four categories: fire alarm systems, special agent fire suppression systems, fire extinguishing systems, and fire extinguishers. The data are based on information provided by state program managers and it is assumed the data is complete. Definitions of the four groups are:

Fire Alarm System: A combination of approved compatible devices with the necessary electrical interconnection and energy to produce an alarm signaling the event of fire or system activation but does not include single station smoke or heat detectors.

Special Agent Fire Suppression System: An approved system and components which require individual engineering in accordance with manufacturer specifications and includes dry chemical, carbon dioxide, halogenated, gaseous agent, foam and wet chemical systems; includes pre-engineered system but does not include a fire extinguishing system.

Fire Extinguishing System: A fire sprinkler system designed in accordance with nationally recognized standards that consists of an assembly of piping or conduits that conveys water, foam or air with or without other agents to dispersal openings or devices to extinguish, control or contain fire and to provide protection from exposure to fire or the products of combustion. Included are underground and overhead piping, ponds, tanks, pumps, extra or special hazard applications and other related components or devices necessary for water supplies.

Fire Extinguisher: A portable device containing an extinguishing agent that can be expelled under pressure for the purpose of suppressing or extinguishing a fire.²⁷

The independent variable in this study is the degree to which each state regulates fire protection systems. States were identified as high, medium, and low regulation states as follows. Two points were awarded for each of the four types of fire protection systems (8 points possible). Two points each were awarded for annual licensing, annual examination, proof of NICET/NAFED certification, continuing education requirement, facility inspection by licensing entity, and commercial liability insurance requirement (40 points possible). A total of 48 points is possible. Table 1 identifies states as high, medium, and low regulation states according to their total point scores. Only 14 states are represented because only 43 belong to NFIC and less than half of these responded to a survey by the author.

Nevada, Florida, Georgia, and Texas are high regulatory states; North Carolina, Nebraska, Wyoming and Oklahoma appear to be minimally regulated. Interestingly, while many states regulated most of the four categories, annual requirements

²⁷Section 23.7.113 through 23.7.136, 1993, Administrative Rules of Montana.

(with the exception of relicensing and submitting annual fees) were by and large deferred, required every two to five years, or not enforced.

TABLE 1
STATE REGULATION STATUS

	CATEGORY ONE	CATEGORY TWO	TOTAL
High-Regulated			
Nevada	8	24	32
Florida	6	24	30
Georgia	6	24	30
Texas	8	20	28
Medium-Regulated			
Arkansas	6	14	20
Utah	6	12	18
Montana	*8	*8	*16
Alaska	8	6	14
California	6	6	12
Idaho	2	8	10
Mass.	8	2	10
Low-Regulated			
N. Carolina	6	0	6
Nebraska	2	2	4
Wyoming	2	0	2

*Note: Comparison figures are for 1992. In 1994 Montana adopted a new licensing system whose points total 46.

To predict whether a national licensing program would have beneficial impacts, the research sought to

determine whether fire protection is highest in the most highly regulated states. This would constitute evidence that regulation is beneficial and national regulation would be highly desirable.

The following hypothesis were tested:

- H₁ The average fail rate of smoke detectors is lower for high regulation states than for medium and low regulated states.
- H₂ The average fail rate for sprinkler systems is lower for high regulation states than for medium and low regulated states.
- H₃ Fatalities per 1000 fires are lower for high regulation states than for the nation as a whole, as well as for low and medium regulated states.
- H₄ Injury rates per capita are lower for high regulation states than for the nation as a whole, as well as medium and low regulated states.²⁶

²⁶ The original intent of this study was to examine all major regions of the country. Although fewer than fifty percent of the NFIC states responded to the survey, western states were over-represented. The states included are: Alaska, Arkansas, California, Colorado, Florida, Georgia, Idaho, Massachusetts, Montana, Nebraska, Nevada, North Carolina, Oklahoma, Texas, Utah, Washington, and Wyoming.

Fire protection performance data was examined to determine performance and non-performance during fire. Specifically, the data analyzed was: Detector Performance - National Data, 1992; Sprinkler Performance - National Data - 1992; Detector Performance in Structure Fires - 1992; Detector Performance Percentiles - Structure Fires - 1992; and Sprinkler Performance in Structure Fires - 1992.

Fatalities and injuries were also compared to assist in determining subsequent correlation between fire protection equipment performance and resulting injury/death. The data

A questionnaire was sent to forty three NFIC state project managers requesting information about their licensing requirements and procedures. Seventeen states responded to the survey. Data provided by three states was not usable because either partial information was received or the data were representative of specific cities rather than the state. National data were also obtained from the United States Fire Administration regarding types of fires and equipment performance.

provided by the United States Fire Administration was not sufficient to confirm an association among factors. However, it is reasonable to assume that fewer lives would be lost and injuries result if the equipment operated more than seventy to eighty percent of the time.

CHAPTER II

DATA ASSESSMENT

The purpose of this chapter is to determine whether there is a need for a nationwide licensing program for fire protection equipment by testing five specific hypotheses. States are separated based on degree of regulations, high-, medium-, and low-regulation. Detector performance, sprinkler performance, and the number of fire-related injuries and fatalities, are examined to determine whether high degrees of regulation are associated with better detector and sprinkler performance. Additionally, fire-related injuries and fatalities are examined.

Equipment Failure Rates

Tables 2.1 and 2.2 provide 1992 smoke detector and sprinkler performance data and address H_1 and H_2 .²⁹

Although H_1 and H_2 appear to have been disconfirmed, the small number of cases raises doubts about the validity of these results. High regulated states experience a 29% failure rate whereas low regulated states experience a 28% failure rate. Medium regulated states are lower by 8% and 7%.

²⁹Ibid.

TABLE 2.1
DETECTOR PERFORMANCE

CATEGORY	TOTAL FIRES	DETECTOR OPERATED	DETECTOR FAILED	FAILURE RATE	NUMBER OF CASES
High-Regulated	6,380	4,519	1,861	29%	3
Medium-Regulated	5,372	4,261	1,111	21%	6
Low-Regulated	432	311	121	28%	2

* Total fires includes only those fires where detectors were present.

NOTE: Data are for 1992

TABLE 2.2
SPRINKLER PERFORMANCE

CATEGORY	TOTAL FIRES	SPRINKLER OPERATED	SPRINKLER FAILED	FAILURE RATE	NUMBER OF CASES
High-Regulated	582	480	104	18%	3
Medium-Regulated	457	426	41	7%	6
Low-Regulated	36	31	5	14%	2

* Total fires includes only those fires where sprinklers were present

NOTE: Data are for 1992

Fatality and Injury Rates

Table 2.3 provides the average fire death rate (per thousand fires) for 1989 through 1992 (Hypothesis 3).

TABLE 2.3

FATALITIES

AVERAGE	1989-1992	NUMBER
NATIONAL	6.8	
HIGH-REGULATION	5.7	3
MEDIUM-REGULATION	7.9	7
LOW-REGULATION	5.5	2

Table 2.3 provides partial support for H₃. Fatalities are lower for highly regulated states than for the nation as a whole and medium regulated states. Low regulated states were slightly lower.

The fire injury rate (per thousand fires) (Hypothesis 4) for these states provides additional information regarding fire detector and fire sprinkler use and performance.

TABLE 2.4

INJURY RATE

AVERAGE	1989-1992	NUMBER
NATIONAL	82.8	
HIGH-REGULATION	72.4	3
MEDIUM-REGULATION	75.1	7
LOW-REGULATION	74.4	2

Table 2.4 provides support for H_4 . Injuries are lower for highly regulated states than for other states and the nation as a whole.

Hypotheses 3 and 4 appear to have been confirmed. The small number of cases, however, raises doubts about the validity of these results. In all but one instance, high regulated states experienced a lower death and fatality rate than other regulated states and the nation as a whole.

TABLE 2.5SUMMARY OF FINDINGS

H ₁	Average fail rate of smoke detectors is lower for high regulation states than for medium and low regulated states.	Disconfirmed. Failure rate was 29% in high regulated states, 28% in low regulated states, and 21% in medium regulated states.
H ₂	Average fail rate for sprinkler systems is lower for high regulation states than for medium and low regulated states.	Disconfirmed. Failure rate was 18% in high regulated states, 14% in low regulated states, and 7% in medium regulated states.
H ₃	Fatalities per 1000 fires are lower for high regulation states than for the nation as a whole, as well as for low and medium regulated states.	Confirmed. Fatality rate in high regulated states was 5.7, the nation was 6.8, and medium regulated was 7.9. Low regulated states was slightly lower at 5.5.
H ₄	Injury rates per capita are lower for high regulation states than for the nation as a whole, as well as medium and low regulated states.	Confirmed. Injury rate in high regulated states was 72.4, the nation was 82.8, and low regulated was 74.4.

CHAPTER III
SUMMARY, RECOMMENDATIONS, AND CONCLUSION

SUMMARY

The purpose of this study was to assess the need for a nationwide licensing program for fire protection equipment. No data has been collected prior to this study to determine the effectiveness or efficiency of state licensing. Consequently, a limited amount of data is currently available.

Most current state licensing and endorsement programs in this study are fragmented and provide minimal safety assurance to the consumer. Some states provide minimal fire, or no safety regulations. Injuries and fatalities that result from fires are a national embarrassment. Billions of dollars are spent each year rebuilding homes and reforesting wildlands as a result of carelessness, lack of education, poor enforcement, and failure to develop appropriate regulations that provide realistic safety measures. The United States reports the highest fatality and dollar loss rate in the world. Establishing regulations and enforcement procedures that are simple to understand and that assure reasonable competence are paramount to saving lives and property. The data suggest that individual state fire protection regulations currently provide protection to the public between 74 and 87 percent of the

time. That means up to 26 percent of the time, the equipment functions improperly.

Regulation does not seem to affect the performance of fire protection systems (hypothesis one and two). The reason may be that regulations do not provide assurance of competency due to lack of enforcement. No standards exist that cross state lines and contribute to the overall well being of the public. Fire protection equipment that has been installed provides a sense of false security. Some equipment simply does not work. The obvious reason lies in improper installation, service, lack of enforcement or all three. Additionally, improper training and education of enforcement staff combined with passive attention to the job plays a significant role. An alternative explanation for the failure to confirm hypotheses one and two is that the number of cases is too small to provide statistically valid results.

Fire protection equipment is marketed nationwide and requirements for company and individual licensing may not be remotely similar from one state to another. Some states do not regulate at all. Additionally, terminology differs among states and federal fire agencies. For example, the definition of "service" and "maintenance" of a portable fire extinguisher may be different. The definition provided by the National Fire Protection Agency may not be adopted by a state. The state may prepare its own definition. Consistency is not

apparent among federal or state agencies. The programs are difficult to understand because no uniform program exists.

Current programs do not assure reasonable individual competence. Fire protection equipment is approved by Underwriters Laboratories (UL) and registered prior to manufacture. That means the equipment works if it is installed properly. The equipment fails to operate up to twenty-six percent of the time. It is reasonable to suspect that the equipment is installed improperly, even in those states that license. Individual competency is not reflected in the bearer of the license, certification, or endorsement. Although many states require an individual to read mountains of regulations and pay confusing fees that can total thousands of dollars, the affect on competency and knowledge are questionable.

RECOMMENDATIONS

Because the data collected indicate abysmal functionality of fire protection equipment, it is reasonable to assume that basic requirements should be developed that assure competency. Requiring individuals, through business licensure, to provide verification of competency appears to be the most logical confirmation. Additionally, annual training requirements would assure continuous education to maintain technological changes.

State administration would be the logical vehicle for consistent data collection with a national database that maintains information. All fire protection individuals should study and pass specific criteria prior to being licensed, similar to an individual who studies to become an accountant, architect or any other professional.

The issue is prevention, prevention through protection. Up to twenty-six percent of installed fire protection equipment does not operate as a result of improper installation and inspection. Loss of life, injury and damage to property can be and should be decreased or eliminated. Currently, regulations do not exist that assure installed protection equipment is reliable. The false sense of security is deadly and needs to be remedied.

Additionally, individuals licensed to install or service fire protection equipment should be held accountable. Federal, state, and local governments provide laws that discipline drunk drivers, penalties correspond with the degree of severity. Should a drunk driver be convicted of vehicular homicide, incarceration most assuredly results. Multiple deaths occur frequently as a result of fire protection equipment failure. Dealer accountability, if the equipment is improperly installed, should be mandatory.

Educational facilities are available - either through NICET, NAFED, or the manufacturer. A prospective applicant should be required to provide verification of training.

Annual continuing education should also be required to assure that as technology advances, the knowledge of the individual is maintained.

CONCLUSION

Clearly, the states studied in this paper are failing to successfully address what may be a national problem. Lives are lost through carelessness, slipshod workmanship, and lack of enforcement. Billions of dollars of property are destroyed. Thousands of people are injured; some live with their injuries as a continual reminder.

Consumers are assured manufactures provide products that are operational and function according to recommended usage. Fire protection equipment is tested and approved through the Underwriters Laboratories prior to marketing. Seldom does a product reach the consumer that functions improperly. The fault lies in regulations, installation, service, maintenance, and enforcement. That means the individual is responsible for making sure the equipment not only is installed properly, but will operate in the future should it be needed.

Local, state, and federal fire protection agencies fall woefully short of protecting the consumer. The author recommends additional study of other states to determine if this analysis is confirmed. While the data are reliable for the states studied, it should not be assumed that the results

are conclusive for the nation. Should the results be supported, the author recommends national regulation to assure that loss of life, property, and injuries are kept to a minimum.

APPENDIX 1 - REQUEST FOR INFORMATION

May 1, 1994

National Fire Information Council
Program Manager

I recently addressed the full membership of the National Fire Information Council regarding research I am conducting to complete the requirements for the degree of Master of Public Administration. This letter is a follow-up to that presentation as a reminder and request to send me your state statutes and administrative rules pertaining to licensing, endorsement, certification, etc. of fire protection equipment dealers and installers.

Please send the information to: Anita L. Varone, 646 Tamarack, Helena, Montana 59620. If you have any questions, please call me at (406)442-2072 or (406)444-2050.

Additionally, if your state does not regulate fire protection equipment, please mark the space below and return this letter in the enclosed, self-addressed and stamped envelope.

I appreciate any assistance you can provide for my research.

THE STATE OF _____ DOES NOT REGULATE
FIRE PROTECTION EQUIPMENT.

Very truly yours,

Anita L. Varone

APPENDIX 2

DETECTOR PERFORMANCE IN STRUCTURE FIRES - 1992

	TOTAL FIRES	DETECTOR PRESENT	IN ROOM OPERATED	IN ROOM NOT OPERATED	SUCCESS RATE %
1. NEVADA*					
2. FLORIDA	12,859	2,078	1,545	533	74%
3. GEORGIA	3,202	486	362	124	74%
4. TEXAS	25,412	3,816	2,612	1,204	68%
5. ARKANSAS	4,020	357	271	86	76%
6. UTAH	2,167	254	183	71	72%
7. MONTANA	1,404	174	118	56	68%
8. ALASKA	1,090	215	147	68	68%
9. CALIFORNIA**					
10. IDAHO	1,856	198	148	50	75%
11. MASSACHUSETTS .	11,982	4,194	3,394	780	81%
12. NORTH CAROLINA*					
13. NEBRASKA	2,254	354	259	95	73%
14. WYOMING	673	78	52	26	67%

* Not participating in 1992.

** Does not report detector performance

SPRINKLER PERFORMANCE IN STRUCTURE FIRES - 1992

	TOTAL FIRES	SPRINKLER PRESENT	IN ROOM OPERATED	IN ROOM NOT OPERATED (Various Reasons)	SUCCESS RATE %
1. NEVADA*					
2. FLORIDA	12,859	208	180	28	87%
3. GEORGIA	3,202	63	57	6	90%
4. TEXAS	25,412	311	241	70	77%
5. ARKANSAS	4,020	54	52	2	96%
6. UTAH	2,167	40	36	4	90%
7. MONTANA	1,404	15	12	3	80%
8. ALASKA	1,090	13	12	1	92%
9. CALIFORNIA**					
10. IDAHO	1,856	16	14	2	88%
11. MASSACHUSETTS	11,982	319	290	29	91%
12. NORTH CAROLINA*					
13. NEBRASKA	2,254	30	26	4	87%
14. WYOMING	673	6	5	1	83%

* Not participating in 1992.

** Does not report detector performance

APPENDIX 4FATALITY RATE PER THOUSAND FIRESBY STATE

	1993	1992	1991	1990	1989
NEVADA	-	-	-	-	-
FLORIDA	7.2	7.3	7.5	10.6	7.5
GEORGIA	5.0	3.1	2.1	2.1	-
TEXAS	-	2.6	7.7	9.1	8.9
ARKANSAS	7.1	8.0	8.4	5.1	7.4
UTAH	5.0	10.2	6.9	8.7	8.1
MONTANA	7.7	7.8	10.2	8.6	5.8
ALASKA	11.8	18.3	14.6	16.8	11.8
CALIFORNIA	-	1.8	5.1	5.0	5.4
IDAHO	8.6	5.4	6.0	5.6	2.6
MASSACHUSETTS	4.6	6.1	4.8	8.7	7.4
NORTH CAROLINA	-	-	-	-	-
NEBRASKA	4.9	5.3	7.6	5.4	5.4
WYOMING	3.6	.8	6.5	5.8	8.3
TOTAL STATE AVERAGE	6.6	6.4	7.3	7.6	7.1
NATIONAL AVERAGE	6.5	7.2	6.4	6.7	6.7

APPENDIX 5INJURY RATE PER THOUSAND FIRESBY STATE

	1993	1992	1991	1990	1989
NEVADA	-	-	-	-	-
FLORIDA	100.1	97.8	7.5	101.8	104.5
GEORGIA	46.3	95.9	95.9	22.9	2.8
TEXAS	-	89.0	79.0	86.2	84.9
ARKANSAS	33.3	43.0	42.5	29.2	37.8
UTAH	91.3	115.8	105.2	102.9	106.8
MONTANA	48.9	46.3	49.7	54.8	50.1
ALASKA	53.5	58.7	62.6	59.0	31.3
CALIFORNIA	-	63.1	61.5	53.1	51.2
IDAHO	43.8	48.0	6.0	62.5	44.1
MASSACHUSETTS	162.4	165.5	178.4	178.8	194.2
NORTH CAROLINA	-	-	-	-	-
NEBRASKA	90.3	77.2	87.3	87.9	81.4
WYOMING	44.1	89.2	46.7	68.4	56.6
TOTAL STATE AVERAGE	71.4	82.5	68.5	75.6	70.5
NATIONAL AVERAGE	83.0	84.1	84.0	82.5	80.7

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