PUTTING A PRICE on Lives and Property

By David Phillips and Steven Ferry
“The frequency and severity of fires in America is a result of our nation’s failure to adequately apply and fund known loss-reduction strategies . . . America today has the highest fire loss in terms of both frequency and total losses of any modern technological society . . . .” (FEMA commission, 2000).

There is little doubt that if funds for building new buildings were unlimited, owners would put in every safety feature available:

- Rated structural frame.
- Sprinkler systems.
- Compartmentalization—gypsum, firestopping, dampers, rated doors, masonry, etc.
- Fire alarms.
- Smoke control systems.
- Etc.

But funds are limited. So the issue for those who forge new building codes or amend existing ones becomes where to draw the line between adequate safety measures and cost.

Many feel that the 2000 International Building Code, currently under adoption, doesn’t reflect the minimum level of property protection and life safety, which it is their purpose to ensure. Points of contention include the allowable height and area figures, the permitted “trade-offs” for sprinklered buildings, and the way buildings with mixed occupancy are regulated.

Monetary considerations invade almost every aspect of the model code development and amendment, making it hard to untangle motivations behind proposed changes. The codes can dramatically affect the sale (or non-sale) of the products and services of many established industries.

Model codes have been brought to the forefront by the
efforts of the International Code Council, ongoing since 1997, to produce a single set of model building codes to replace the three codes that have traditionally existed in the United States: the National Building Code (NBC—used in the Northeast), the Standard Building Code (SBC—prevalent in the South) and the Uniform Building Code (UBC—used in the West).


Model codes are intended to be minimum standards for life safety and property protection. Different regions of the United States have been governed by separate model codes, and minimum standards for life safety and property protection vary considerably among them.

**Different Codes for Different Folks**

“In the 1980s, I found out there was a veiled threat from the Feds that if the various model code groups didn’t get together and create a single, national document, then the Feds would write their own building code and everyone would be stuck with it,” explains Tom Meyers, a member of the Colorado Chapter of the ICC.
There is no question that one universal model code is the answer. But that code has to be right. Human lives are at stake.

“As a chapter member, the first thing I noted was that in order to coalesce three divergent documents, the individuals on the drafting committees started by using the lowest common denominator in each of the documents,” explains Meyers. “The argument was that if the code turned out to be more restrictive, jurisdictions adopting the code would then have a number of buildings that would be effectively out of compliance.”

This is faulty reasoning, especially because the Insurance Services Offices have been rating building departments for some years based on the most current adopted code, whether or not it is amended. They favor restrictive amendments and penalize less restrictive amendments to the code because insurance is expensive.

**Lowest Common Denominator, Highest Possible Risk**

The question that should have been asked by the ICC was: Is this lowest common denominator good enough for our purposes? Do we have a great record of fire safety based on these lowest common denominators?

The United States has one of the highest fire death rates in the industrialized world. The figures reported in 2000 were 1,708,000 fires, 4,045 civilian deaths, 22,350 injuries and about $11.2 billion direct dollar loss from fires.

In non-residential properties, which is the area covered by the IBC, the figures are 126,000 fires, 90 deaths, 2,200 injuries and $2.8 billion property loss. This is nothing to be proud of, even though there has been a significant improvement in the non-residential fire loss figures over the last decade and a half.

This improvement, however, is not spread evenly across the country. NFPA data for 2000 reveals the following:

- Civilian fire deaths per million people are 61 percent higher in the Northeast and the South (averaging 4.5 deaths per million people annually), while the West’s incident rate at 2.8 deaths per million people is 36 percent below the national average.

- Property damage as measured in dollars per person from fires in the Northeast and South is $6.50 per person, making it 46 percent higher than the national average of $4.40 per person. The West’s property damage rate of $1.30 per person is 56 percent of the national average.

Richard Licht points out in his article, *Maintaining Safety Effectiveness in the New Building Codes*, “There is a clear and substantial difference in loss of life, injuries and property damage between the regions governed by the Uniform, National and Standard Building Codes, with the best performance provided
by the more balanced fire protection provisions of the Uniform Building Code.”

Mark Kluver, manager of regional code services for the Portland Cement Association, investigated to establish the connection, if any, between these disparate fire safety records and the different building codes.

Kluver found that the UBC (covering the West) was the most restrictive in three main categories: occupancy separation; sprinkler trade-off; allowable heights and areas. He also found “significant differences in the fire performance of buildings that were erected under the jurisdiction of the three model building codes.” The information suggests “that the differences in fire performance can be explained by differences in the fire protection features required by the three model codes. Unfortunately, the differences in fire performance between buildings erected under the three model codes have not been considered during the merging of these documents into the 2000 IBC.”

“Even more distressing is the fact that most of the provisions in the first draft of the IBC are based on the least restrictive requirements in any of the three codes,” Kluver said. He found that many IBC allowable heights and areas requirements are significantly less restrictive than even the least restrictive of the three model codes. Kluver says, “This will mean that throughout the United States, larger buildings will be constructed with combustible materials and/or without providing fire-resistance—rated construction. The likely consequence will be larger fires, which will result in higher fire losses.”

**Sprinkler Trade-Offs**

The IBC, with its “lowest common denominator” approach, includes many trade-offs in sprinklered buildings, whereby if sprinklers are installed, certain other restrictions are waived. In “Are Sprinklers Enough?,” Thomas Allen, president of the Smoke Guard Corporation of Boise, Idaho, traces the history of sprinkler trade-offs back to 1980 when the Building Offi-
cials and Code Administrators International’s National Building Code introduced trade-offs on the basis that “such an exception in the building code may encourage the installation of sprinkler systems in those buildings that could marginally justify sprinkler installations otherwise. Significant cost savings could be achieved through the deletion of the one-hour construction and the special door requirements.” Since then, the deletion of multilayered or redundant fire protection features has escalated.

These trade-offs have been justified partly on the basis of Australian fire loss figures (where sprinklers have achieved 99.7 percent satisfactory rating). However, two factors make this comparison irrelevant:

- In Australia, sprinkler systems are required to be inspected, which is not the case in the United States, where sprinkler systems often fail for various reasons.

- In Australia neither fire resistance nor compartmentalization are traded off—the sprinklers are used in combination with passive fire protection systems, thereby providing much greater fire safety.

Meyers notes, “Originally the code came to us in the form of a draft document that was substantially less restrictive [than the existing UBC code]. A key reason was that the NBC was in many ways much more friendly toward active fire suppression sprinkler systems than the UBC had been.” The East has more existing buildings that predate the building codes and the fire officials wanted to encourage developers to install sprinklers in those building through “trade-offs” in their code.

In the West, these trade-offs were not considered necessary. The insurance industry helped by simply refusing to insure buildings that didn’t have sprinkler systems in them.

“We then spent a considerable amount of time arguing against
those trade-offs,” Meyers says. “Building officials from the Northeastern part of the country were saying, ‘Hey guys, we’ve been doing this here for umpteen years and it works. We don’t see a problem with having the additional trade-offs. It works for us.”

But what are they considering “works”? The fire safety record of the Northeast is much worse than the West’s, as seen in the earlier figures. Blaming this on “older buildings” or any other reason is simply to rationalize the facts. That doesn’t save any lives. The West’s better record should at least prompt the question, “Are we doing something wrong?” on the part of other areas where the record is worse.

Sprinkler Systems Alone Are Not Adequate

If one were limited to only one system, sprinklers would probably be the best choice. However, we have many systems that can be incorporated to help prevent life and property loss and injury from fires. Sprinklers, even when they work (which is far from always being the case), are not the full answer.

Licht adds in his article: “The U.S. Fire Administration’s most recent tabulated data from the National Fire Incident Reporting System shows that sprinklers are ineffective against the migration of smoke in reported fires. Based on other data, some have concluded that sprinkler performance is 98.2 percent effective. However, four out of 10 fires occur in sprinklered buildings where sprinklers do not activate, or do not effectively control the fire.”

A building protected only by sprinklers without passive protection presents three key dangers to occupants:

- The sprinkler system fails to activate because it has been turned off deliberately (due to a leak or other reason), is not working properly (frozen pipes, component failure, broken pipes, has not been maintained, etc.).

- The fire overwhelms the sprinkler system (not uncommon in large fires).

- The fire is shielded from the sprinklers or is a smoldering fire that does not generate enough heat to activate the sprinkler system.

Allen’s article supplies extensive anecdotal information that shows sprinklers

- Often don’t stop smoke.

- Do not necessarily activate with low

- Are ineffective with shielded fires.

- Can pose additional threats to building occupants who are trying to leave
the building by creating more smoke and reducing visibility.

Often fail, and the reliance on these to control a fire is misplaced (turned off for the winter or due to non-payment of utility bills, poor design, sprinklers overwhelmed by the fire, etc., etc.).

When sprinklers alone are relied on for fire safety, tragedies can and do occur.

Licht also points out that, “Smoke kills approximately 75 percent of fire victims in the United States. These deaths occur in areas remote from the room of fire origin and are due to the toxic effects of the smoke as it migrates throughout a building.”

Here, on the other hand, is an example of what is meant by a balanced approach to fire safety:

The Woburn Nursing Center, a 101-bed facility in Woburn, Mass., had been expanded and renovated over the course of many years. The building core had been separated from the patient wings with non-combustible, slab-to-slab walls and self-closing fire-rated doors to the corridors. The sprinkler system was connected to a building-wide alarm system that automatically notified the fire department and could release the magnetic hold-open devices on the fire doors. Fire extinguishers and emergency lights with back-up power had been installed throughout the facility. An additional water main, new fire hydrants, and a new access road had been recently installed at the request of the Woburn Fire Department. The nursing home staff had been trained by the fire department and had developed a fire-safety training program.

On Friday, Oct. 30, 1992, the nursing home, fully occupied at the time, caught fire. The operating sprinklers, in conjunction with the fire-rated doors and walls, controlled the fire and prevented it from spreading into the wings, where the residents’ rooms were located. The residents were all evacuated successfully (Isner 1992).

**Many Voices**

Jeffrey Shapiro, P.E., president of International Code Consultants, used to be
a firefighter and worked in the fire marshals office in Fort Worth, Texas. “In my mind, the 2000 IBC provides a very reasonable level of safety based largely on proven approaches that have been in the various model codes that were consolidated,” he says.

Although not a member of the Alliance for Fire and Smoke Containment and Control, Shapiro notes, “Within the Alliance I see a general agreement that a balanced approach to fire- and life-safety can’t consist of sprinklers alone, and I completely agree with that. However, the large number of products manufactured and marketed by Alliance members, (drywall, concrete, masonry, spray-on fireproofing, fire dampers and firestopping materials, etc.) must result in a compromise that falls short of requiring sprinklers and every other product marketed in the name of fire- and life-safety.”

“People who are pro-sprinkler are not against everything else,” he adds. “They are against a shotgun approach of ‘let’s
have sprinklers and everything else’ as opposed to ‘let’s have sprinklers and then decide what other systems would be the most bang for the buck in terms of complementary and/or redundancy for certain applications.” He feels the owner has to have a role in the decision-making process about what fire safety systems to install in addition to sprinklers, “because at some point the building ceases to be economically feasible and it doesn’t get built.”

Kathy Tabara, a leading fireproofing contractor who heads the Fire Safety Task Group of the Association of the Wall and Ceiling Industries-International, is also a building owner herself. She feels life safety is senior to cost considerations.

“I own several warehouses and offices,” she says, “I would rather pay for a well-built building than do an ‘Enron’ and have a building that may not be as it appears.”

Having almost lost one of her best foremen because the hotel he was staying in had a sprinkler system that didn’t work (it had been turned off because of a leak), and didn’t have proper firestops built in to prevent smoke leaking from an adjoining room to his room, she is alarmed at the slackening of allowable heights and areas and the sprinkler trade-offs in the IBC.

Meyers, after five frustrating years of trying to amend the IBC, has developed a “Let’s wait and see” attitude toward the code. He is not sure whether the UBC was too restrictive, as others ICC members claim.

Shapiro feels that although it can be improved, the IBC strikes a reasonable balance between safety and the cost of fire- and life-safety features.

Many building owners around the United States are doubtless relieved: It is considerably less expensive to build under the IBC than, for example, the UBC. But will they still feel that way if their building burns to the ground with loss of life?

AWCI supports passive fire protection in addition to sprinklers, including fireproofing and firestopping, to contain fires in limited areas. The likelihood of failure of these passive systems throughout a whole building is very low (when a sprinkler system fails, it tends to fail everywhere). AWCI considers the basic premise that the IBC had to choose the lowest common denominator for code-compliance of existing buildings to be flawed. The values obtained by the lowest common denominator or even further modifying that value upward reflect the weakest fire protection standard of our nation, not the highest or even a reasonable intermediate standard. Additionally the IBC height and area table has to be fixed.

The basic question remains: Where do we draw the line between fire protection and safety, and the cost of building in America? ❍

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