This fireplace was in the process of being dismantled yet the primary smoke box and smoke chamber was yet untouched. This allowed me access to all important details of the firebox construction.

I have found the following deficiencies in the construction of the fireplace all of which I believe contributed to the combustion of the framing members located behind the fire-place.

1. Masonry wall in rear of firebox not built to code:

A. Wall Thickness: The rear wall of the firebox center rear wall (where a 4” hole was drilled for inspection) is a total of 6” thick as can be seen by the enclosed picture. The 2003 IBC states:

R1003.5 Firebox walls. Masonry fireboxes shall be constructed of solid masonry units, hollow masonry units grouted solid, stone or concrete. **When a lining of firebrick at least 2 inches (51 mm) in thickness or other approved lining is provided, the minimum thickness of back and side walls shall each be 8 inches (203 mm) of solid masonry, including the lining**. The width of joints between firebricks shall not be

greater than 1/4 inch (6.4 mm). When no lining is provided, the total minimum thickness of back and side walls shall be 10 inches (254 mm) of solid masonry. Firebrick shall conform to ASTM C 27 or C 1261 and shall be laid with medium-duty refractory mortar conforming to ASTM C 199. ----end code quote-----

(Above- Hollow blocks used in rear wall construction)

The firebox wall is not up to this standard.

B. Wall Construction: The same code paragraph above states that the 8” of masonry must be solid. In the case of 27 Locust Road, 4” ventilated (hollow) blocks were used and the voids were not filled.

2. Framing Members behind Fireplace too close to fireplace - not to code:

A. The studs behind the fireplace are approx. 2.25” from the code-deficient rear masonry wall of the fireplace. Again, according to the IBC:

R1003.11 Fireplace clearance. All wood beams, joists, studs and other combustible material shall have a clearance of not less than 2 inches (51 mm) from the front faces and sides of masonry fireplaces and **not less than 4 inches (102 mm) from the back**

faces of masonry fireplaces. The air space shall not be filled, except to provide fire blocking in accordance with Section R1003.13.

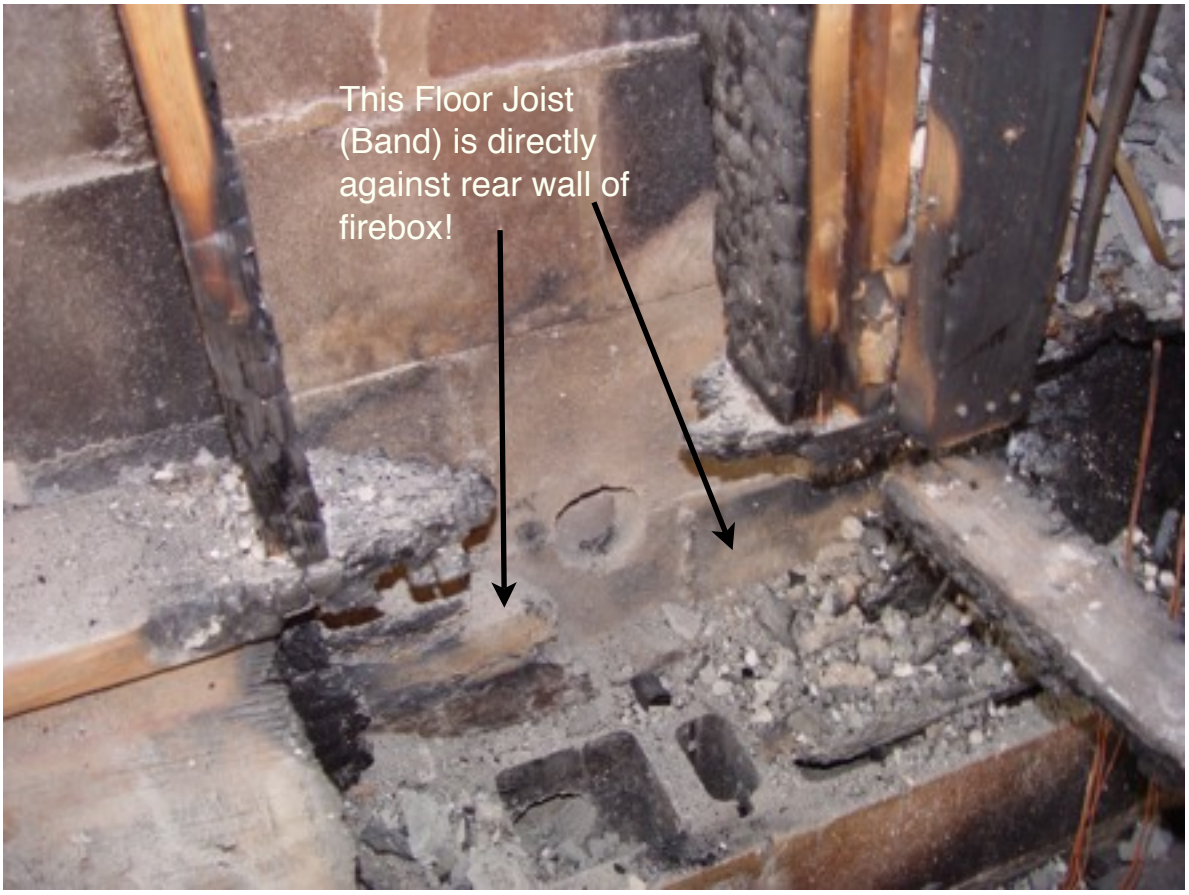
(Above - distance from rear wall of fireplace to studs)

B. **One of the floor framing members in the basement of the higher room (kitchen) was directly against the masonry of the fireplace.** This area is clearly shown in the picture below with the arrows pointing to it.

Given the multiple code and construction violations, it is certainly no surprise that a fire occurred when the fireplace was heavily used.

Of all the above violations, it is my opinion that the following represents to order of severity in respect to this particular fire:

#2B - framing member directly against rear wall of fireplace
In this case, because the room with the fireplace is a few feet lower than the room behind the fireplace, this meant that the framing member in question - which would usually be BELOW the fireplace level, was actually directly behind it. This 2x10 was directly against the masonry and could certainly combust from the direct radiant heat and conducted heat of a hot fire



Above shows fireplace from rear with 2x10 solid wood framing member directly against masonry firebox.

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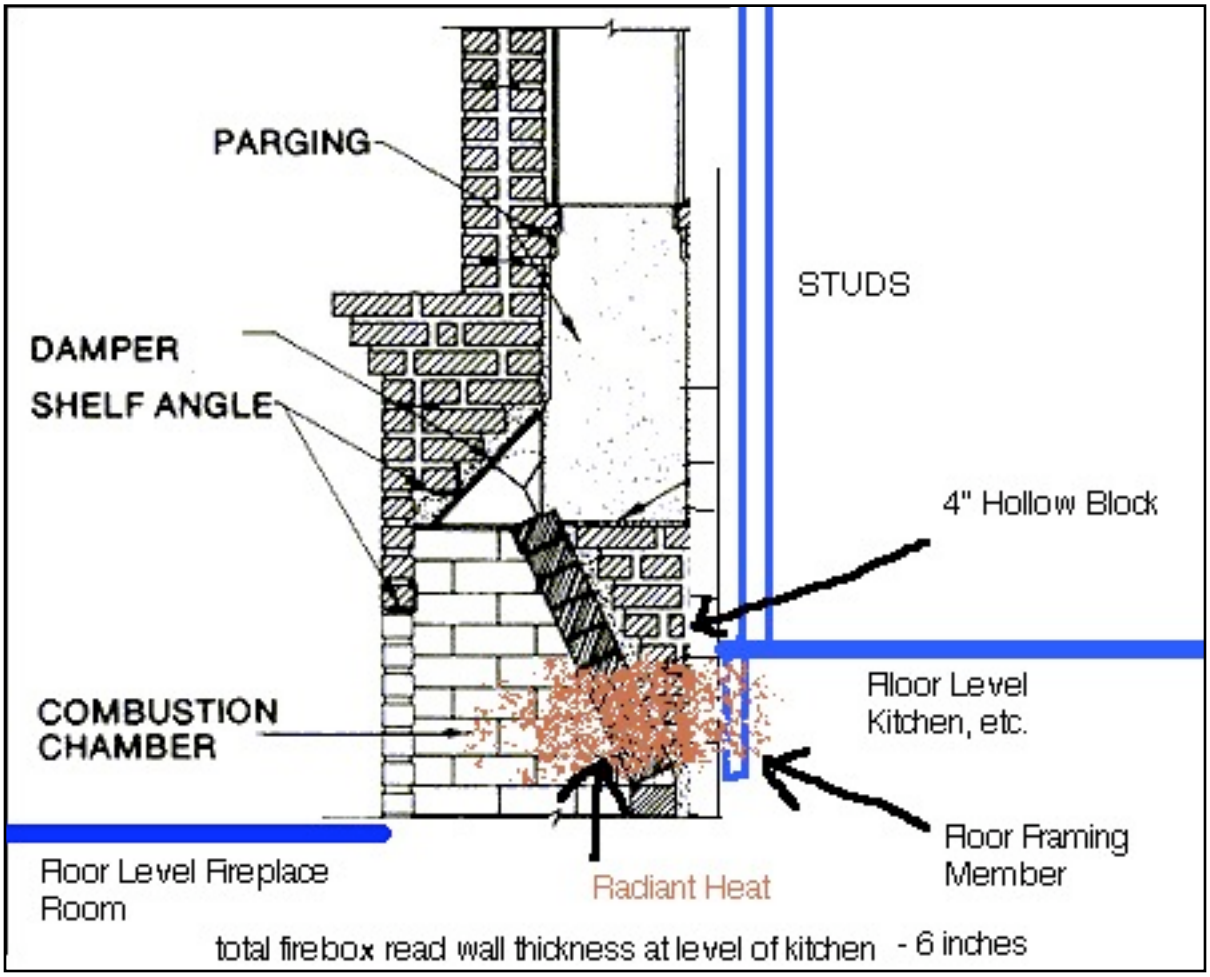
#1A &B - Hollow masonry units of insufficient thickness

Heat from a fire flows in various ways, in this case mostly by radiant energy and by conduction though the masonry materials. Radiant energy can easily pass through air, which is one of the reasons the code specifies solid masonry units. This radiant energy, not unlike the rays of the sun, can overheat combustibles which are nearby, especially those that present a large surface area toward the source of the rays.

In summary, this fireplace was going to cause problems at some time, either now or in the future. In this case, the heavy use contributed to an almost immediate fire, while other scenarios might have taken years of the slow drying of the framing members. It is my opinion that the triggering factor in this case was the direct contact of framing members with the fireplace rear - which was made much worse in this case due to the offset in height of the two room - i.e., a framing member which would normally be located well below the fireplace burn area was now located directly behind it.



(Diagram above shows how radiant heat penetrated rear wall to combust floor framing)