
Background

CHAPTER 1

People commonly associate fire departments with fire fighting. Most Minnesota fire departments, however, are involved in numerous emergency activities beyond suppressing fires. According to the State Fire Marshal Division in the Department of Public Safety, fire departments responded to nearly 147,000 calls in 1997, only 13 percent of which were for extinguishing fires.¹

The breadth of duties performed by Minnesota fire departments includes serving as first responders in emergencies, providing emergency medical services at incidents and being licensed to transport victims to medical facilities, rescuing victims from incidents such as traffic accidents or mishaps on lakes and rivers, responding to spills of hazardous materials, inspecting buildings for fire hazards, preparing for the management of emergencies such as natural disasters, investigating the cause of fires, and educating children and other citizens about fire safety. Although not every department is involved with each of these activities, very few have limited their roles to fire suppression alone. According to a survey we conducted of Minnesota fire departments, about 98 percent offered other services in addition to fire fighting.

Fire departments also conduct rescues, offer emergency medical services, work on fire prevention, and manage hazardous materials spills.

Fire departments also vary in their organizational structure and staffing arrangements. We found that 92 percent of Minnesota fire departments in 1997 relied primarily on volunteers or paid on-call fire fighters. They were staffed largely by members who made their living in some occupation outside the fire department and either received no compensation for responding to incidents or were paid a stipend or on an hourly or per-call basis. The rest of Minnesota's departments were staffed by full-time career fire fighters or with a combination of full-time and volunteer or paid on-call members.

Regardless of their employment status, fire fighters perform essentially the same duties. They face a variety of occupational hazards due to their dangerous and unpredictable work environment. In 1997, 234 Minnesota fire fighters were injured on the job, according to the State Fire Marshal Division. This is a ratio of 0.5 fire fighter injuries for every 10,000 Minnesota citizens, as compared to 3.3 fire fighter injuries for every 10,000 residents across the country in 1996.² Two Minnesota fire fighters died in the line of duty in 1997, and none in the previous five years. Nationally, 57 volunteer and 37 full-time, career fire fighters died

¹ Department of Public Safety, State Fire Marshal Division, *1997 Fire in Minnesota* (St. Paul, 1998), 3. The actual number of calls statewide may be somewhat higher because not every department regularly reports fire data to the State Fire Marshal. For 1997, about 88 percent of departments reported.

² John R. Hall, *The U.S. Fire Problem Overview Report: Leading Causes and Other Patterns and Trends* (Quincy, Mass.: National Fire Protection Association, 1998), 2.

while on duty in 1997, for a total of 466 fire fighter on-duty fatalities from 1993 through 1997.³

Local expenditures on fire protection were \$39 per capita in Minnesota compared to \$65 per capita across the country during fiscal year 1995, the most recent year that comparable data were available.⁴ Minnesota's per capita spending on fire services that year ranked 39th out of the 50 states and Washington D.C.⁵

Fire departments differ in their reliance on state resources. Some, for instance, rely heavily on the State Fire Marshal Division in conducting fire investigations; others conduct their own investigations. Local departments also vary in their involvement and coordination with other local agencies, such as local water utilities or building inspection agencies.

This chapter presents background information on the current structure, financing, and scope of fire services in Minnesota. In the chapter we ask the following questions:

- **How is the delivery of fire services structured?**
- **How are fire department services financed?**
- **What services do fire departments in Minnesota provide and how do they vary within the state?**
- **What is the state role in fire services?**

To answer these questions we relied in part on information gathered through a survey we conducted of an extensive sample of fire departments in Minnesota.⁶ Most of the data we present in this report come from our survey, but not every fire department responded to the survey; all fire departments we surveyed are listed in Appendix A, along with the results of surveys from those who replied in time for our analysis. We also collected information by visiting and interviewing fire department personnel and others in the emergency response field. In addition, we used information published by a variety of associations and agencies within the fire and public safety industries.

THE STRUCTURE OF FIRE SERVICES IN MINNESOTA

Fire services in the public sector are largely local government functions. Minnesota had 790 fire departments in 1997, according to the State Fire Marshal.

More than 90 percent of fire departments were organized as municipal fire departments in 1997, that is, they were a department of a city, township, or group of municipalities, according to our survey. Nearly 70 percent of these departments provided fire-related services to nearby communities on a contract basis. About 7 percent of Minnesota fire departments indicated they were organized as private, nonprofit corporations. These departments also contract with local communities to provide fire services. They are typically run by boards of directors with membership prescribed in their bylaws.

³ Federal Emergency Management Agency (FEMA), *Firefighter Fatalities in the United States in 1997* (Washington D.C.: FEMA, 1998), 7-8.

⁴ U.S. Census Bureau, "State and Local Government Finances by Level of Government: 1994-1995," WWW document, URL: <http://www.census.gov/govs/estimate/95stlus.txt>, (February 1999).

⁵ Minnesota Taxpayers Association, *How Does Minnesota Compare? Fiscal Year 1995 Comparisons* (St. Paul: Minnesota Taxpayers Association, September 1998), 28.

⁶ We conducted two simultaneous surveys, one of all fire departments in larger communities, which we defined as those with 8,000 or larger populations. Eighty-eight departments responded to this survey, for an 87 percent response rate. The second survey was shorter to reduce the time burden of completing it for volunteer chiefs of departments in smaller communities. We sent this survey to 454 of the 689 fire departments in communities with fewer than 8,000 residents. We received 307 surveys returned in time for analysis, for a 68 percent response rate. Additional details on our methodology are available in Appendix A.

In a few areas, townships have organized special fire protection districts. These districts consist of contiguous property, at least 25 percent of which is classified as homestead property or other buildings or structures.⁷ Property owners in these districts pay a special property tax rate with a levy specifically for fire services. Only slightly more than 1 percent of fire departments reported that they were part of such a fire protection district in 1997.

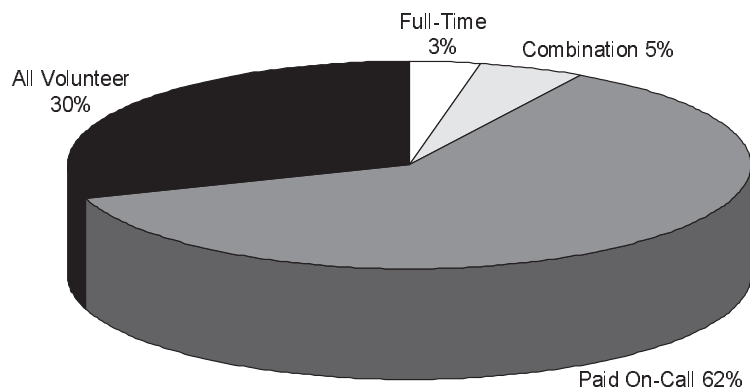
Fire Department Staffing Arrangements

Fire departments are staffed primarily in one of four ways: (1) with volunteer members; (2) with paid, on-call personnel; (3) with a combination of full-time staff and volunteer or paid on-call staff, known as “combination departments”; or (4) with exclusively full-time paid staff. As shown in Figure 1.1:

- **Most fire departments in Minnesota during 1997 used volunteer or paid on-call members.**

Some of these used entirely unpaid staff. About 30 percent of all Minnesota fire departments in 1997 had members that received no compensation for responding to emergencies, although they may have been eligible for retirement pensions. A larger proportion, approximately 62 percent, employed fire fighters who received compensation for their services either on a per call or per hour basis, or in the form of a stipend.⁸ This group includes fire departments who employed up to five full-time members but relied primarily on volunteers or on-call fire fighters. About 5 percent of Minnesota fire departments in 1997 used at least six full-time members along with paid on-call or volunteer fire fighters (which we defined as “combination” departments) while slightly more than 3 percent had entirely full-time personnel.

Figure 1.1: Fire Departments by Type of Staffing, 1997



NOTE: Combination departments include those with at least six full-time members. Some on-call departments also have volunteer members.

SOURCE: Legislative Auditor’s Office Survey of Fire Departments, 1998.

By comparison, approximately 6 percent of all fire departments in the United States in 1997 were staffed entirely with career fire fighters, and about 73 percent relied on volunteer or on-call members. The remaining 21 percent of U. S. departments used a mix of career and volunteer or on-call fire fighters.⁹

Throughout this report, when we compare fire departments we group those employing five or fewer full-time fire fighters together with volunteer and paid on-call departments, not with combination departments. We do this because departments with such a small number of full-time members would not be likely to operate on

⁷ Minn. Stat. §368.85, subd. 1.

⁸ Nearly 70 percent of the volunteer or on-call departments had fire chiefs who received compensation in 1997, although most of these chiefs were not full-time and did not earn full-time pay.

⁹ Nancy Schwartz, research assistant, National Fire Protection Association, interview by author, Telephone conversation, St. Paul, Minnesota, March 2, 1999.

an around-the-clock basis, and therefore, are not as comparable to combination departments.

When comparing the shares of population served in the primary response areas of the different types of departments, a somewhat different picture emerges, as shown in Figure 1.2. Although volunteer and paid on-call departments still served many citizens,

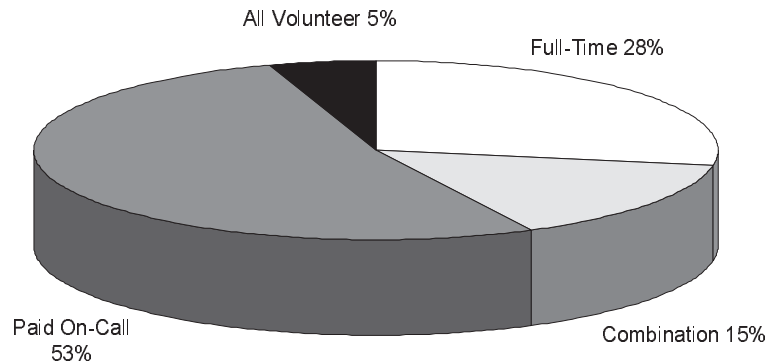
- **Fire departments with all volunteers served about 5 percent of Minnesota's population in 1997 and paid on-call departments served about 53 percent. Combination departments served about 15 percent and full-time departments about 28 percent of the state's residents.**

Community Characteristics by Department Type

Full-time fire departments in Minnesota are typically found in areas with large populations, high densities, and older buildings. In 1997, 11 full-time departments operated in response areas that generally held the largest populations, with a median population of 34,470; all but two full-time departments were in cities above the 95th percentile of Minnesota city populations.¹⁰ By contrast, combination departments had response areas with a median 25,305 residents and the response areas for volunteer or on-call departments had a median 1,990 residents in 1997.

Full-time fire departments served densely concentrated populations, with a median 3,061 people per square mile within their primary response areas. This compares to median densities of 453 people per square mile for combination departments and 29 for volunteer or on-call departments. In addition, the full-time fire

Figure 1.2: Percentage of Minnesota Population Served by Type of Fire Department, 1997



NOTE: Combination departments include those with at least six full-time fire fighters. Percentages do not add to 100 due to rounding.

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

departments and volunteer or on-call departments were mostly located in cities with older housing units. About 73 percent of the full-time departments were in cities where the median housing units were built before 1965, whereas only 47 percent of combination departments were in communities with similar aged housing, and about 70 percent of the volunteer or on-call departments were in such communities.

Full-time and combination departments were fairly evenly divided between those located in the Twin Cities metropolitan area and those outside it. The volunteer or on-call departments, on the other hand, were predominantly outside the Twin Cities area, with 85 percent located in greater Minnesota.

Selecting Officers

The process for promoting officers within fire departments varies. We learned that unlike the managers for many local government services, fire chiefs in some departments are elected by department membership, in accordance with the department's bylaws. In other fire departments, chiefs are appointed by the mayor or local

¹⁰ Using 1997 population estimates, the 95th percentile included cities with at least 18,877 residents. Full-time departments also operate at the Minneapolis/St. Paul International Airport and at the Rochester Airport; they are not included in this comparison.

governing body. Appointments in some cases are based on qualifying examinations to help determine the candidates' skills, knowledge, and abilities. Data are not available on how many fire departments elect their fire chiefs as opposed to having them appointed.

Reliance on Mutual Aid

The fire service in Minnesota and elsewhere has a long history of participating in what is known as "mutual aid." Essentially, fire department members of mutual aid associations respond free of charge to requests for assistance at emergencies and other events occurring outside their primary response area. If an emergency requires resources, personnel, or expertise that is beyond the scope of a particular department, the department may request aid from other departments belonging to the association. From our survey we found that:

- **Virtually all Minnesota fire departments had mutual aid agreements for some components of their fire services.**

Because of the widespread use of mutual aid, individual fire departments do not have to hire the number of fire fighters or purchase the amount of equipment they would need to handle infrequent, large-scale emergencies. Of the fire departments with mutual aid agreements in 1997, 98 percent covered fire suppression in their mutual aid, about 57 percent included first responder services, and 51 percent included

Mutual aid produces efficiencies.

rescues. Beyond providing and receiving services, some departments use mutual aid associations for gaining efficiency in training personnel or making joint purchases. Three-quarters of Minnesota fire departments participating in mutual aid reported using it for cooperative drills and exercises, and

59 percent for using specialized equipment or apparatus (apparatus refers to fire department vehicles including pumpers, tankers, or ladder trucks).

Some departments participate in "automatic aid," whereby members from multiple departments will automatically respond to incidents occurring in a predetermined area within a neighboring jurisdiction or within a given time frame. For instance, two neighboring departments might have automatic aid for any incident occurring within a predetermined distance of the boundary line separating two departments' jurisdictions. Or automatic aid may be given based on the time of day or day of the week; when one department's personnel resources are usually lower, for instance during daytime hours, another department may automatically respond, and the first department would reciprocate during nighttime hours.

Private Sector Roles in Fire-Related Services

Although public fire departments may represent one of the most visible components of fire protection, several important fire-related services exist independent of fire departments. Often, local fire departments that work on fire prevention complement these private sector efforts.

Privately-Purchased Fire Protection Systems

Home smoke detectors and security systems are a growing segment of private sector fire protection. For instance, as of 1993 in Minnesota, state law has required the installation of smoke detectors in all dwellings in the state intended to be occupied for living purposes.¹¹ Nationwide, it has been estimated that 95 percent of American households now have smoke detectors (although many may not be in working order) and 20 percent have monitored electronic security systems.¹² Realizing the value

¹¹ *Minn. Laws* (1993), ch. 329, subd. 1. (b) and *Minn. Stat.* §299F.362.

¹² National Burglar & Fire Alarm Association, Inc., "Facts and Stats About the Electronic Security Industry," WWW document, URL: <http://www.alarm.org/consumer/quick.htm> (March 1, 1999); Joe Freeman, CEO, J. P. Freeman Co., Inc., interview by author, Telephone conversation, St. Paul, Minnesota, January 20, 1999. The J. P. Freeman Co., Inc. specializes in electronic security and home and commercial automation and was referred by materials from the National Burglar and Fire Alarm Association.

of smoke detectors in alerting people to fires, fire departments often participate in smoke detector programs for privately owned buildings. According to our survey:

- **About 44 percent of fire departments have smoke detector programs to assist homeowners and others with the acquisition and installation of smoke detectors.**

Automatic sprinkler systems have been demonstrated to reduce the extent of damage and spread of fires because they act at the early stage of fires, according to the National Fire Protection Association.¹³ Further, the association has concluded that in most cases sprinkler system activation causes much less water damage than when sprinklers are not present and fire departments extinguish fires. Some studies have indicated that the installation of sprinkler systems reduces insurance premiums for building owners (particularly of commercial buildings), and widespread sprinkler installation may help control the growth of public expenditures for fire stations, equipment, and personnel.¹⁴

In Minnesota and around the country, automatic fire extinguishing systems have been installed primarily in commercial, industrial, educational, and public assembly buildings. The *Minnesota Uniform Fire Code* requires the installation of automatic sprinkler systems during the construction of structures that meet certain size and occupancy thresholds and that are not dwellings, lodging houses, family day care, certain supervised living facilities, private garages, carports, or agricultural buildings.¹⁵ Because many buildings were built prior to the fire code, however, many commercial buildings do not have sprinkler systems. About 27 percent of the larger fire departments we surveyed reported having full automatic sprinkler coverage in high percentages of their high-hazard occupancies, such as repair

Larger and Smaller Fire Departments

Larger Fire Departments

Throughout this report, references to “larger” fire departments include: (1) volunteer and paid on-call departments in communities of 8,000 or more, (2) all departments with full-time personnel, and (3) departments with a combination of at least six full-time and other personnel.

We sent to these departments our full survey. Included in the group are three fire departments in cities under 8,000 population that received our full survey because preliminary data indicated they were combination departments; according to our survey results, they are actually paid on-call departments.

Smaller Fire Departments

The “smaller” fire departments are volunteer and paid on-call departments in communities of under 8,000 population.

Some data are not available for smaller departments because we mailed shorter surveys to the small volunteer or paid on-call departments, and therefore, collected less information from them. Appendix A contains details on the methodology of our survey.

garages with open flames or welding, in 1997. Of the larger departments that could estimate percentages of homes that are sprinklered, 90 percent said that less than 5 percent of the single- and two-family homes, family day care facilities, and supervised living facilities in their service areas had sprinklers.

Private Sector Fire Investigators and Fire Prevention Specialists

Property insurance companies employ fire investigators who investigate fire causes to verify and substantiate fire insurance claims. The investigators conduct their investigations independent of the fire marshal whose job it is to determine the cause and origin of fires and report on fires of unknown origin. Some insurance companies also employ prevention specialists who

¹³ Arthur E. Cote, ed., *Fire Protection Handbook*, 18th ed. (Quincy, Mass.: National Fire Protection Association, 1997), sec. 6-139.

¹⁴ U.S. Fire Administration, “The Major Conclusions For Experience with Sprinklers,” October 1997, WWW document, URL <http://www.usfa.fema.gov/safety/sprinkler.htm> (August 5, 1998); Jim Ford, *Automatic Sprinklers A 10 Year Study* (Scottsdale, AZ: Rural/Metro Fire Department, 1997), 16-17, 20.

¹⁵ International Fire Code Institute, *1997 Uniform Fire Code Volume 1*, (Whittier, CA: International Fire Code Institute, 1997), part 3, art. 10, sec. 1003.2.2; *Minn. Rules*, ch. 7510.3530, art. 2, subp. 8. “Dwellings” mean single-family residences and congregate residences (such as a convent or dormitory) of 10 or fewer persons.

work with large insured parties, such as a county, to identify ways to reduce the insured party’s exposure to risks including the risks of fire. The main purpose behind these specialists is to control losses by taking steps to reduce fire and other hazards and prevent the outbreak of fires. Often the specialists will conduct a risk assessment before writing an account for a client, and may recommend property protection systems. They typically view themselves as working in partnership with local fire departments.

Insurance Services Office, Inc.

As a service to insurance companies that determine fire insurance premiums, the Insurance Services Office, Inc. (ISO), a nonprofit organization, evaluates communities’ abilities to suppress fires. The ISO produces a classification of properties based on their loss potential in the event of a fire. This classification (a ranking of 1 to 10 based on numerous factors within the community) is one variable among many that insurance companies may use in setting premiums. Large commercial structures within a city may have their own individual ISO classification; other smaller properties and residential structures, on the other hand, are rated as a group. In 1998, the ISO began a process of updating its fire suppression information, such as district boundaries and automatic aid agreements, for determining classifications. It is also developing a process to grade communities’ building-code enforcement with the prospect of favorable insurance pricing for areas with strong support for enforcing building codes.

The ISO classification does not account for fire prevention efforts. It ordinarily includes an assessment of the community’s water supply, fire department features and practices, and fire alarm system.

Fire Brigades and Safety Teams

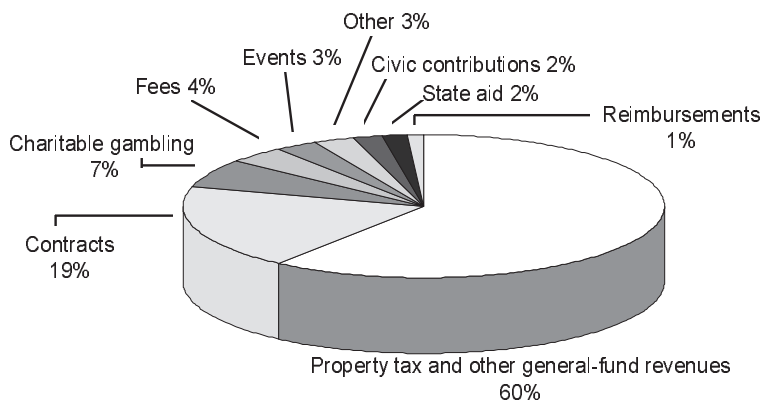
Some commercial enterprises employ their own fire fighters, known as fire brigades, due to the high-risk nature of their business. Oil refineries are an example of industries likely to have fire brigades with their own fire stations, trucks, and equipment. Other businesses, such as those storing or manufacturing certain chemicals, may not have fire brigades but may have safety teams. These are employees trained and equipped to diagnose fire or other emergency risks and administer first aid when necessary. Although we recognize that certain companies use fire brigades and safety teams, we did not include them in this review of local fire departments.

FINANCING FIRE DEPARTMENT SERVICES

Revenues for Operating Expenses

Most Minnesota fire departments rely heavily on property tax revenues and other general-fund revenues for their operating expenses but also supplement them with revenues from other sources. Figure 1.3 shows the average percentage of various revenue sources received by fire departments in 1997. Our survey indicated that:

Figure 1.3: Fire Department Average Revenue Sources, 1997



SOURCE: Legislative Auditor’s Office Survey of Fire Departments, 1998.

- **Eighty-two percent of fire departments relied on property taxes and other general-fund revenues for at least some of their revenues in 1997.**

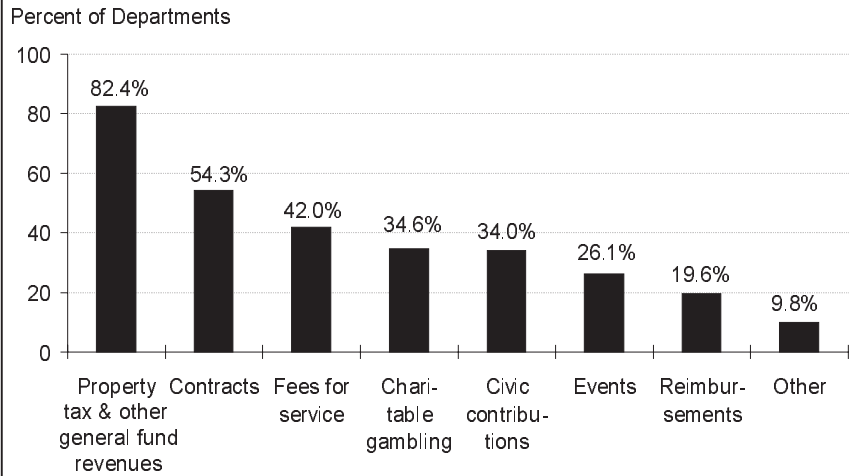
About 66 percent relied on property taxes and other general-fund revenues for half or more of their operating revenues. As explained below, many fire departments also received revenues from contracts for services they provided in 1997. Figure 1.4 illustrates how many fire departments relied on specific types of revenues that year.

Approximately 42 percent of departments received revenue from fees they charged for providing certain services in 1997. Among those departments charging fees, a higher share of the full-time departments had fee revenue in 1997 than did combination or volunteer and paid on-call departments. We learned that one common activity for which fire departments charged fees was responding to repeat false alarms at a given location; after three or four false alarms, departments send invoices for additional responses to false alarms. Figure 1.5 shows other circumstances under which fire departments charged fees.

Townships have explicit authority to impose service charges for fire or rescue services they provide.¹⁶ Townships may collect unpaid charges against the property owners' property at the time property taxes are levied. The authority extends to cities by virtue of statutes that confer certain township powers to cities.¹⁷

Some departments supplement their tax and fee revenues with other sources of funds. In 1997,

Figure 1.4: Percentage of Fire Departments Receiving Revenue from Various Sources, 1997



SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

more than half of all fire departments received revenues from contracts to provide services; 35 percent of departments, most of which were volunteer or paid on-call departments, received proceeds from charitable gambling; 34 percent of all fire departments received revenues in the form of contributions from civic organizations, such as Lions Clubs; and 26 percent from events, such as charitable balls or sporting events. About a fifth of all departments also received in-kind donations, such as defibrillators donated by a local group.

The state of Minnesota provides two sources of aid for fire-related purposes: fire state aid and amortization aid. We briefly describe these two aid programs later in this chapter where we discuss the state's role in fire services. Revenues from these state aids are primarily used for fire fighter pensions.¹⁸

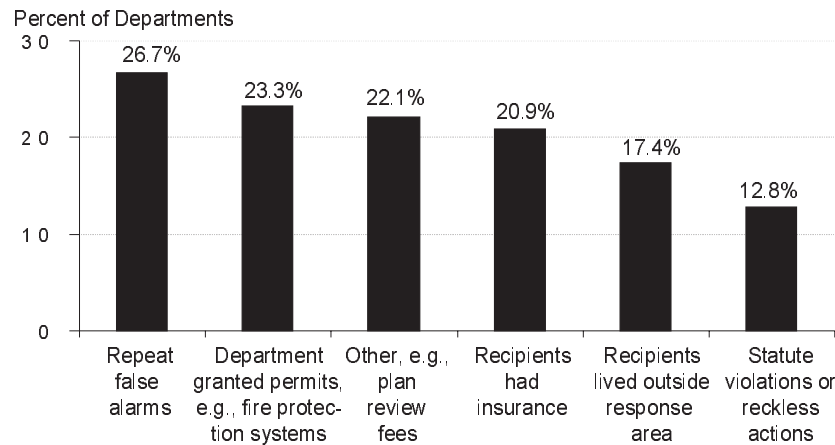
The fire departments that operate at the Minneapolis/St. Paul International Airport and at the Rochester Airport receive other types of

¹⁶ Minn. Stat. §366.011.

¹⁷ Minn. Stat. §415.01.

¹⁸ The management of fire fighter pensions is not considered in this report.

Figure 1.5: Circumstances Under Which Larger Fire Departments Charged Fees, 1997



NOTE: Data collected from volunteer or on-call fire departments in cities with more than 8,000 population and from full-time and combination departments.

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

Revenues for Capital Expenses

Fire fighting requires the use of ladder trucks, pumpers, and other apparatus that can cost in the hundreds of thousands of dollars when purchased new. As with operating expenses, most departments finance capital purchases with property tax revenues. Some cities sell bonds to raise the capital funds they need when purchasing apparatus and financing the construction of major facilities, such as fire stations. In contrast to most other locally provided services where vehicles and equipment are purchased largely with revenues raised by local governments, many fire

departments use revenues from civic organizations to defray the costs of their capital purchases. According to our survey,

- **Many volunteer and paid on-call fire departments rely on other sources outside the public sector to finance their purchases of fire department apparatus.**

financing. Airport user fees paid by flyers at Minneapolis/St. Paul International finance that fire department's operations and apparatus. At the Rochester Airport, the fire department is part of a private, for-profit operation financed through earned revenues.

Operating Expenditures

In 1997, the median level of operating expenditures for fire departments was about \$17 per capita, according to our survey data.¹⁹ (Calculations include the populations of all communities within each department's primary response area.) The range was large, as may be expected. Median operating expenditures ranged from a low of about \$16 per capita in volunteer or on-call departments to about \$76 per capita in full-time departments. Differences in operating expenditures per capita result largely from the type of staffing in the department and from differences in the range of services departments provide, as discussed later in this chapter.

More than 49 percent of all fire departments reported that they used some contributions from civic organizations or charitable gambling proceeds toward the purchase of apparatus during the last 10 years; all but 4 of those departments were volunteer or paid on-call departments. Four percent of fire departments received apparatus in exchange for fire services they provided by contract; again, all were volunteer or paid on-call departments.

According to our survey, fire departments estimated that they spent a median \$57 per capita on capital expenditures for apparatus over the ten years between 1987 and 1997 (unadjusted for inflation). Estimates ranged from spending nothing on capital purchases in that time period to spending \$488 per capita. The median capital expenditures were

¹⁹ Per capita data are based on population estimates provided by the State Demographer's Office; they do not account for shifts in population that communities may encounter due to the influx of daily commuters or seasonal variations caused by tourists or students.

higher for volunteer and paid on-call departments at \$64 per capita over ten years than for full-time and combination departments at \$22 and \$26 per capita, respectively. Because many of the volunteer and paid on-call fire departments are located in communities with relatively small populations, their capital costs are spread over a smaller base of people.

SERVICES PROVIDED BY FIRE DEPARTMENTS

Because each fire department decides its own level of service based on its community's needs and resources, the type and level of service varies from department to department around the state. State statutes require that departments ensure the investigation of fire causes and origins and report the results of their investigations to the State Fire Marshal.²⁰ The scope of other fire department activities is a matter of local discretion.

Fire Suppression

All active fire departments suppress fires, although no statute requires them to do so. Around the state, fire departments that reported data to the State Fire Marshal responded to more than 19,300 fires in 1997, 5 percent less than the previous year.²¹ About a third of the reported 1997 fires were in buildings, a quarter were vehicle fires, and the remaining 42 percent were other types such as wildland fires and dumpster fires.²² Over the past five years, the number of reported fires remained fairly steady, increasing less than 3 percent, while other types of reported incidents increased more than 44 percent.²³

Of the fires occurring in structures in 1997, 63 percent were in residential properties. Fires in residential buildings were most often caused by

unattended cooking and by heating-related causes.²⁴ Two-thirds of the 54 civilians who died in fires in 1997 perished in residential buildings.²⁵ Over time, more civilian fire deaths per capita have occurred in rural Minnesota than in the seven-county Twin Cities metropolitan area. Conversely, the rate of incendiary fires is higher in the Twin Cities region: In 1997, the metropolitan area experienced 5.5 incendiary fires per 10,000 residents compared to 4.5 outside the Twin Cities area.²⁶ For fires in all buildings in 1997, the three primary causes of fires with known causes were heating, cooking, and incendiary, according to State Fire Marshal data.

According to our survey data, for every one response fire departments made to suppress fires in 1997, they made almost seven responses for other types of services, such as for rescues, emergency medical services, and hazardous materials spills. Fire departments in the Twin Cities area spent a median 39 percent of their person-hours involving responses in 1997 on fire suppression compared to 62 percent of person-hours by fire departments outside the Twin Cities. This means that metropolitan area fire fighters spent a larger share than fire fighters elsewhere of their response time on responses such as rescues, first responder services, investigations, and fire prevention.

Fire Prevention

Although fire prevention activities are widely acknowledged to be significant forces in reducing fire losses and fire-related injuries and deaths, many departments' fire suppression functions have largely overshadowed them. Many European countries and Japan place stronger emphases on fire prevention

Fire prevention often receives less attention.

²⁰ *Minn. Stat.* §299F.04, subd. 1-3.

²¹ State Fire Marshal, *1997 Fire in Minnesota*, 3. Wildland fires managed exclusively by the Department of Natural Resources' Forestry Division are not included in this count.

²² State Fire Marshal, *1997 Fire in Minnesota*, 3.

²³ State Fire Marshal, *1997 Fire in Minnesota*, 4.

²⁴ State Fire Marshal, *1997 Fire in Minnesota*, 10, 16.

²⁵ State Fire Marshal, *1997 Fire in Minnesota*, 31.

²⁶ State Fire Marshal, *1997 Fire in Minnesota*, 25.

and have had lower numbers of fire incidents than the U.S., as well as lower rates of fire fighter and civilian fire deaths and injuries.²⁷ Although the average fire death rate across our country dropped significantly between 1979 and 1992, the U.S. still had one of the highest per capita fire death rates when compared to similar nations.²⁸ The high death rate is attributed in part to fewer resources committed to fire prevention activities.

While some Minnesota fire departments have strong fire prevention efforts, we found that fire suppression generally takes precedence over fire prevention. For instance, according to our survey:

- **For every 1 person-hour spent on public education and fire code enforcement in 1997, Minnesota fire departments spent 2.7 person hours on fire suppression.**

As Table 1.1 shows, the disparity in this ratio is larger outside the Twin Cities metropolitan area and for volunteer and paid on-call departments.

Public Education

Many departments recognize the need to provide public education to help prevent fires, mitigate

those that start, and reduce personal injuries from fire. We found that:

- **More than 90 percent of fire departments indicated they had a public education program, although the extent of the programs varied widely.**

Table 1.2 shows the percentages of fire departments that had various elements in their fire-safety public education efforts in 1997.

The number of people affected by the larger fire departments' public education programs also varied. About 13 percent of the larger fire departments that offered fire safety education estimated that at least 75 percent of their population received public education materials in 1997. Approximately a third estimated that at least half of their populations received their fire-safety messages. Similar data are not available for fire departments in smaller jurisdictions.

Intervention Programs for Juvenile Fire-Setting

The sources of many incendiary fires have been traced to juveniles playing with fire, either out of curiosity or maliciousness. In 1997 more than 550 fires around the state, about 3 percent of all fires, involved children playing with fire; high percentages of juveniles who set fires once will do so again, lacking proper intervention.²⁹ Across the country, juveniles accounted for a higher share of arson arrests in the mid-1990s than a decade earlier.³⁰ Intervention programs are designed to identify children who have set fires in the

Table 1.1: Time Spent on Fire Prevention vs. Fire Suppression, by Type of Fire Department, 1997

| Ratio of Person-Hours on Fire Prevention to Person-Hours on Fire Suppression | | | | | |
|--|------------------------------------|------------------------------|--------------------|----------------------|--------------------------------------|
| All Fire Departments (N=187) | Metropolitan Departments (N=36) | Rural Departments (N=151) | Full-Time (N=5) | Combination (N=6) | Volunteer or Paid On-Call (N=176) |
| 1:2.7 | 1:1.5 | 1:5.4 | 1:0.5 | 1:3.5 | 1:3.1 |

NOTE: "N" refers to the number of fire departments responding to particular survey questions; not all respondents answered each question.

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

27 Federal Emergency Management Agency (FEMA), *Fire in the United States 1985-1994*, ninth ed. (Washington D.C.: U.S. Fire Administration, National Fire Data Center, 1997), 179-183; Philip S. Schaenman, *International Concepts in Fire Protection* (Arlington, VA: TriData, 1982), 91-93.

28 FEMA, *Fire in the United States*, 180.

29 State Fire Marshal, *1997 Fire in Minnesota*, 4, 79.

30 John R. Hall, Jr., "Use of Fire Incident Data and Statistics," *Fire Protection Handbook*, 18th ed. (Quincy, MA: National Fire Protection Association, 1997), 11-23.

Table 1.2: Elements in Fire Departments' Public Education Programs, 1997

| Element | All Fire Departments (N=387) |
|--|------------------------------|
| Participation in Fire Prevention Week | 80.9% |
| Collaboration with school administrators and teachers | 72.9 |
| Use of public education materials and programs such as <i>Learn Not to Burn</i> and fire-safe demonstration houses | 54.0 |
| Use of media and community organizations to deliver fire-safety messages | 52.5 |
| Smoke detector program | 44.2 |
| Identification of local fire risks and targeting of information accordingly | 39.0 |
| Availability of fire education materials for use by citizens and civic groups | 30.5 |
| Availability of materials in languages spoken within community | 20.7 |
| Designation of qualified fire-safety public education officer | 17.1 |
| Routine monitoring of program's effectiveness | 11.6 |
| Program of fire-safety surveys in residences | 10.1 |
| Other | 4.9 |

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

past and prevent them from setting fires again. We found that:

- **About 51 percent of larger fire departments had established juvenile fire-setter intervention programs, and another 8 percent had them under development in 1997.**

About 74 percent of combination departments had such intervention programs; about 46 percent of full-time and 44 percent of larger volunteer or paid

on-call departments also had them. Similar data are not available for departments in smaller jurisdictions.

Following a 1997 recommendation of the Attorney General's Arson Task Force and a subsequent legislative appropriation, the State Fire Marshal Division implemented a Juvenile Firesetter Intervention program in 1998 (described briefly later in this chapter).³¹ The program has the potential to benefit fire departments around the state.

Fire-Code Inspections and Plan Reviews

Another component of fire prevention is inspecting buildings for compliance with the fire code. Minnesota's fire code, based largely on the *Uniform Fire Code* provisions promulgated by the International Conference of Building Officials and the Western Fire Chiefs Association, provides standards on fire safety for the construction and use of buildings.

The *Minnesota Uniform Fire Code* applies statewide and local fire chiefs and fire marshals have authority to enforce it, with the exception of specific types of buildings for which the State Fire Marshal has enforcement authority.³² We found that:

- **Slightly more than half of fire departments reported that they or other local agencies conducted fire-code related inspections in 1997.**

Forty-three percent of the fire departments in 1997 inspected buildings for fire code enforcement or had their fire marshal do so. In another 13 percent of the departments, fire-code related inspections were conducted only by a county, city, or some other local agency not part of the fire department. For 44 percent of the departments, no local agency conducted fire-code related inspections.

³¹ Office of Minnesota Attorney General Hubert H. Humphrey III, *Report of the Attorney General's Arson Task Force* (St. Paul: February 1997), 22; *Minn. Laws* (1997), ch. 239, art. 1, sec. 7, subd. 4., (11) and art. 8, sec. 21.

³² *Minn. Stat.* §299F.011, subd. 4; International Fire Code Institute, *1997 Uniform Fire Code Volume I*, part 1, art. 1, sec. 103.2.1.1.

We found that:

- **Fire code inspections were more likely in cities that have full-time or combination departments than in those with volunteer or paid on-call departments.**

All but two of the full-time and combination departments that answered our survey inspected buildings for fire-code compliance; by contrast, only 37 percent of the volunteer and paid on-call departments did so.

Some cities have adopted the *Minnesota Uniform Fire Code* to amend the code in ways that address local fire safety concerns. Local regulations can be more restrictive than the *Uniform Fire Code* but they must: (1) be directly related to fire or life safety; (2) be uniform for each class of buildings or hazard covered; and (3) not exceed the requirements of the *State Building Code*.³³

The *State Building Code* applies to new construction and remodeling in those Minnesota cities or counties that have adopted the code. (Unlike the *Minnesota Uniform Fire Code*, the *State Building Code* does not apply statewide). Although parts of the state fire code are adopted by reference in the *State Building Code* or appear in both codes, other parts are not. For instance, both building

The Uniform Fire Code applies statewide and is enforced locally.

and fire codes set requirements for fire-resistant materials and construction, yet only the fire code specifies fire department access to buildings and water supply. Further, building inspectors can grant variances, or equivalencies, from the *State Building Code*.

Therefore, fire personnel involvement in the early stages of building construction, such as in reviewing construction plans for compliance with the

overlapping portions of the fire code, helps ensure that fire-safety criteria are considered before the building inspector grants a certificate-of-occupancy to the owner. A 1999 report from the Legislative Auditor's Office recommended that both building and fire officials be involved throughout the code enforcement process and that they give mutual approval on proposed equivalencies regarding the overlapping portions of the codes.³⁴

About 98 percent of the larger communities had fire code inspections conducted by the fire department or another local agency in 1997. In our study, we found that:

- **About 90 percent of larger communities where fire departments or other local personnel were involved with fire code inspections had personnel participating in plan reviews for new building construction; 74 percent had them in certificate-of-occupancy processes.**

Similar data are not available for fire departments in smaller communities. Table 1.3 shows the level of fire department participation in plan reviews and certificate-of-occupancy by type of department.

Some fire departments rely at least in part on self-inspection of buildings by the building owner or manager to ascertain fire-code compliance. In these cases, fire departments require documentation of such inspections in lieu of conducting the inspections themselves. About 79 percent of fire departments in larger communities indicated that they requested documentation of code compliance in 1997. Most of these requests were made of certain types of buildings that represented less than half of the buildings subject to local inspection for fire code compliance.

Fire Investigations

State statutes require all fire chiefs to investigate, or cause to be investigated, the cause, origin, and circumstances of each fire in the jurisdiction when

³³ *Minn. Stat.* §299F.011, subd. 4.

³⁴ Minnesota Legislative Auditor's Office, *State Building Code* (St. Paul, 1999), 59-60.

Table 1.3: Fire Code Activity by Fire Departments or Fire Marshals in Larger Cities, 1997

| | Full-Time Departments (N=12) | Combination Departments (N=18) | Volunteer or Paid On-Call Departments (N=46) |
|--|------------------------------------|--------------------------------------|---|
| Conducted plan reviews | 91.7% | 94.4% | 87.0% |
| Participated in certificate-of-occupancy process | 75.0 | 77.8 | 71.7 |

NOTE: Data collected from volunteer or paid on-call fire departments in cities of 8,000 or more population and departments with full-time or combination personnel.

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

damage exceeds \$100.³⁵ Further, investigators must report investigation results within a week to the State Fire Marshal Division.³⁶

Some fire departments conduct their own fire investigations, others rely on their local police or sheriff departments, and still others rely on the State Fire Marshal Division for this function. Some

departments rely on outside investigative help only for very large or complex fires. Even when fire departments contact the State Fire Marshal Division, however, the local fire chief remains responsible for overseeing the investigation through to its conclusion. Table 1.4 shows that:

- **Fire departments in smaller jurisdictions and volunteer or paid on-call departments were more likely than others to have relied on the State Fire Marshal Division for investigations in 1997.**

Table 1.4 also shows that full-time fire departments were slightly more likely than other types of departments to rely frequently on local law enforcement for investigations.

Emergency Medical Services

Many fire departments of all types, whether staffed by full-time, paid on-call, or volunteer members, provide some level of emergency medical services (EMS). Fire departments became involved in EMS over time for several reasons: Their emergency training was a natural precursor to providing emergency medical help, cross-training fire fighters to assume EMS duties increased their productivity,

Table 1.4: Fire Departments that Relied on State Fire Marshal or Law Enforcement for Investigations, 1997

| | Relied Frequently on State Fire Marshal or Law Enforcement | | | Relied Heavily on State Fire Marshal Volunteer or Paid On-Call Departments in Smaller Communities |
|--------------------|---|----------------------------|---|---|
| | Full-Time Departments | Combination Departments | Volunteer or Paid On-Call Departments in Larger Communities | |
| State Fire Marshal | 7.7% (N=13) | 15.8% (N=19) | 29.6% (N=54) | 63.7% (N=289) |
| Law Enforcement | 46.2 (N=13) | 31.6 (N=19) | 26.4 (N=53) | |

NOTE: Fire departments not represented above relied sometimes or rarely (if at all) on the State Fire Marshal or law enforcement for investigations.

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

³⁵ Minn. Stat. §299F.04, subd. 1.

³⁶ Minn. Stat. §299F.04, subd. 3.

and fire stations were often located in places that allowed fire fighters to respond efficiently to incidents requiring EMS.

In Minnesota, the Emergency Medical Services Regulatory Board licenses and regulates transporting ambulance services but does not regulate the nontransporting services.³⁷ Figure 1.6 briefly describes the differences between first responder services, basic life support (BLS), and advanced life support (ALS) services. The EMS Regulatory Board specifies training and issues certificates for three different levels of EMS, but it does not certify first responders. First responders may, however, register with the board after successfully completing certain training.³⁸ According to our survey:

- **About 60 percent of all fire departments offered some level of emergency medical services in 1997.**

As shown in Table 1.5, full-time departments were more likely than combination or volunteer and paid on-call departments to offer first responder and BLS service. A small number of fire departments have ambulances for transporting victims to medical facilities, which requires state licensure. Most fire departments involved with emergency medical services, though, provide prehospital care at emergency scenes and do not have ambulances to transport.

Rescues

Over the years, many fire departments have acquired the training and experience to add rescues to their services. Different types of rescues require different training, expertise, and equipment.

Perhaps one of the more common rescues performed by many fire departments, usually as part of their first responder activities, is the extrication of victims from vehicles involved in traffic accidents. Other types of rescue activities include:

Figure 1.6: Levels of Emergency Medical Service

| First Responders | Basic Life Support (BLS) | Advanced Life Support (ALS) |
|---|---|--|
| <p>The minimal level of service is first responder. First responders arrive first at the emergency scene, control the scene, and administer initial medical care before the arrival of a licensed ambulance. First responders are not certified in Minnesota, but can be registered by the EMS Regulatory Board after completing a 40-hour training program that meets U.S. Department of Transportation standards.</p> | <p>Persons certified at EMT-basic levels have completed at least 81 hours of instruction and been tested for certain skills including patient assessments, immobilization of spinal injuries, splinting of long bone fractures, wound care, care of shock, and CPR. BLS ambulances need at least two persons trained at the emergency medical technician (EMT)-basic level to transport people.</p> | <p>The highest level of EMS is advanced life support. ALS-licensed ambulances can offer more advanced services than BLS units and can administer drugs. ALS can provide advanced airway management, cardiac defibrillation, and intravenous administration. To transport, ALS crews must have a minimum of an EMT paramedic and EMT basic.</p> |

SOURCE: *Minn. Rules*, ch. 4690.3900 to 4690.7200; *Minn. Stat.* §144E.001; Bob Bailey, et al, *State of Minnesota A Reassessment of Emergency Medical Services* (St. Paul: EMS Regulatory Board), July 1997, 11-14.

³⁷ According to the Emergency Medical Services (EMS) Regulatory Board, Minnesota registers first responders and certifies three additional levels of EMS providers: emergency medical technician (EMT)-basic, EMT-intermediate, and EMT-paramedic. Required training and experience increase for each level. Each EMT level requires completion of a prescribed content and number of continuing education hours, and requires ongoing training. Plus, *Minn. Stat.* §144E.16, subd. 6 requires ambulance drivers to complete an approved emergency vehicle drivers program if they use red lights and siren. Although the EMS Regulatory Board certifies EMTs and renews certification, it has no authority to revoke, suspend, deny, or place conditions on EMTs. Legislation introduced in 1999 would extend such authority to the board. (See *Minn. House* (1999), H.F. no. 476.)

³⁸ *Minn. Stat.* §144E.27, subd. 2.

Table 1.5: Fire Departments Offering Emergency Medical Services, 1997

| | Full-Time Departments | Combination Departments | Volunteer or Paid On-Call Departments |
|--------------------------|--------------------------|----------------------------|---|
| First Responder | 83.3% (N=12) | 68.8% (N=16) | 54.3% (N=339) |
| Basic Life Support | 92.3 (N=13) | 61.1 (N=18) | 17.6 (N=341) |
| Advanced Life Support | 23.1 (N=13) | 27.8 (N=18) | 5.0 (N=341) |

NOTE: Most fire departments reporting BLS or ALS services are not licensed transporting ambulance services.

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

confined-space entry and rescue operations, trench rescues, structural collapse rescues, water and ice rescues, wilderness search and rescue, high- and low-angle rope rescues, and agricultural or industrial rescues. We found that:

- **About 70 percent of all fire departments offered rescue services, including vehicle extrications, in 1997.**

As with other specialized services, higher percentages of full-time and combination departments than volunteer or paid on-call departments offered rescues. Table 1.6 shows the differences. Fire departments typically spent less time on rescues than on fire suppression in 1997. For every 1 person-hour fire departments spent on suppression activities in 1997, they spent about 0.2 person-hours on rescues.

Hazardous Materials Responses

Many fire departments are equipped and trained to offer basic responses to accidents involving releases of hazardous materials. Hazardous materials are any gas, liquid, or solid that can cause harm to people or the environment. Vehicle accidents

involving trucks carrying hazardous materials are a common source of hazardous materials spills. Safety standards established by the United States Occupational Safety and Health Administration (OSHA) set five different levels of preparedness for identifying and managing hazardous materials accidents. They also prescribe the nature of the training that personnel must receive before participating at any of the five levels of response. Figure 1.7 briefly describes these levels.

The minimum level of response and training is known as the “awareness” level, which encompasses any personnel who may be likely to witness or discover a hazardous materials spill and initiate a response. At the next level, known as the “operations” level, personnel act in a defensive fashion during the initial response to protect nearby people and property. Neither of these levels prepares personnel to actually stop or clean up a spill.

- **Nearly 79 percent of fire departments required or offered training at the minimum “awareness” level, and 41 percent at the “operations” level, of hazardous materials responses in 1997.**

All fire departments with full-time and combination personnel reported they had awareness level training, and 77 percent of volunteer or paid on-call departments had training at this level. According to OSHA regulations, fire departments must train their members at the level of hazardous material response they perform or are expected to perform.³⁹

Table 1.6: Fire Departments Offering Rescues, 1997

| Full-Time Departments (N=12) | Combination Departments (N=19) | Volunteer or Paid On-Call Departments (N=340) |
|------------------------------------|--------------------------------------|--|
| 91.7% | 100% | 67.4% |

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

³⁹ 29 Code of Federal Regulations, sec. 1910.120, (q), (6).

Figure 1.7: Levels of Hazardous Materials Response

| First Responder-Awareness | First Responder-Operations | Hazardous Materials Technician | Hazardous Materials Specialist | On-Scene Commander |
|---|---|--|--|--|
| Personnel are likely to discover a hazardous substance release and have been trained to initiate an emergency response. | Personnel respond for the purpose of protecting nearby persons, property, or the environment from the release; they respond defensively and do not actually stop the release. | Personnel approach the point of hazardous materials release to stop the release. | Personnel support the technicians but have more specific knowledge of certain substances they may be called upon to contain. | Incident commanders assume control of the incident scene and implement the incident command system and emergency response plans. |

NOTE: Each successive level of response requires specific training and knowledge.

SOURCE: 29 Code of Federal Regulations, ch. XVII, sec. 1910.120, (6)(i) - (v), (July 1997).

If a fire department, for instance, has been designated locally to contain releases of hazardous materials, evacuate residents, and prevent spills from spreading, its fire fighters must be trained at the first responder-operations level. Although hazardous materials training may vary among fire departments across the state, the level of training must correspond to the duties and functions performed by each responder.

Because of the expense and training needed for hazardous materials responses, and the sporadic nature of hazardous materials spills, in 1992 the Department of Public Safety began an effort to develop response teams of local fire officials who could respond to spills within specific regions of the state at the request of local officials. In lieu of each individual department acquiring the training, equipment, and expertise for full responses to hazardous material spills, the teams contracted by the department are available to assist local response units with these incidents. Even when the teams are contacted, however, the local incident commander retains command over the incident.

Nine local governments (and one private firm) around the state currently contract with the Department of Public Safety to provide specially trained and equipped personnel to respond to

hazardous materials releases at the request of, and in support of, local authorities. Contracts are set for a two-year period. Training at least at the “technician” level is required for members of the regional teams.

At the request of local government officials, the Department of Public Safety will activate regional hazardous materials teams of two types: chemical assessment teams or hazardous materials emergency response teams. Chemical assessment teams provide technical advice to local incident commanders who must remain in command of the incident. The teams recommend to local commanders the actions necessary to protect life, property, and the environment that are in keeping with locally-available levels of hazardous materials training and response capability.

Emergency response teams take actions necessary to protect life, property, and the environment from the effects of a release of a hazardous material. Emergency actions include, but are not limited to: preventing the release, mitigating the effects of the release, and stabilizing the emergency situation. Neither chemical assessment teams nor emergency response teams may transport or dispose of hazardous materials; nor may they assume overall command of the incident.⁴⁰

⁴⁰ Minn. Rules, 7514.0900, subp 6.

Fire Fighter Training

Individual fire departments make their own training decisions based on the services their fire fighters are expected to provide. With the exception of extensive Minnesota Occupational and Safety Administration training requirements described below and other Minnesota Administrative Rules for specialized activities such as ambulance services and responses to hazardous materials spills, the state does not set general fire fighting training standards.⁴¹ Most fire departments, however, require fire fighting training. According to our survey:

- **More than 97 percent of fire departments offered or required training in fighting structural and vehicle fires in 1997.**

About 86 percent offered or required first aid and cardiopulmonary resuscitation (CPR) training, and a similar percentage offered or required training on the use and limitations of personal protective equipment (the apparel and gear worn or carried by fire fighters to protect themselves from hazardous conditions).

Although the state does not certify fire fighters' qualifications, the Minnesota Fire Service Certification Board offers voluntary certification of fire fighters who complete certain requirements. Other certification programs from around the country are also available, such as that offered by the International Association of Arson Investigators.

Fire fighter training has become an issue in Minnesota because of perceived problems with the availability of training and its costs. In 1997 the Legislature created a Firefighter Training Study Committee to explore training issues.⁴² The committee submitted a report to the Legislature in February 1998 stating that the fire service favors continued local determination of training needs.

The report also identified several problems in the current training system, including inconsistent quality of instruction, inadequate curriculum standards, insufficient funding, and unclear accountability for the uses of some funding.

This report was predated by a joint advisory training committee, formed by the Minnesota State Fire Chiefs' Association, Minnesota State Fire Departments Association, and Minnesota Professional Fire Fighters Association in 1993. The joint committee concluded that training programs around the state were inconsistent in content and that local departments had inadequate funding to obtain training.

As an offshoot of the 1997 Firefighter Training Study, a bill introduced in the 1999 legislative session addresses fire fighter training.⁴³ The bill would establish a board of fire fighter training responsible for: reviewing fire fighters' educational needs, recommending ways to improve fire fighter training and skills, developing qualifications for training instructors, and establishing and administering a training reimbursement program.

Differences Among Types of Fire Departments

To look at differences in performance among types of fire departments serving larger communities, we compared 1997 survey data for three groups of departments: (1) full-time departments, (2) combination departments with six or more full-time members, and (3) departments with five or fewer full-time members and volunteer or paid on-call departments in communities with 8,000 or more people. For lack of data, all volunteer departments and on-call departments in smaller communities were not in this analysis. In many cases, we saw little difference when comparing the performance of full-time, combination, and larger volunteer or paid on-call departments. For instance:

⁴¹ *Minn. Rules*, 7514.0600 and 7514.0800, subp. 5 specifies the training necessary for members of chemical assessment teams and emergency response teams that respond to hazardous materials accidents on a contract basis with the Department of Public Safety. *Minn. Rules*, 4690.0400 and 4690.2100 prescribe training standards for persons involved with basic life support and advanced life support ambulances. Minnesota's Occupational Safety and Health Act (MNOSHA) defines worker-safety rules, some of which apply to working conditions that fire fighters face.

⁴² *Minn. Laws* (1997), ch. 239, art. 2, sec. 9.

⁴³ *Minn. House* (1999), H.F. no. 465.

- **High percentages of full-time, combination, and larger volunteer or paid on-call departments reported acceptable median response times to fires for 1997.**

As shown in Table 1.7, while the typical response times for full-time and combination departments were lower than that for larger volunteer or paid on-call departments, high shares of all types of departments were at or below an eight-minute threshold for the initial attack team to arrive after receiving the call, which the National Fire Protection Association suggests as an important rule of thumb.⁴⁴

Similarly, approximately equal percentages of full-time, combination, and larger volunteer or paid on-call departments reported: (1) implementing recommended health and safety practices for their

members, (2) providing training that prepared fire fighters well for the services they were expected to perform, and (3) using preventive maintenance programs for department apparatus. High rates of all department types also reported having incident management systems in place for fire fighting. Table 1.8 shows the percentages of full-time, combination, and volunteer or paid on-call fire departments with these and other characteristics.

At the same time, our survey data for 1997 showed:

- **In some regards, full-time departments were more likely than others to provide more comprehensive services and advance planning.**

Full-time departments were more likely than others to offer a full range of public fire-safety education initiatives. A somewhat larger share of the full-time departments than others reported having long-range master plans for their department that included strategic planning, a community risk analysis, and contingency plans in the event of disasters. In addition, full-time and combination departments were more likely than volunteer or paid on-call departments to have complete preincident plans available with information needed to prepare in advance for the possibility of fire and comprehensive fire-code inspection and enforcement efforts. More full-time departments than others had high percentages of structure fires contained to the room of the fire’s origin.

For many measures, on-call departments performed as well as others.

Table 1.7: Response Times and Expenditures per Capita by Type of Fire Department in Larger Cities, 1997

| | Full-Time Departments | Combination Departments | Volunteer or Paid On-Call Departments |
|---|-----------------------|-------------------------|---------------------------------------|
| Median response time after receiving call for units capable of initial attack | 3.5 minutes (N=10) | 4.0 minutes (N=11) | 6.0 minutes (N=42) |
| Percentage of fire departments within 8 minute response time to fires | 100% (N=13) | 95% (N=19) | 88% (N=51) |
| Median operating expenditures per capita within primary response area | \$76 (N=11) | \$45 (N=18) | \$15 (N=53) |

NOTE: Data collected from surveys of volunteer or paid on-call fire departments in cities of 8,000 or more population and departments with full-time or combination personnel. Volunteer or paid on-call departments in communities under 8,000 population are not included.

SOURCE: Legislative Auditor’s Office Survey of Fire Departments, 1998.

⁴⁴ Cote, *Fire Protection Handbook*, sec. 10-31. This source also suggests a 12-minute average response time for volunteer departments using nonstaffed stations. All paid on-call departments in our analysis met this threshold. Response time is defined as the average time starting when companies were alerted and ending when a full response unit capable of initial attack arrived.

Table 1.8: Comparison of Select Performance Measures by Type of Fire Department in Larger Cities, 1997

| | Full-Time Departments | Combination Departments | Volunteer or Paid On-Call Departments |
|---|--------------------------|----------------------------|---|
| Used preventive maintenance program for apparatus and equipment | 100% (N=13) | 100% (N=19) | 96.4% (N=56) |
| Used incident management system with written emergency response plans | 69.2 (N=13) | 89.5 (N=19) | 75.0 (N=56) |
| Conducted comprehensive fire code enforcement | 66.6 (N=12) | 61.1 (N=18) | 37.8 (N=45) |
| Percent of departments with high rate of structure fires contained to room of origin | 63.6 (N=11) | 47.4 (N=19) | 49.1 (N=53) |
| Had full range of information in preincident plans | 61.5 (N=13) | 57.9 (N=19) | 44.6 (N=56) |
| Provided training that prepared fire fighters well in every service they were expected to perform | 53.8 (N=13) | 47.4 (N=19) | 51.8 (N=56) |
| Wrote complete, long-term master plans for the department | 46.2 (N=13) | 10.5 (N=19) | 35.7 (N=56) |
| Offered full range of initiatives on public fire-safety awareness | 38.5 (N=13) | 31.6 (N=19) | 28.6 (N=56) |
| Had comprehensive investigation programs with ongoing training of investigators and fire fighters, among other things | 30.8 (N=13) | 42.1 (N=19) | 31.5 (N=54) |
| Implemented specific health and safety practices | 30.8 (N=13) | 26.3 (N=19) | 25.0 (N=56) |
| Had mutual aid agreements with standard procedures, communication protocols, and interagency training | 23.1 (N=13) | 31.6 (N=19) | 64.8 (N=54) |

NOTE: Data collected from volunteer or paid on-call fire departments in cities of 8,000 or more population and departments with full-time or combination personnel. Volunteer or paid on-call departments in communities under 8,000 population are not included.

SOURCE: Legislative Auditor's Office Survey of Fire Departments, 1998.

had fire investigation programs with standard operating guidelines, ongoing professional investigator training, instruction for fire fighters in preserving arson scenes, and joint investigation training with fire fighters and peace officers.

On the other hand, as shown in Table 1.7:

- **Volunteer or paid on-call departments in larger communities had far lower expenditures per capita in 1997 than full-time or combination departments.**

Not surprisingly, three-quarters of the volunteer or paid on-call departments had expenditures per capita for their primary response area that were below the median for all fire departments in communities with populations above 8,000. Given that these fire departments had few or no full-time personnel, this result was expected. In addition, a larger share of volunteer or paid on-call departments than either full-time or combination departments had mutual aid arrangements characterized by important features. These features included having a common agreement on standard operating procedures, interagency training,

familiarity of all fire fighters with mutual aid procedures, a uniform approach to incident command, and systems for interdepartmental communications, among others.

Speaking generally, our survey data for 1997 showed that many full-time, combination, and volunteer or paid on-call departments provided very good fire services in their communities. More volunteer and paid on-call departments had low per capita expenditures, but because of their reliance on part-time personnel, they did not have as full an array of comprehensive fire-related services as many full-time departments.

THE STATE ROLE IN FIRE SERVICES

As stated earlier, local officials generally organize and operate fire departments. At the same time, certain state agencies are involved with some components of local fire departments' work.

Department of Public Safety

State Fire Marshal Division

The State Fire Marshal Division has multiple responsibilities that involve it in operations with local fire departments. One already mentioned is state fire investigations. Twelve fire investigators from the State Fire Marshal Division investigated 582 fires in 1997, about a third of which were determined to be arson.⁴⁵ Besides conducting investigations at the request of local fire departments, the division investigates all fires involving fatalities.

The division is responsible for offering fire-scene investigation and preservation training to fire fighters and other local government personnel, in consultation with the Bureau of Criminal

Apprehension among others.⁴⁶ Specifically to aid investigations and prosecutions of incendiary fires, the division maintains a computerized arson investigation data system.⁴⁷

In 1998 the division implemented a juvenile fire-setting intervention program. This program offers materials outlining steps that local fire departments can take to identify juveniles at high risk of setting additional fires and intervene to help prevent juveniles from repeating their behavior. The material offers a sequence of techniques designed to provide the appropriate level of intervention for a range of firesetting behavior: from juveniles involved in firesetting out of curiosity to those setting fires maliciously. Also included are contact names and phone numbers of local resources in mental health and social services fields, to whom fire departments can refer juveniles when such treatment is warranted.

In addition, State Fire Marshal Division staff are organizing regional task forces of fire personnel and educators who agree to participate in the intervention programs. Personnel from local fire departments receive training to teach monthly classes to juveniles and their families who are referred to the program in lieu of prosecution.

Another role the State Fire Marshal Division plays is in fire code inspections. Certain buildings around the state are under the jurisdiction of the State Fire Marshal for inspections. These include schools, hotels, motels, hospitals, nursing homes, and certain resorts. The division inspects day-care facilities under contract with the Department of Human Services and health-care facilities licensed by the Department of Health under a contract with that department. The State Fire Marshal Division contracts with about 20 local fire departments whose local inspectors conduct inspections of these types of facilities (except hospitals and nursing homes) within their jurisdiction.

⁴⁵ State Fire Marshal, *1997 Fire in Minnesota*, 64, 66. Local fire departments are not required to pay for fire investigations conducted by the State Fire Marshal.

⁴⁶ *Minn. Stat.* §299F.051, subd. 1-subd. 4.

⁴⁷ *Minn. Stat.* §299F.04, subd. 3a-subd. 5.

In addition to inspections, the State Fire Marshal Division is the key player in promulgating and administering the *Minnesota Uniform Fire Code*. The Fire Marshal may get involved in appeals of orders issued for code compliance: If local building owners disagree with the orders they can appeal to local boards of appeal that may exist at the municipal level, and then to the State Fire Marshal. Ultimately, the owners could go to an administrative law judge for a final appeal. State Fire Marshal Division code specialists conduct plan reviews of particular occupancies planned for construction. Division staff also provide technical assistance to local fire officials, building owners, general contractors, building code officials, and the public on fire safety statutes and code requirements. They also conduct training on fire safety and the *Uniform Fire Code* for fire and building code officials. On the division's website, viewers have access to provisions of the *Minnesota Uniform Fire Code*.

The State Fire Marshal Division is involved with equipping and training the hazardous materials regional response teams described earlier. It collects and analyzes the data reported by local fire departments to provide a statewide picture of fire incidence and trends. In addition, the division is involved with multiple fire-safety public education initiatives. It also plays a regulatory role in the fire-sprinkler industry and certifies fireworks operators.

Division of Emergency Management

Also in the Department of Public Safety, the Division of Emergency Management performs functions that affect local fire departments. The division works with the State Fire Marshal Division on the regional hazardous-materials response teams that assist at the request of local fire departments. It also takes the lead on reviewing emergency management plans, some of which are prepared by local fire departments, as well as developing the state's emergency operations plan used to prepare for natural disasters, civil emergencies, and other security events.

Along with the Department of Natural Resources Forestry Division and several federal agencies, the Division of Emergency Management plays a role in the Minnesota incident management system. The incident management system is an effort designed to coordinate responses and communication among multiple agencies responding to fires and other emergency incidents. Among other things, the Division of Emergency Management has trained response agencies in the incident management system and has worked to extend the concepts of incident management, such as common terminology, integrated communications, and a unified command structure, to all types of emergencies.

The Division of Emergency Management offers grants to local emergency response agencies for planning and training on local responses to hazardous materials releases. Grants of up to \$2,000 are available for training or conducting drills in hazardous materials responses; others of up to \$350 are available for division-led training on incident-management systems that incorporate multiple agencies in responses to hazardous materials. Some grants require matching funds from the participating local governments.

In addition, the division houses the Minnesota Duty Officer. This is a one-stop office which local emergency personnel can call whenever they need state assistance with hazardous materials releases, weather warnings, search and rescues, and other incidents. It is this office's responsibility to contact the appropriate state agency staff and provide a communication link between them and the local reporting agencies.

Public-Safety Training Facilities Study

In 1998 the Legislature directed the commissioner of public safety, in consultation with Minnesota State Colleges and Universities, the Department of Military Affairs, and the Peace Officer Standards and Training Board, to develop a statewide master plan for the siting, ownership, and operation of fire and public-safety training facilities.⁴⁸ The

⁴⁸ *Minn. Laws* (1998), ch. 404, sec. 21, subd. 3.

committee compiled an inventory of existing and planned training facilities in the state as well as a set of decision-making criteria that legislators can use to evaluate proposals for funding new or expanding public safety training facilities. Based on its assessment of needs for specialized training facilities, the committee's report suggests that travel time and expenses are key barriers to obtaining adequate training, especially for small volunteer fire departments. The committee also found that while some facilities are not used to their maximum capacity, clear deficiencies exist in the availability of facilities for certain types of specialized training such as live-burn training and emergency-vehicle driving.

Among the criteria recommended for evaluating training-facility proposals is whether the project would be a multi-purpose facility and spread its cost and usage across several agencies. Further, the report recommends limiting state funding to 50 percent of a project's total capital costs and prohibiting operating subsidies from the state unless a state agency is an ongoing partner in a facility's operation.⁴⁹

Department of Natural Resources, Division of Forestry

The Division of Forestry in the Minnesota Department of Natural Resources has responsibility for preventing and extinguishing wildland fires (on grassland, brush, cropland, or forest areas) around the state.⁵⁰ It has identified wildfire protection districts, including both public and private lands, where there are high probabilities of wildfires starting; consequently, more of the division's firefighting resources are focused on the more densely forested areas in the northern half of Minnesota. Public education on wildfire prevention is also part of its duties.

Although the Forestry Division has area offices with foresters who fight fires, it also contracts with local fire departments and individual fire fighters for supplementary personnel and equipment to

extinguish wildfires. The division reimburses the fire departments for the calls to which they respond as well as for water hauling. It may also provide certain fire fighting apparatus and equipment to local fire departments as part of an agreement that the departments will assist when help is needed to extinguish wildland fires.

Forestry Division personnel do not use local department apparatus in fire fighting unless local personnel operate them.

***The DNR has
responsibility
for wildfires.***

Before engaging in live-burn training exercises for fire fighters, local fire departments must first receive permits issued by the Forestry Division. Fire departments must meet certain criteria before receiving the live-burn permits, such as identifying asbestos in the structure to be burned and stipulating clean-up activities following the training.

In addition, the Forestry Division manages the Interagency Fire Center, located in Grand Rapids, which was created to improve wildfire management. It is a focal point for the exchange of wildfire information and available resources for planning and managing wildfires. The Interagency Fire Center is a central member of the Minnesota Incident Command System, which is a partnership for common terminology and collaborative planning among multiple agencies involved with managing wildfires and other emergencies. Fire Center duties include a wildland fire prevention campaign; local fire departments may use the Center's "Smokey Bear" materials as part of their public information efforts.

The Interagency Fire Center manages a federal excess property program, from which local fire departments receive loaned surplus federal equipment and vehicles for fire fighting needs at minimal costs charged for transporting the equipment and vehicles to the fire departments.

⁴⁹ Commissioner of Public Safety, *Statewide Master Plan for Fire and Law Enforcement Training Facilities in Minnesota* (St. Paul: 1999), 45-46.

⁵⁰ *Minn. Stat.* §88.10, subd. 1.

The state makes the equipment and vehicles available to local departments that may convert what they receive to meet their particular needs, such as outfitting a truck with a tank, portable pump, and hose reel for fighting wildland fires. Waiting lists exist for some items, particularly certain vehicles, and the selection of apparatus and equipment available through the program is limited. State statutes allow local governments to acquire another government unit's equipment or property without entering the competitive bidding process.⁵¹ According to our survey:

- **Nearly a third of Minnesota fire departments had acquired fire fighting apparatus through the excess property program during the past 10 years.**

Local fire departments located outside the Twin Cities metropolitan area were more likely than metropolitan departments to purchase apparatus from the program. Similarly, the volunteer and paid on-call departments were more likely than full-time or combination departments to use the program.

The Fire Center also coordinates a program of "Forestry Assistance Matching Grants" available primarily to rural departments in cities with under 10,000 people or departments that have wildland firefighting responsibilities. Matching grants are available in amounts up to \$2,000. Each year, the program matches local dollars used to: purchase fire department communications equipment, personal protective gear, hose, nozzles, and other equipment; help start up a new or inactive fire department; or retrofit excess property vehicles for local department needs such as grass fire rigs. To be eligible for the matching grants, fire departments must have submitted data on their fire incidents for the most recent year to the State Fire Marshal.

The Interagency Fire Center sells wildland fire fighting equipment to local departments for wildfire prevention and suppression. Equipment includes

fire resistant apparel, headlamps, hose, nozzles, pumps, and hand tools. Local fire departments pay for the equipment and a shipping charge, but typically at a lower price than what the department itself could find. In addition, as part of its role in the Incident Command System, the Fire Center coordinates and reimburses local fire fighters and apparatus for helping in out-of-state emergencies.

Minnesota Occupational Safety and Health Act (MNOSHA)

MNOSHA sets standards for workplace safety, including provisions on training, equipment, and procedures that fire departments must meet. Because Minnesota has adopted by reference the federal occupational safety and health standards, these U. S. OSHA rules also apply.⁵² In Minnesota's Department of Labor and Industry, the Occupational Safety and Health Enforcement Division oversees and enforces OSHA provisions.

Although the state of Minnesota does not prescribe a training program that all fire fighters must complete, many MNOSHA standards require training for any fire fighter involved in particular procedures. For instance, fire fighters who are expected to respond to releases of hazardous materials at the "awareness" level of response must first complete training that will allow them to demonstrate certain competencies. They must understand what hazardous materials are and their risks, and they must have the ability to recognize the presence of hazardous substances in an emergency, among other things.⁵³ As a different example, MNOSHA requires annual training on operating and rescue procedures and possible hazards of a confined space for workers who enter

OSHA rules affect training, equipment, and procedures.

⁵¹ *Minn. Stat.* §471.64 allows local governments to enter into contracts with the federal, state, or other local governments for the purchase, lease, or acquisition of equipment, supplies, and other property, without regard to statutory provisions.

⁵² *Minn. Rules*, 5205.0010, subp. 1, 2.

⁵³ *29 Code of Federal Regulations*, sec. 1910.120, (q), (6), (i), (A) - (F).

such spaces.⁵⁴ Another requirement specifies the general content of training required for employees exposed to hazardous substances, harmful physical agents, or infectious agents.⁵⁵

Some MNOSHA standards apply to equipment. For example, all fire fighters must use self-contained breathing apparatus when engaged in interior structural firefighting.⁵⁶ The standards also specify the function and maintenance of the respirators. Additional standards require the use of protective clothing, including protective footwear, coats, trousers, gloves, and helmets.⁵⁷

Other MNOSHA standards mandate certain procedures that fire departments must follow. For any fire fighting conducted in an atmosphere which is immediately dangerous to life or health, one rule requires that at least two employees enter the atmosphere and remain in contact with one another, and two others must be stationed outside.⁵⁸ Fire fighters entering a burning building, for instance, must follow this so-called “two-in, two-out” rule. As another example, MNOSHA requires that fire departments maintain a log and summary of all occupational injuries and illnesses and make the log accessible to employees.

In addition, MNOSHA conducts inspections to ensure that fire departments meet health and safety standards. Some of these are programmed safety and health investigations, which are planned investigations based on the highest hazard operations. MNOSHA also conducts unprogrammed investigations whenever employees are in imminent danger of death or serious physical harm or in response to employee complaints about unsafe or unhealthful working conditions. We observed that some fire personnel find it difficult to know all of the numerous and often complex OSHA rules that apply to fire departments because they do not have a single comprehensive list of OSHA requirements.

FIRE/EMS/Safety Center

Another resource for fire departments is the FIRE/EMS/Safety Center, now under the jurisdiction of the Minnesota State Colleges and Universities or MnSCU. With its extensive library dedicated solely to fire-related research and information, the FIRE/EMS/Safety Center provides information and resources to fire departments and the public at large. Fire service specialists at the center develop training on fire services and other emergency responses, including annual Minnesota Fire Schools held in locations around the state, and the center coordinates training for fire personnel with each of Minnesota’s technical colleges.

To offset fire fighter training expenses, the state has offered a partial subsidy since 1987 that reduces the technical colleges’ costs for training. Recently, the state began issuing vouchers directly to fire departments in amounts based on the hours of training they had received at technical colleges over the past three-year period. Fire departments use the vouchers in partial payment of their technical college training costs, and the FIRE/EMS/Safety Center reimburses the colleges for the voucher amounts.

State Auditor’s Office and Department of Revenue

The State Auditor’s Office and Minnesota Department of Revenue play pension-oversight roles that affect fire fighters. The State Auditor oversees the financial and statutory operation of fire relief associations. Relief associations manage the pension funds provided to qualified fire fighters following their retirement. Both the state and the municipalities in which fire departments are located may make contributions to the special funds of fire relief associations, from which pension benefits are

⁵⁴ *Minn. Rules*, 5205.1020.

⁵⁵ *Minn. Rules*, 5206.0700.

⁵⁶ *29 Code of Federal Regulations*, sec. 1910.134, (g), (4), (iii).

⁵⁷ *29 Code of Federal Regulations*, sec. 1910.156, (e), (1) - (5).

⁵⁸ *29 Code of Federal Regulations*, sec. 1910.134, (g), (4), (I) - (ii).

paid.⁵⁹ To qualify for state aid, fire relief associations file actuarial data and annual financial reports or audited financial statements for review by the State Auditor's Office.

Together with the State Auditor's review of financial records, the Minnesota Department of Revenue's Property Tax Division monitors fire relief associations' eligibility for aid through annual reports on operations submitted by the associations. Eligibility criteria include: having at least 10 fire fighters including a fire chief and assistant chief, conducting drills in fire-fighting tactics and the use of equipment, maintaining a communication system for receiving fire alarms, and having a motorized fire truck equipped with a 250-gallon water tank and other specified equipment.⁶⁰ Contingent on State Auditor and Department of Revenue assessments of relief associations' compliance with various statutory requirements, relief associations may qualify for state aid. The Revenue Department calculates the amounts of aid distributed annually on behalf of eligible relief associations.

Two types of state aid are available: (1) fire state aid and (2) amortization aid. The fire state aid comes from dedicated gross earnings taxes on property insurance premium revenues. Aid allocations depend on the population in a fire department's primary response area as a percent of the statewide population and the area's assessed tax capacity relative to total assessed tax capacity. Amortization aid from the state's general fund is intended to retire the unfunded liabilities of retirement plans for full-time, paid fire fighters, which the state closed to new members in 1980. A 1996 program reallocates 30 percent of any unallocated amortization aid to certain volunteer relief associations. The reallocated money is intended for those relief associations receiving the lowest amounts of aid per fire fighter, and therefore, mostly affects the smallest volunteer departments.

CHAPTER SUMMARY

Minnesota fire departments do far more than extinguish fires. Many are involved in rescues, fire code inspections, emergency medical services, and responses to hazardous materials releases, among other things. About 60 percent of all fire departments provided some level of emergency medical services in 1997, and 70 percent offered rescue services.

Fire services are mostly local government functions but the state is also involved.

Most Minnesota fire departments use personnel who are either volunteer or part-time. Volunteer fire fighters receive no compensation for their services; paid on-call members receive a stipend, or hourly or per-call wage. Only about 3 percent of Minnesota fire departments use exclusively full-time personnel. Combination departments with a mix of 6 or more full-time personnel and volunteer or paid on-call members represented about 5 percent of all departments in 1997. For comparability in our analysis, we grouped those departments with 5 or fewer full-time fire fighters together with the paid on-call departments.

To finance their services, most fire departments rely heavily on property tax revenues and other general-fund revenues. They also receive substantial revenues from contracts for service and, to a lesser degree, from charitable gambling proceeds. Unlike many other local government services, a large share of fire departments rely on civic organizations and other nontraditional sources of income for capital purchases.

Fire prevention efforts are not as widespread in the U.S. as in some other developed countries. Minnesota fire departments typically spend 1 person-hour of time on fire prevention activities for

⁵⁹ *Minn. Stat.* §424A.05, subd. 2 and 3.

⁶⁰ *Minn. Stat.* §69.011, subd. 4 (a)-(g).

every 2.7 hours they spend on fire suppression. Although most fire departments reported having some activities related to public fire-safety awareness, only a few had comprehensive public education programs.

By some measures, the volunteer and paid on-call departments performed as well as the full-time and combination departments. As one might expect, we found that they were far more likely to spend less on a per capita basis than full-time or combination departments. On the other hand, as a group, full-time departments were more likely than the volunteer departments to provide more comprehensive services.

Although fire departments operate as local units of government, many work closely with the State Fire Marshal Division and other state agencies. All fire departments are required to abide by extensive rules and statutes pertaining to operations, equipment, and training for certain services.