Performance Audit
Fire Prevention Division

August 2002

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City Auditor's Office

City of Kansas City, Missouri

2-2002

August 7, 2002

Honorable Mayor and Members of the City Council:

This audit of the Fire Prevention Division focuses on identifying properties to be inspected and performance measures for the program. The audit also includes descriptions of approaches to fire prevention used in some other cities. The audit was initiated by the City Auditor pursuant to Article II, Section 13 of the city charter.

The Fire Department does not have a written policy to define what places it intends to inspect. Currently, the department attempts to inspect all commercial properties, places of assembly, and residential structures with more than four units.

The Fire Prevention Division's list of addresses to inspect is not complete and the process used to update the list is not effective. Because the division relies on its existing address list to plan inspections, places not already on the list are not assigned to inspectors and are less likely to be inspected. Other city departments have address information that could be used to update the address list and ensure that establishments are inspected.

We recommend the Fire Department formally define the places they intend to inspect; improve the list of addresses for places to inspect; and report on seven performance measures that use available data, are focused on outcomes, and can provide information for which comparative data is available.

Addressing policies, improving the address list, and measuring and reporting on performance will be important because the 2003 budget includes significant additional resources for fire prevention. We believe that implementing the recommendations will increase the likelihood that the additional resources will improve fire safety in Kansas City.

We identified three other approaches that some local governments use to address fire prevention. Some fire inspection programs inspect high-risk places more often than low-risk places. In some cities, fire suppression staff make some inspections. Some communities require residential sprinklers. The report includes descriptions of theses approaches, but we did not evaluate how appropriate each approach would be in Kansas City.

We sent a draft of this report to the Fire Chief on June 20, 2002. His response is included as an appendix. We appreciate the courtesy and cooperation the Fire and Information Technology departments extended to us during this project. The audit team was Deborah Jenkins, Martin Tennant, and Michael Eglinski.

Mark Funkhouser
City Auditor

Performance Audit – Fire Prevention Division

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Introduction

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Objectives

This audit of the Fire Prevention Division of the Fire Department was conducted pursuant to Article II, Section 13 of the Charter of Kansas City, Missouri, which establishes the Office of the City Auditor and outlines the City Auditor's primary duties.

A performance audit is an objective, systematic examination of evidence to independently assess the performance of a government organization, program, activity, or function in order to provide information to improve public accountability and facilitate decision-making.[1] This audit was designed to answer the following questions:

- How could the Fire Department identify every property that needs to be inspected?
- What performance measures should be used to evaluate and improve the city's efforts to increase safety, reduce loss, and prevent fires?

We also identified some other approaches to improving fire safety, reducing loss, and preventing fires. Three approaches are described in the section following the recommendations.

Scope and Methodology

Our review of the Fire Prevention Division was conducted in accordance with government auditing standards. Audit methods included the following:

- Reviewing and analyzing fire prevention investigation, inspection, permit, and education records.
- Reviewing fire prevention literature and regulations.
- Interviewing staff in the Fire, Codes Administration, and Information Technology departments.

[1] Comptroller General of the United States, *Government Auditing Standards* (Washington, DC: U.S. Government Printing Office, 1994), p. 14.

- Interviewing fire prevention staff in other cities.
- Observing division staff as they performed their duties.
- Interviewing experts in the insurance industry about fire prevention.

In conducting our work, we identified issues related to records retention and supervision of cash handling. These issues were not related to the audit objectives. We communicated these issues to the Fire Chief in a separate memorandum.

No information was omitted from this report because it was deemed privileged or confidential.

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Background

Legislative Authority

The Fire Department is responsible for enforcing the city's fire code for the purpose of preventing and suppressing fires. Chapter 26 of the Code of Ordinances adopts the 1997 Uniform Fire Code with modifications. The fire code contains detailed fire safety regulations and standards. It extends police powers to the fire marshal, who is the chief of the Fire Prevention Division, and to members of the Fire Prevention Division.

The city's fire code requires annual permits under certain conditions. Places of assembly for 50 or more people require a fire permit. Permits are required for conditions and practices that introduce risk related to hazardous materials, fire and explosion. The Fire Department also issues short-term permits for such things as open burning, fireworks, tents and canopies, and use of fire hydrants. Before the Fire Department issues a one-year permit, they conduct an inspection.

The Codes Administration Department is responsible for enforcing the building code in order to regulate construction. The fire code is referred to in the building code and is considered part of the requirements of the building code.

Program Activities

The Fire Prevention Division's mission is to increase life safety for the citizens by reducing community risk through an aggressive public

education program, fire code enforcement, building plans review, and fire cause determination.

Fire inspections. Thirteen fire prevention inspectors conduct about 11,500 annual inspections of places where people assemble, commercial places, and common areas of buildings with more than four residential units. They cite violations of the fire code and draft permit applications. If violations are found on an inspection, inspectors conduct reinspections and educate those they contact regarding fire safety.

Fire investigations. Four investigators, working 12 hour rotating shifts, investigate suspected arson fires, fatality fires, and other serious fires. Investigators gather evidence and prepare records to describe the cause and progress of the fire.

Education. Two fire education specialists conduct presentations at meetings, schools, and public events. Their primary tool is the "Kids' Safety House" for children in kindergarten through third grade. The safety house is a trailer that simulates a home setting. Educators use it to teach about hazards in the home, how fire behaves, and fire emergency drills.

Educators offer additional programs in fire safety for older school-age groups, for the workplace, and for senior citizens. Instruction is based mostly on materials published by the National Fire Protection Association and the Federal Emergency Management Agency. Educators promote the use of residential smoke alarms and the division provides them at no charge.

Plans review. The division reviews plans for new buildings and construction over 10,000 square feet in order to assure that plans for fire access roads and fire suppression systems comply with the fire code. One fire investigator and the assistant chief fire marshal review building plans sent to them by Codes Administration.

Funding and Staffing

The Fire Prevention Division was budgeted almost $1.5 million in fiscal year 2002 and authorized 24 full time equivalent positions. Revenue from permits is expected to be over $900,000. (See Exhibit 1.)

Authorized positions include the chief fire marshal, the assistant chief fire marshal, two fire education specialists, four investigators, 13 inspectors, two administrative assistants, and one information processor.

Exhibit 1. Fire Prevention – Staffing, Permit Revenue, and Expenditures

Fiscal Year	Staff	Revenue	Expenditures
1995	15	$363,726	$ 608,017
1996	18	373,703	655,027
1997	18	449,340	711,854
1998	18	598,977	798,114
1999	21	779,690	1,005,211
2000	22	768,308	1,180,651
2001	25	644,300	1,449,941
2002 (adopted)	24	933,550	1,479,111

Sources: Adopted budgets and AFN.

The 2003 budget added eight staff to the Fire Prevention Division: five inspectors, two investigators, and one information processor.

Prior Audit Work

Prior audit work recommended improving methods for updating the inspection address list, examining the relationship between inspections and actual fires, and considering what role firefighters could assume in inspection and education.

In a September 1987 audit of the Fire Prevention Division, we reported that the division did not maintain a list of inspected properties. The audit recommended developing a comprehensive inventory of commercial property to ensure periodic inspection. The audit also recommended developing an inspection manual with procedures and guidelines and, based on a priority system, including inspection frequency standards in the city's fire code.

Our 1993 Fire Resource Allocation audit identified possible areas for further audit work. These included examining the relationship between fire safety inspections and the occurrence of fires and considering what role firefighters might assume in inspection and fire safety education.

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Findings and Recommendations

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Summary

The Fire Department does not have a written policy to define what places it intends to inspect. Currently, the department attempts to inspect all commercial properties, places of assembly, and residential structures with more than four units. The department should formally define what places it will inspect.

The Fire Prevention Division's list of addresses to inspect is not complete and the process used to update the list is not effective. Because the division relies on its existing address list to plan inspections, places not already on the list are not assigned to inspectors and are less likely to be inspected. Other city departments have information that could be used to update the address list and ensure that establishments are inspected. Fire should work with Information Technology to improve the inspection database.

We also recommend the Fire Department adopt and report on seven performance measures that use available data, are focused on outcomes, and can provide information for which comparative data is available.

The 2003 budget added eight staff to the Fire Prevention Division: five inspectors, two investigators and one information processor. Strengthening policies, improving the address list, and measuring and reporting on performance increases the likelihood that the additional resources will result in improved fire safety.

Fire Should Formally Define What Establishments It Intends to Inspect

The Fire Department does not have a written policy to define what places it will inspect. Currently, the department attempts to inspect all commercial properties, places of assembly and residential structures with more than four units. The department should formally define what places they will inspect.

Fire Does Not Have Written Policy on What Types of Establishments It Intends to Inspect

The Fire Department does not have a written policy describing the types of places the division should inspect. The city code does not describe the types of places the division should inspect, although it requires inspections before issuing a permit. Conditions that require a permit also require an inspection at least annually because city code limits the term of fire permits to one year.

According to Fire Prevention management, in addition to inspecting places that require permits, the division intends to inspect all commercial properties, places of assembly, and common areas in apartment buildings containing more than four residential units. Our observations of inspectors and reviews of inspection files indicated inspections are consistent with this unwritten policy.

Fire Should Formalize Policy of Properties to Be Inspected

The department should formalize their policy of what properties they intend to inspect by putting it into writing. Written policies encourage continuity and understanding within an organization. They also promote consistent interpretation of regulations that require action on a recurring basis such as inspections.

The Fire Chief should write a policy that defines what types of places the Fire Prevention Division should inspect.

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Fire Should Update the Inspection List

The Fire Prevention Division's list of addresses to inspect is not complete and the process used to update the list is not effective. Because the division relies on its existing address list to plan inspections, places not already on the list are not assigned to inspectors and are less likely to be inspected. Other city departments have address information that could be used to update the address list and ensure that establishments are inspected.

Inspection List Is Incomplete

The division's inspection address list does not cover all of the places the department would like to inspect. About 25 percent of the commercial properties we reviewed were not in the department's database and

therefore, would not have been assigned to inspectors. Since they are not included on the inspection list, it is unlikely the department will inspect these places.

Inspectors identify places to add to the list. Inspectors are the main source of updates to the inspection list. While they are out in the field conducting inspections, they watch for occupancy changes or new places and report these to the division's administrative staff who add new addresses to the list. The division generally does not use address information from other city departments that maintain information on commercial activity or construction.

Fire does not inspect some places. Each month, inspectors receive assignments based on the address list. Because the division relies on its existing address list to plan inspections, places not already on the list are not assigned to inspectors and are less likely to be inspected.

Although Fire Prevention inspects commercial properties, about 680 (25%) of the commercial remodeling and new construction permits issued by the Codes Administration Department since 1995 were for properties that are not on the division's inspection list. Fire prevention managers compared the address list with water records and business license information and concluded that some addresses were missing from the fire database.

Other City Information Could Be Used to Update the List

In addition to information gathered by inspectors, the division could use other sources of address information. Other city departments maintain information on commercial activities and construction that could be used to update and maintain the fire prevention database. For example, commercial water accounts, food inspections, business licenses, and the Codes Administration Department are potential sources of information that the Fire Prevention Division could use to periodically add new addresses to its inspection address list.

An improved address list should increase safety and permit revenue. A more comprehensive address list would result in more properties being assigned for inspection and increase the likelihood that fire safety inspections will be conducted on properties where hazards might exist. Some of these additional properties would most likely require permits, and as a result, increase permit revenues. For example, if an improved address list resulted in 25 percent more inspections being performed, and those properties required permits at the same proportion as now, revenue would increase approximately $230,000 annually.

Fire and Information Technology should work together to update the list. Once the division has formally defined what properties they intend to inspect, fire prevention managers and the Information Technology Department should work together to use other city information to update the list of places Fire intends to inspect. The Fire Department should write procedures for updating and maintaining the inspection address list.

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Recommended Performance Measures for Fire Prevention

The Fire Department should set performance goals for fire prevention activities, measure progress periodically, and report the results to the City Council periodically. We recommend seven performance measures that use available data, are focused on outcomes, and can provide information for which comparative data is available.

Developing goals, objectives, and performance measures enables fire departments to analyze the impact, efficiency, and effectiveness of their fire prevention programs. We identified nearly 100 performance measures related to fire prevention. From those we selected seven measures to recommend to the Fire Prevention Division. In making the selection we focused on outcomes, chose measures for which there is comparative data available (e.g., measures used by the International City County Management Association which publishes an annual comparative data report), and considered measures for which the department already collects data or for which data could be collected without much difficulty.

Exhibit 2 shows the seven recommended performance measures for fiscal years 2000 and 2001.

Exhibit 2. Fire Prevention Performance Measures

Measure	2000	2001
Total fire incidents per 100,000 population served	1,552	1,484
Total structure fires per 100,000 population served	485	464
Percentage of fires with cause determined	92%	95%
Percentage of investigated residential fires where a smoke alarm is present	56%	54%
Number of fire safety presentations (only 8 months of data are available for 2000)	79	200
Number of attendees at fire safety presentations (only 8 months of data are available for 2000)	12,312	31,970
Percentage of total inspected occupancies experiencing fire[2]	N/A	N/A

Source: Fire Department records.

[2] The information needed to calculate this measure is available in the Fire Department, but is kept in different systems. We did not attempt to compile the information from the different systems to calculate this measure.

Total fire incidents, per 100,000 population served. This measures the fire department's overall success in preventing fires. Fire Department staff compiled this data from the Fire Information Reporting System. The data reflects the total number of fire incidents reported in Kansas City including residential and commercial structure fires, and non-structure fires (i.e., vehicle fires, grass fires, dump fires, etc.). The number does not include false alarms.

Total structure fires per 100,000 population served. This measures the program's success in preventing structure fires. This data is a subset of the data reported in the preceding measure. This data was also compiled from the Fire Information Reporting System by Fire Department Information Management staff.

Percentage of fires with cause determined. This performance measure quantifies success in determining the cause of fires. Kansas City fire investigators look for evidence at fire scenes to determine the causes of fires. The investigators prepare a report on each fire scene they examine. They also record their determination of the cause(s) of the fire in a logbook. We used the logbook data to calculate this measure.

The Fire Prevention Division already uses this measure. They have set goals and reported the results for this performance measure in recent city budgets.

Percentage of investigated residential fires where a smoke alarm is present. This measure shows the success of the division's smoke alarm program by determining the prevalence of smoke alarms in residences. Information to collect this measure is from the investigators' log. Investigators usually, but not always, record this information.

The NFPA reports that most residential fire deaths are caused by smoke inhalation, and that half of all residential fire deaths result from fires that are reported between 10:00 p.m. and 6:00 a.m. Smoke alarms are an effective and economical defense against fire deaths and injuries.

Number of fire safety presentations. This measures the fire safety program's community education outreach efforts. About 70 percent of fires that occur in buildings can be attributed to human carelessness. Public education can enhance awareness of fire risk.

Fire education staff document the number of presentations they make. We used this documentation to determine the number of presentations for fiscal year 2001.

The Fire Prevention Division has used this measure. They have set goals and reported results for this performance measure in recent city budgets. This performance measure was not used in fiscal year 2000 and data was not kept for that entire year.

Number of attendees at fire safety presentations. This is another indicator used to measure the fire safety program's community education outreach efforts. It measures the total number of people the fire safety education program is reaching.

Fire education staff record this data and compile a monthly report for the assistant fire marshal. We used source data documented by the educators to calculate the total number of attendees for fiscal year 2001.

In addition to the safety presentation attendees reported here, Fire Prevention staff made educational materials and the fire safety house available to approximately 50,000 people at the Aviation Expo in August 2000.

Percentage of total inspected occupancies experiencing fire. This measure is recommended as a measure of effectiveness in correcting or preventing conditions that result in a fire.

Inspection and fire code enforcement programs serve an important role in fire prevention. Some cities use this indicator to evaluate the effectiveness of their fire prevention efforts.

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Recommendations

1. The Fire Chief should write a policy that defines what places the Fire Prevention Division should inspect.

2. The Fire Chief should work with Information Technology to use information from other departments to update the inspection database.

3. The Fire Chief should write policies and procedures on maintaining the inspection database.

4. The Fire Chief should adopt the seven recommended performance measures for fire prevention activities, set performance goals, measure progress, and report the results to the City Council periodically.

Other Approaches to Fire Safety

We identified three other approaches to fire safety that some local governments use. The three approaches are inspecting high-risk places more frequently, using fire suppression staff to perform some inspections, and requiring sprinklers in new homes.

We did not evaluate how appropriate these methods would be in Kansas City.

Inspecting High Risk Places More Frequently

Inspecting high-risk places more often than low-risk places allows fire departments to focus resources on areas where the risk of death and injury from fire is greater. (See text box.)

> A primary objective of code enforcement is the reduction of death and injury from fire. People are most vulnerable when they are asleep or their movement is restricted; therefore, residential and institutional occupancies should be high priorities. Public assembly and educational types of occupancies where people gather should be the next class, followed by high hazard occupancies, which are generally the manufacturing occupancies and those storing or transferring flammable gasses, flammable liquids or hazardous materials. Finally, of course, all other occupancies should be considered.
>
> Source: Fire Inspection Management Guidelines, p. 3-3.

Some fire departments inspect high-risk places more often. For example, fire inspectors in Charlotte, North Carolina, inspect public schools every six months but inspect other places less frequently. (See Exhibit 3.)

Exhibit 3. Fire Inspection Frequency, Charlotte, North Carolina

Frequency	Type of Place
6 months	Public schools
12 months	Institutions, high rises, places of assembly, residential with 3 or more units and hazmat
24 months	Industrial and educational places except for public schools
36 months	Other businesses and other educational places with occupants over 18 years old

Source: City of Charlotte, North Carolina, Fire Marshal's Office.

The costs involved with inspecting high-risk places more frequently include developing and administering a program to assign risk categories to different places and adequately staffing a program. A fire department

needs to collect and maintain adequate information in order to determine the risk. Collecting and maintaining the information may be more expensive than inspecting all places on a set schedule. Depending on the number of high-risk places, a risk-based inspection program may require more inspections.[3]

Using Fire Suppression Staff to Make Some Inspections

In some cities, fire suppression staff make some inspections. This is sometimes referred to as company level inspection. For example, firefighters in Dallas inspect small businesses, such as places that need no permits, shopping centers less than four stories high, and offices. The firefighters have a standard checklist that they send to the fire marshal after the inspection.

> In some departments fire fighters perform company inspections….These routine inspections check for compliance with the general regulations concerning access to standpipes and sprinkler valves, adequacy of fire extinguishers, lack of obstructions to emergency evacuation exits, and the more obvious safety problems such as multiple connections from electrical outlets.
>
> Source: Management in the Fire Service, p. 136.

A company-level inspection program has several benefits. Using fire suppression staff increases the number of people available to do inspection and prevention work. Fire suppression staff can collect information that can be used for pre-incident planning and become familiar with specific buildings before an emergency.

Implementing a company-level program may be costly. Fire suppression staff need additional training before doing the inspections. Adding responsibilities may require increasing compensation. In addition, some firefighters may have negative feelings about conducting inspections. Most fire suppression staff are interested in fighting fires; fire prevention is a different kind of work.[4]

[3] Moving to a risk-based food inspection program increased the city's inspection workload. We estimated that the city would have to make about 25 percent more inspections if the Health Department changed from inspecting all food establishments every six months to inspecting based on risk. *Performance Audit: Health Department Food Protection Program*, Office of the City Auditor, Kansas City, Missouri, August 2001, p. 9.

[4] Harry Carter and Erwin Rausch, *Management in the Fire Service,* (Quincy, MA: National Fire Protection Association, 1999) p. 144.

Requiring Residential Sprinklers

The National Fire Protection Association (NFPA) reports that 85 percent of fire deaths in the United States occur in the home. NFPA recommends installing fire sprinklers in homes. Correctly installed and maintained automatic fire sprinkler systems can help save lives. The Federal Emergency Management Agency states, "Sprinklers are acknowledged as the most effective tool in immediately suppressing fires, minimizing damage and saving lives."[5] There are over 150 jurisdictions in the United States that require residential fire sprinkler systems in one and two family homes.[6] Some ordinances have conditions that must be met before sprinklers are required (i.e., new construction, square footage, distance from hydrant, available gallons of water per minute, etc.).

Residential fire sprinkler systems reduce loss because sprinklers can extinguish or limit fires to the room of origin. Sprinklers react so quickly that they can dramatically reduce the heat, flames, and smoke produced in a fire. NFPA reports that sprinklers typically reduce the chances of dying in a fire and the average property loss by one-half to two-thirds in any kind of property where they are used. Installing both a fire sprinkler system and smoke alarms reduce the risk of death in a home fire by 82 percent, relative to having neither.[7]

Nationally, on average, installation of a fire sprinkler system in a new home adds 1 percent to 1.5 percent to the total building cost.

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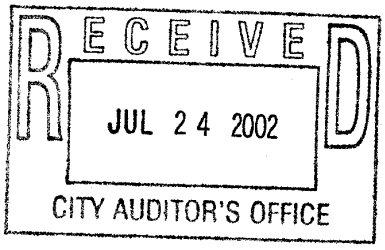
[5] *America at Risk*, Federal Emergency Management Agency, Washington D.C., 2000, p. 13.
[6] Residential Fire Safety Institute, http://firesafehome.org/1-2fam.htm.
[7] Home Fire Sprinkler Coalition, http://www.homefiresprinkler.org/facts.html.

Appendix A

Fire Chief's Response

Interdepartmental Communications



Date: July 24, 2002

To: Mark Funkhouser
City Auditor

From: Chief Richard A. Dyer
Fire Director

Subject: Performance Audit: Fire Prevention Division

The Fire Department appreciates the research and work applied by the staff of the Auditor's Office preparing this audit. Fire Administration agrees with the recommendations and approaches contained within the report. The Fire Departments strategic plan will include examining and redefining concepts and practices that the department currently employs regarding fire prevention. The following are our comments concerning the audit:

1. **The Fire Chief should issue a policy that defines inspection practices.**

   Fire Administration agrees with this recommendation. The department's current inspection program is in compliance with the City adopted 1997 Uniform Fire Code. This code currently provides the direction involving the buildings to be inspected. A General Operating Guideline will be issued clarifying inspection policy.

2. **The Fire Chief should work with Information Technology to better use information from other departments to update the inspection database.**

   Fire Administration agrees with this recommendation. On August 1, 1999, the City began using the KIVA records data system. Since the inception of this program, the Fire Prevention Division staff has progressively worked on increasing the accuracy and size of the inspection database. The Fire Prevention Division will implement this recommendation and begin to interface records data with other City departments. Information Technology Department has been requested to assist in this endeavor.

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3. **The Fire Chief should write policies and procedures on maintaining the inspection database.**

   Fire Administration agrees with this recommendation. We believe that procedures that deal directly with obtaining electronic data from other City departments should be issued by the Information Technology Department. A General Operating Guideline addressing the frequency of cross-referencing data shall be issued by the Fire Chief.

4. **The Fire Chief should adopt the seven recommended performance measures for fire prevention activities, set performance goals, measure progress, and report the results to the City Council periodically.**

   Fire Administration agrees with the recommendation. As mentioned before, all fire prevention activities will be examined during the comprehensive strategic planning process. We believe that the strategic plan should drive the creation of performance measures and goals.

The performance audit also contains a section that sets forth examples of other approaches to fire safety. The three examples mentioned were inspection frequency of high-risk occupancies, using fire suppression companies to conduct inspections, and requiring residential sprinkler systems. All three of these approaches have proven to be successful in some municipalities. Additional inspections would most probably have significant fiscal implications. Residential sprinklering could have a significant negative effect on residential growth. These and other "best practices" will be examined in the strategic planning process.

Over the last eighteen months I have had a chance to examine the operations of the Fire Prevention Division. The performance audit failed to mention the quality and quantity of the work currently being performed by this division. It is important to note that a significant governmental service is being provided with the majority of the cost being recouped through sources outside of general revenue funding. We are doing well or better than most major US cities in our fire prevention program.

Please accept our thanks for your cooperative attitude and including us throughout the audit process. We are committed to making positive change, and your assistance will help us to achieve that goal.

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