



MEMORANDUM

To: On-Site Inspections Subcommittee Date: 11 October 2002
Partnership for Safer Buildings

From: Codes Assessment Subcommittee
Walter Smittle III, Chairman

Re: Initial recommendations: Building Code Fire Safety Concerns

We are pleased to report that the Codes Assessment Subcommittee has completed its initial review of the International Building Code and general issues related to coverage of building codes, and has identified the following items to be considered by the On-Site Inspections Subcommittee. This list is the result of our own reading of the code as well as concerns expressed by the fire code enforcement community, standards and testing organizations, consumer and industry groups. Other members of the Partnership have contributed their comments as well. Some of these issues have received significant attention in the news media, while others have not.

Your Subcommittee's on-site inspections will help us determine if apparent weaknesses in the building code actually translate to unsafe conditions in the real world. We also hope that the On-Site Inspections Subcommittee will help to identify additional issues for our Subcommittee to explore during the course of your inspections. The items we have identified initially are as follows (note: our Subcommittee reserves the right to issue follow-up findings to this report as we continue our review of the codes and related issues):

Inconsistent application of building codes

- **Findings:**
 - The original *America Burning* report of the National Commission on Fire Prevention and Control, published in 1973, points out that, at the time of publication, many areas – chiefly those in sparsely populated rural areas – were not governed by any building code whatsoever (p. 81). Nearly 30 years later, we find that there are still jurisdictions and unincorporated areas that can build buildings without regard to any established building code. Estimates at the time *America Burning* was released were that 3% of the United States still was ungoverned by a building code. Our Subcommittee believes that this statistic is severely underestimated, and that a significant portion of the country is

ungoverned by any building code, either where a code has not been adopted or a code that is in effect is never enforced. Quite apart from the adequacy of the codes themselves, this situation is clearly unacceptable.

- As an example, an investigator from the US Chemical Safety and Hazard Investigation Board recently alerted us to an incident in May 2002 in which a Third Coast Industries chemical blending and packaging plant located in an unincorporated area outside of Pearland, Texas, in Brazoria County, experienced a fire and a number of explosions that destroyed the building. Upon inspection, it was discovered that the County has not adopted a building code and, accordingly, the facility had absolutely no fire protection mechanisms in place (see enclosed Houston Chronicle news report, May 2, 2002).

▪ **Tasks:**

- We ask the On-Site Inspections Subcommittee to find examples of structures that fall outside of jurisdictions requiring building codes and document any major safety issues that are observed.

Government Exemptions from Building Codes

▪ **Findings:**

- In his initial instructions to our group when we met in July, outgoing NASFM President George Miller said, “If you think it is an abomination that some government agencies exempt themselves from the fire safety codes ... say it.” This situation, which manifests itself under the doctrine of “sovereign immunity,” is, indeed, an area of great concern. Our understanding is that public buildings are implicitly exempted from code compliance unless a law is passed by the jurisdiction in which the building is located.
- Past President Miller, in his comments at the National Institute of Standards and Technology (NIST) hearing on the World Trade Center disaster in June 2002, pointed out that the Port Authority of New York and New Jersey, which had jurisdiction over the World Trade Center towers, is considered “its own government with its own rules, including the sole authority to conduct fire prevention and building code enforcement at its own facilities” (see comments, attached). Neither the New Jersey Division of Fire Safety nor the New York State Office of Fire Prevention and Control had the authority to inspect the buildings to ensure their code compliance – and, because of dual jurisdiction, both states would have had to pass laws to gain that authority.
- South Carolina State Fire Marshal Robert Polk reports that although sovereign immunity is not an issue in his state, “the result is the same” because the enforcement of the building code for state buildings does not fall under the

jurisdiction of his office, but rather under the office of the State Engineer, whose interpretation of the code is often not as strict.

- In the opinion of this Subcommittee, government must lead by example in code compliance and enforcement, and is not in a position to ask the private sector to comply with codes unless its own house is in order.

▪ **Tasks**

- The Codes Assessment Subcommittee will conduct a survey of State Fire Marshals to attempt to determine the extent to which sovereign immunity or other practices or situations such as jurisdictional issues explicitly or effectively exempt public buildings from code compliance and enforcement in their respective states. The US Chemical Safety and Hazard Investigation Board has expressed a willingness to assist NASFM in obtaining this information.
- The On-Site Inspections Subcommittee is asked to provide any information it is able to locate to corroborate or contradict this finding.

Tradeoffs in Passive vs. Active Fire Protection

▪ **Findings**

- As the three regional model codes (the Uniform Building Code, Southern Building Code and National Building Code) have been combined into the International Building Code, concerns have been expressed that the tradeoffs in passive (i.e., structural) fire protection vs. active fire protection (such as automatic sprinkler systems) are more liberal than any of the regional model codes, or have taken the least restrictive provisions from the three model codes for use in the combined code.
- Stephen Weinryb, AIA, of the Clarett Group, points out that tradeoffs “enable a developer or business to maximize the property development and therefore make projects viable where they would normally not be viable.” This is an important point. While some reduction in passive fire protection may be appropriate to encourage the installation of active systems, however, some redundancy of safety provisions is necessary in the event that one fire protection element were to fail (for example, sprinklers).
- The original *America Burning* report of 1973 encouraged the use of sprinkler tradeoffs as a way to encourage the more widespread use of sprinklers, stating that, “...the model codes should permit other savings by relaxing requirements for other fire safety features when automatic sprinklers are installed” (p.83). However, *America Burning Revisited*, the 1987 report of the U.S. Fire Administration, observed, “Risk management, calculated risk, trade-offs and decisions made by broad-based community groups, not just the professionals,

are concepts that have taken hold in our country. People are willing to purchase some amount of protection, but they are not willing, or not able, to purchase all of the protection that the professionals specify is needed in a given instance” (p. 44).

- It is the position of this Partnership for Safer Buildings that both active and passive fire protection must be in place at adequate levels to achieve safety from fire for both occupants and emergency responders.

- **Tasks**

- With this in mind, we ask that the On-Site Inspections Committee pay particular attention to the following chapters of the International Building Code (2000) initially. We are aware that some changes to the model code might be so new that they are not yet observed in the real world:

- *Chapter 6, Types of Construction:* Tables 601 (Fire-Resistance Rating Requirements for Building Elements (hours) and 602 (Fire-Resistance Rating Requirements for Exterior Walls Based on Fire Separation Distance). For example,
 - Is a rating of “0” appropriate for any building element in any circumstance?
 - Table 601, footnote B, notes that “Fire-resistance ratings of structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.” Is this situation safe?
 - Table 601, footnote C, notes cases in which “fire protection of structural members shall not be required, including protection of roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant treated wood members shall be allowed to be used for such unprotected members.” Does this allow for dangerous situations?
 - Table 601, footnote D, describes the situation for construction types IIA, IIIA and VA in which “an approved automatic sprinkler system ... shall be allowed to be substituted for 1-hour fire-resistance-rated construction” In the event of a sprinkler system failure, is the structure then unprotected?
- *Chapter 5, General Building Heights and Areas:* Several situations are described in which the area of certain types of buildings may be unlimited as long as automatic fire protection is installed. Without a required corresponding increase in passive fire protection measures, do

these situations represent a hazard to occupants and firefighters. Some examples follow:

- Section 504.2, Automatic Sprinkler Increase, states: “For buildings protected throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, the value specified in Table 503 for maximum height is increased by 20 feet (6096 mm) and the maximum number of stories is increased by one story. For Group R buildings protected throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.2, the value specified in Table 503 for maximum height is increased by 20 feet (6096 mm) and the maximum number of stories is increased by one story, but shall not exceed four stories or 60 feet (18 288 mm), respectively. These increases are permitted in addition to the area increase.”
- Section 506.3, Automatic sprinkler system increase: “Where a building is protected throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1, the area limitation in Table 503 is permitted to be increased by 200 percent ($I_s = 200$ percent) for multi-story buildings and 300 percent ($I_s = 300$ percent) for single-story buildings.”
- *Chapter 10, Means of Egress:*
 - Table 1004.3.2.1, Corridor Fire-Resistance Rating, the required fire-resistance rating drops to zero for sprinklered assembly, business, educational, factory, mercantile, storage, utility/misc., and certain institutional occupancies. (Though residential occupancies are not in the scope of the Partnership, an addendum to the 2000 IBC drops the fire-resistance rating for a sprinklered residence to half an hour.) According to State Fire Marshal Polk, this has the effect of eliminating fire doors, closers on doors, protecting penetrations on walls, and other built-in features that would have allowed the spread of smoke to be controlled. This table essentially puts all the eggs in the basket of fire sprinklers for most occupancies.
- *Chapter 4, Special Detailed Requirements Based on Use and Occupancy:* Section 403 on High-Rise Buildings (specifically section 403.3) allows fire-resistance rating reductions in buildings that “have sprinkler control valves equipped with supervisory initiating devices and water-flow initiating devices for each floor.”
 - In these cases, Type IA construction is permitted to be dropped to Type IB (reference Table 601), with a resultant fire rating reduction for certain building elements such as the structural

frame and bearing walls from 3 hours to 2 hours and roof construction from 1½ to 1 hour (Section 403.3.1, Type of construction).

- Likewise, in other situations, Type IB construction is allowed to be reduced to Type IIA, which drops structural frame and bearing walls requirements from 2 hours to 1 hour and floor construction from 2 hours to 1 hour (Section 403.3.1, Type of construction).
 - In addition, “where automatic sprinklers are installed within the shafts at the top and at alternate floor levels,” the required fire-resistance rating of the fire barrier walls enclosing vertical shafts has been reduced to 1 hour (Section 403.3.2, Shaft enclosures).
 - As we know, it can take several hours for a high-rise building to evacuate. If a sprinkler system were to fail, as it did in the case of the World Trade Center, the occupants stand little chance of reaching safety in the time allotted by the fire-resistance rating of these structural elements.
- *Chapter 7, Fire Resistance-Rated Construction:*
- Section 707.2, Shaft enclosure required, allows for the construction of intercommunicating stairs throughout a fully sprinklered B (Business) & M (Mercantile) occupancy building if specific requirements are met. These include a draft curtain, (minimum of 18” deep) with closely spaced sprinklers at 6 feet on center per NFPA 13 and an opening of no more than double the projected area of the stair or escalator. In other words, a 40-, 50- or 60-story building can have a legal communicating stair without a shaft the full height of the building. In an office building, the draft curtains can quickly be overcome by smoke that then starts to rise up the building. The closely spaced sprinklers will not be effective if the fire is 40 feet away, and, if for some reason, has not come under control by the other sprinklers. In addition, the smoke baffle assumes hot smoke rising to the ceiling. There is a concern that cool smoke from a fire under attack by water can linger at lower levels and could quickly fill the floor and find its way up the opening. Air movement in tall buildings is tricky due to stack effect. The code does not address this issue. How it would be controlled in a fire scenario is questionable. How would floors be pressurized above and below the fire floor with this opening in the floor?

- Section 708, Fire Partitions, specifies that the wall assemblies, including walls separating tenant spaces in covered mall buildings as well as corridor walls, shall have a fire-resistance rating of 1 hour – and less in some circumstances where an automatic sprinkler system is present (Section 708.3, Fire-resistance rating).

We have included relevant appendices for your immediate reference.

As your Subcommittee conducts its on-site inspections, we also would appreciate your guidance on potentially unsafe materials or practices not on this list. Additionally, the issue of code-compliance over time has been raised by our Subcommittee as a potential area of concern. We would appreciate your looking into such maintenance-type issues as you conduct your inspections.

Our Subcommittee now will go back through the IBC for a more detailed examination of the codes. We will conduct the same analysis of the NFPA building code once it is released later this Fall. During this more comprehensive review, we will use the NFPA 550 Fire Safety Concepts Tree as a guide for organizing our recommendations, per the Partnership's suggestion. We expect to make additional recommendations as a result of this more in-depth review.

Enclosures

cc: Partnership for Safer Buildings
Catastrophic Fire Safety Task Force
NASFM Membership (w/out enclosures)