

U.S. Fire Administration/National Fire Data Center

Restaurant Fires

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Findings

- In 2002, an estimated 7,100 restaurant structure fires were responsible for 108 civilian fire injuries and \$116 million in property loss.
- Less than one-third of restaurant structure fires occurred in an area that was known to have a fire alarm, and less than half of fires occurred in an area with an automatic extinguishment system, such as automatic sprinklers.
- Approximately 64% of restaurant structure fires were caused by cooking, followed by heating (10%) and incendiary or suspicious activities (5%).
- Cooking materials (grease, oil) were the most frequent items first ignited.
- Restaurant fires were confined to the object first ignited in 70% of incidents.

Restaurants pose unique fire risks as they gather potentially large numbers of customers at one time, while engaging in cooking activities that inherently pose the risk of fire. This topical report examines the causes and characteristics of reported restaurant structure fires in 2002 and compares such characteristics with those of all non-residential structure fires.¹ There were an estimated 7,100 fires in 2002,² resulting in an estimated 108 injuries and \$116 million in property loss.³ Although this report contains no estimates of deaths from restaurant fires for 2002, the potential for fire fatalities exists in any building or property where people congregate.

Fires in restaurants caused more property damage per fire than the average structure fire (Figure 1), but less property damage than the average non-residential structure fire. This less-than-average property loss is due to the large number of cooking fires that were confined to the cooking vessel (41% of all restaurant fires) and resulted in small or no-loss fires. Also, restaurant kitchens are usually equipped with fire extinguishers so that fires are often extinguished before severe property damage is incurred. The average number of deaths and injuries per 1,000 fires was considerably less than the average structure fire, which includes residential homes, but similar to the casualty rates for non-residential structures.

FIGURE 1. LOSS MEASURES IN RESTAURANT FIRES

Loss Measure	Structure Fires	Non-Residential Structure Fires	Restaurant Fires
\$ Loss/Fire	\$14,279	\$21,857	\$15,570
Fatalities/1,000 Fires	5.2	1.1	–
Injuries/1,000 Fires	30.8	14.8	17.0

Source: NFIRS 5.0 only

CAUSES OF RESTAURANT FIRES

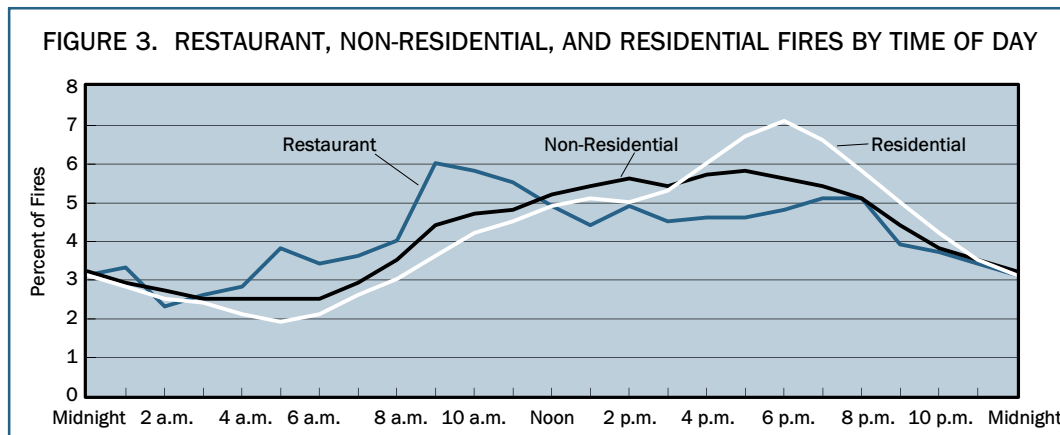
Not surprisingly, cooking was the primary cause of restaurant fires in 2002, responsible for 64% of structure fires in restaurants. Of these fires, 89% were confined to the object of origin. As shown in Figure 2, heating was the second leading cause with 10%, followed by incendiary or suspicious, electrical distribution, appliance or air conditioning fires, and other heat, flame, or spark. This contrasts with the estimated causes for all non-residential structure fires, where cooking was the cause of 22% of fires, and incendiary or suspicious fires caused 19% of fires.

FIGURE 2. LEADING CAUSES OF RESTAURANT FIRES (percent)		
Cause	All Non-Residential Fires	Restaurant Fires
Cooking	21.6	64.2
Heating	9.8	9.9
Incendiary/Suspicious	18.7	5.2
Electrical Distribution	3.9	4.2
Appliances, A/C	3.5	4.2
Other Heat, Flame, Spark	9.6	4.2

Source: NFIRS 5.0 only

RESTAURANT STRUCTURE FIRES BY TIME OF DAY

Restaurant structure fires have a unique incidence pattern, coinciding with the daily cycles of the restaurant business. These fires are lowest between midnight and 4 a.m. when most restaurants are closed (Figure 3), although the peak period of incendiary or suspicious fires is between midnight and 2 a.m. The daily peak is between 9 and 10 a.m. as cooking fires ramp up along with smaller increases in heating and other fires. Cooking fires peak in the 10 a.m. hour, indicating that many cooking fires may be associated with prep-work before lunch. For comparison, all non-residential structure fires peak during the mid- to late-afternoon period, during the height of normal business hours, and residential structure fires peak between 6 and 7 p.m. when many people are at home cooking dinner.



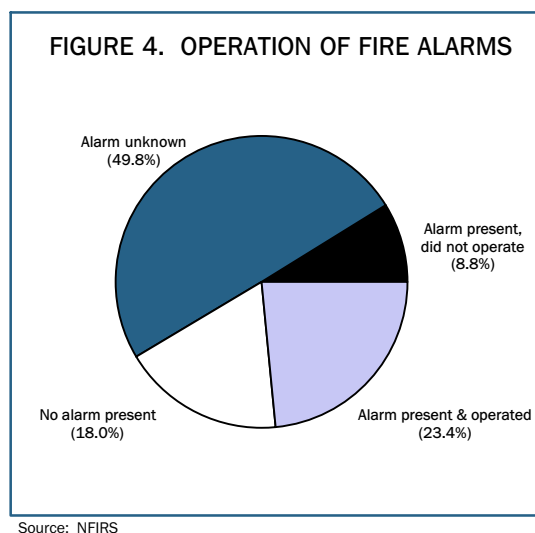
Source: NFIRS 5.0 only

MATERIALS AND EQUIPMENT INVOLVED

Cooking materials were the most frequent item first ignited (33%) in all restaurant structure fires in 2002.⁴ Grease (including butter, fat, and lard) and cooking oil fires were particularly notable as the type of material ignited in 68% of cooking fires. The three primary types of equipment involved in restaurant cooking fires were deep fryers (31%), cooking ranges (18% combined), and cooking grills (11%). After cooking materials, electrical wiring was the second most frequent item first ignited (8%) in restaurant fires.

SMOKE ALARMS AND EXTINGUISHMENT SYSTEMS

An estimated 54% of restaurant structure fires in 2002 took place in an area with no automatic extinguishing system (AES), such as automatic sprinklers. For fire alarms, as shown in Figure 4, an alarm was present and operated in less than one-quarter of restaurant structure fires in 2002. No alarm was present in 18% of restaurant structure fires. The presence of an alarm was unknown in half of the reported fires.



FIRE SPREAD

In approximately 70% of restaurant structure fires, the fire was confined to the object where the fire first ignited, such as a deep fryer or a trash can, and did not spread further into the room. In an additional 15% of restaurant fires, the fire spread beyond the object ignited but was contained in the room of origin.

FIRE SUPPRESSION

Previous examinations of NFIRS data have indicated that restaurant fires were often extinguished by fire extinguishers (35% of incidents).⁵ Hose lines operated by fire departments extinguished another 35% of fires. Twelve percent of fires were self-extinguished, and 9% were extinguished by makeshift aids.⁶ Finally, AESs extinguished 6% of restaurant fires.

REGULATIONS

Restaurants are regulated under an assortment of codes. Although most local jurisdictions or states have established fire-safety building codes that affect restaurants, some national associations like the National Fire Protection Association have recommended standardized regulations regarding restaurant fire and life safety. NFPA 96: *Standard on Ventilation Control and Fire Protection of Commercial Cooking Operations* is an established guideline regarding and often recognized as the governing standard on fire safety in commercial kitchens, which covers many of the operations of the commercial kitchen including exhaust and grease removal systems, fire-extinguishing equipment in restaurant kitchens, and the maintenance and cleaning of such equipment.

EXAMPLES

August 2, 2001: A fire that started in the deep fat fryer of a St. Petersburg, FL restaurant caused \$50,000 in damage. The restaurant was 3 months overdue for routine cleaning of its chimney and hood, which also ignited and fueled the flames.⁷

January 1, 2001: An early morning fire at a fast food restaurant in Columbia, MO caused \$900,000 in damages. The fire, which was caused by grease-laden vapors in an exhaust hood over a charbroiler, took about 3 hours to control. Firefighters used 100,000 gallons of water by the time the fire was under control.⁸

February 14, 2000: Two Houston firefighters were killed in an early morning fire caused by arson at a fast food restaurant. The fire, which was set in the kitchen and storage areas of the restaurant to cover up a burglary, caused extensive damage to the structure, including a roof collapse that trapped the two firefighters.⁹

CONCLUSION

The nature of restaurant fires is fairly predictable given the primary activity of the business—cooking. The majority of restaurant fires are cooking fires, followed in frequency by heating. Electrical systems also pose a consistent fire threat due to the substantial amount of lighting and electrical wiring in restaurants. Fortunately, the common characteristics of restaurant fires means that fire prevention can be targeted in those areas (such as kitchens) where fires are most likely, and through inspections of older or heavily used heating and electrical systems. Most restaurant structure fires are contained to the area where the fire started and are extinguished using fire extinguishers or through makeshift methods (e.g., putting the lid on the pan). On average, restaurant fires produce slightly fewer casualties and damage per fire than other non-residential structure fires. For further information on restaurant fires, contact your local fire department or the USFA.

To request additional information or comment on this report, visit
<http://www.usfa.fema.gov/feedback/>

Notes:

- ¹ Distribution statistics are based on data from the National Fire Incident Reporting System (NFIRS 2002). At the time of this report, NFIRS is continuing to transition from version 4.1 to 5.0. Due to issues related to accurately converting version 4.1 data to version 5.0, this report is based on data reported only in version 5.0.
- ² Restaurant loss estimates are based on 2002 non-residential NFIRS data for which the property use was reported, and NFPA's *Fire Loss in the United States During 2002*. Approximately 97% of 2002 non-residential fire incidents in NFIRS reported a property use and were included in this report.
- ³ No restaurant fire deaths were reported in the 2002 version 5.0 NFIRS data; however, one death was reported in the converted version 4.1 data, which was excluded from this report.
- ⁴ For restaurant structure fire incidents reported in 2002, the item first ignited and the type of material ignited were either not reported or were coded as unknown in 47% and 57% of the records, respectively. Data were unavailable for equipment involved in approximately 65% of records (not including records coded as "none"). Therefore, these estimates may have a wide margin of error.
- ⁵ NFIRS 1996–1998 data.
- ⁶ Makeshift aids include baking soda, placing a lid on a frying pan, closing an oven door, etc.
- ⁷ "Grease fire closes Red's Snak Shak," St. Petersburg Times, August 3, 2001.
- ⁸ "Fire destroys restaurant: The grease-fed blaze did \$900,000 in damages," *With the Command* Web site: <http://www.withthecommand.com> January 9, 2001.
- ⁹ "Blaze deliberate, investigators say; 4 arrested in 2 firefighters deaths," *The Houston Chronicle*, February 16, 2000.