

How Fires Start

by William A. Lotz, P.E.



Frankly I don't like fires and never "go to one" for entertainment. Insurance companies occasionally ask our firm to determine the cause of a fire. Usually, they are unsure of the cause or think someone can be sued for negligence.

There are four principles for investigating fires:

1. Get there before the debris has been disturbed.
2. Don't jump to conclusions about the cause.
3. Ask questions of the owner, occupants, fire fighters, neighbors or anyone with knowledge about the building and fire.
4. Look at every detail and scrap of debris.

Below are case studies which, when led down, reveal the most frequent causes of building fires:

- Ignorance and stupidity
- Product failure
- Arson

No Chimney Clearance

The 30-year-old house was retrofitted a few years ago with a wood stove fireplace insert. Two pieces of 2x6 lumber were in direct contact with the chimney. On a cold and windy January night, with only 3 inches of brick between the wood and the hot flue gases, the wood finally caught fire. Building codes require a 2-inch air-space between chimneys and combustible materials.

Wood Shelf on Chimney

The house was 50-years-old, with two stories plus a basement. While parents were at work, and the children were "sleeping over" with a friend, a fire raced up the stairwell. There was some smoke damage in the basement, charring and smoke damage ceilings, severe damage to both stairways, and attic damage. The fire appeared to have started around the chimney in the lower stairway. The owner was fortunate that the two children were not home that night—they probably would not have survived. We learned that the owner had attached a wood shelf to the chimney upon which he stored various paints. Behind the wood shelf, on the chimney, was an old wood stove thimble, which had been plugged years ago with a crumbly lime mortar. The heat from the oil burner caught

the wood shelf on fire, the paints exploded and the fire caught on to the adjacent stairwell. (Note: In the living room a woodstove was in direct contact with plywood wall paneling. This probably would have caused a fire at some point in the future.)

Not the Wood Stove

It was 20-below in rural western Maine. The homeowner had left the house at 6:30 p.m. Around 7:00 p.m. a neighbor noticed flames in the kitchen and notified the fire department. There was a great deal of smoke, and the firemen did their best with cold conditions and freezing water. Around 9:00 p.m., the fire department felt they were losing the house and started removing furniture. When I arrived all that was left was a cold cellar hole filled with debris and covered with 6 inches of fresh snow.

Sticking up through the snow were two inexpensive sheet-steel wood stoves whose type have a history of causing fires. But neither stove was in the kitchen where the fire started. According to the firemen, there was no fire in the rooms where the stoves were until the whole house was burning. After asking many questions of the homeowner and firemen, we focused our investigation on the microwave oven. When the cellar hole was dug out, the microwave was uncovered. We took the cover off its cabinet, and found the cause of the fire. Even when a microwave is not in use, there is high voltage in the wires at the capacitors. The electrical insulation had failed on the 12-year-old oven, causing these wires to arc and catch the kitchen cabinets on fire.

Faulty Gas Control

The L. P. gas water heater exploded and burned a backwoods camp to the ground. The water heater had a White-Rodgers gas control (re-branded frequently as Smith, Sears, Jackson, State, or Rheem). In 1980, the Consumer Product Safety Commission issued a report that some White Rodgers controls were defective and had caused many L.P. gas explosions and deaths. At that time, White-Rodgers had an 800 phone number to handle claims and concerns.

Aluminum Wiring Connection

The nursing home for the elderly was 11-years-old. The building was all-electric. Wires from the transformer to the 1,200-amp main breaker-box were aluminum. We estimated the total connected load at 2,500 amps. The fire started in the main breaker-box and was quickly put out resulting in minimal damage to the building.

What caused the fire? Overload? Probably not. The lug and clamp that held the large aluminum wire connecting the transformer to the main breaker-box did not have an anti-oxidant compound. Over ten years, the aluminum oxidized, causing heating, and finally ignition of the connection. Had an anti-oxidant compound been applied to the connection, there would not have been a fire.

Delicatessen Fire

The delicatessen leased the first floor and there were apartments on the two floors above. Via a 3-way plug from the hardware store, the deli owner plugged the following into a single duplex electrical outlet:

- Double door beverage cooler
- Two 16-cubic-foot freezers
- A table-top video game

The deli owner piled cardboard between one freezer and the outlet. It took four years for the outlet to overheat and arc, catching the cardboard on fire. The smoke alarm in the apartment went off at 4:45 a.m. and the fire department arrived. The inside of the deli was gutted but there was only minor smoke damage upstairs.

Though the breaker did not trip, we

told the insurance company we felt the deli owner was irresponsible when he plugged so many items into a single duplex outlet.

Coffee Maker

The donut shop owner's son closed for the night at 10:15 p.m. At 1:36 a.m., the clock on the wall 15 feet from the coffee maker melted and stopped. At 4:30 a.m., the owner arrived to start making donuts. Substantial heat and smoke greeted him and he called the fire department as the fire started burning in earnest. The firemen reported flames where the coffee maker and paper products were kept. A classic burn pattern was evident on the wall and the owner's son admitted he "may have left the coffee maker on last night."

Inspection of the coffee maker and the surrounding area confirmed it as the fire's origin.

Arson

The interior of the apartment was gutted by fire. The most severely burned area was a circle 6 feet in diameter on the dining room floor below a picture window. There was no fire damage in the basement. A neighbor told us she heard breaking glass prior to seeing the fire. After checking every possible alternative, we concluded the fire was started by a fire bomb thrown in the window.

It's hard to foresee the potential for arson, but as a builder or remodeler, keep your eyes peeled for situations where ignorance or product failure could cause a fire. And certainly don't create fire hazards with your work. ■

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