



America Burning: Design Strategies for Fire Prevention

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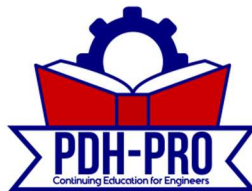
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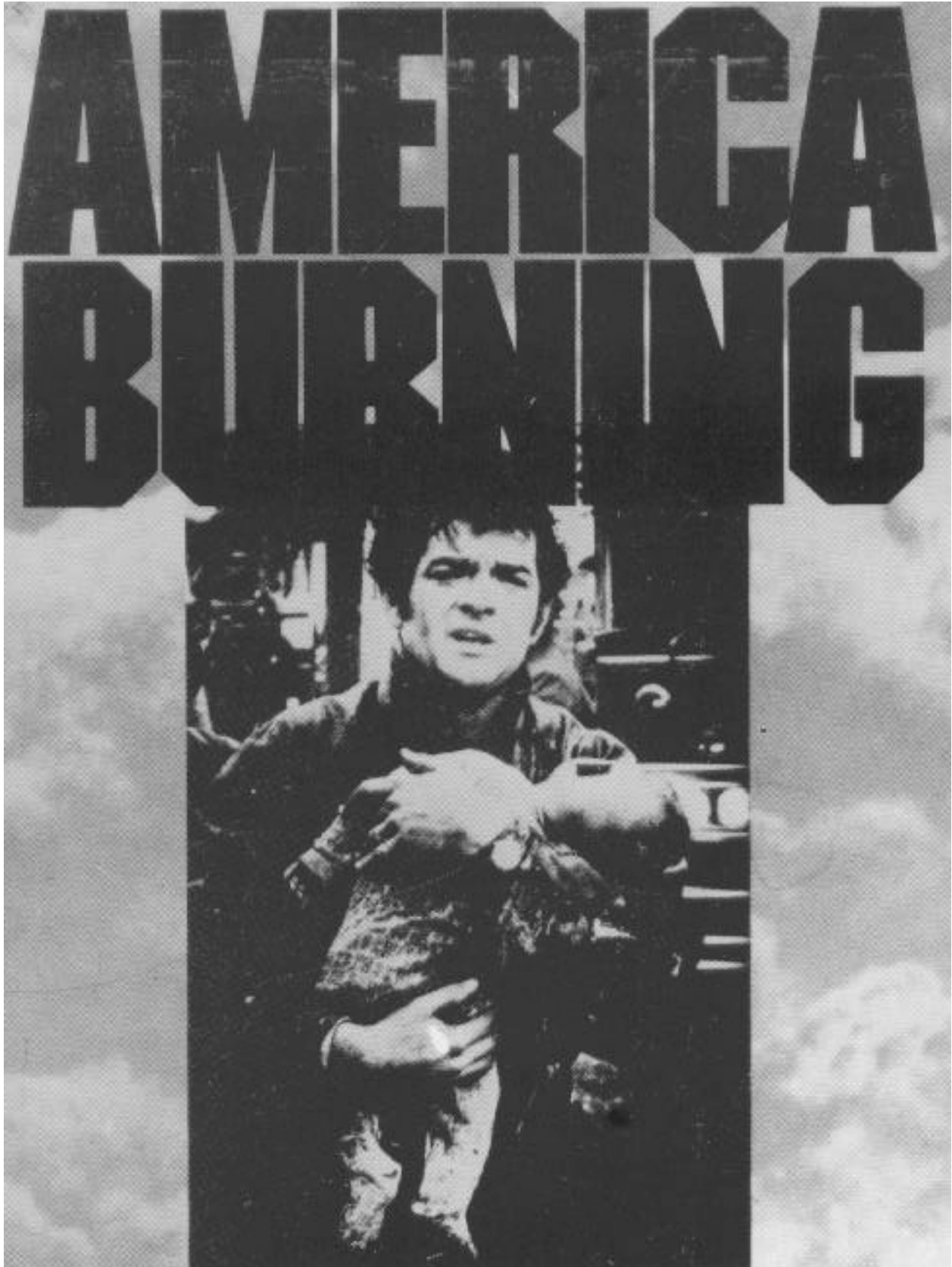
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The Report of The National Commission on Fire Prevention and Control



WHAT THIS REPORT IS ABOUT

The striking aspect of the Nation's fire problem is the indifference with which Americans confront the subject. Destructive fire takes a huge toll in lives, injuries, and property losses, yet there is no need to accept those losses with resignation. There are many measures--often very simple precautions--that can be taken to reduce those losses significantly.

The Commission worked in a field where statistics are meager, but its estimates of fire's annual toll are reliable: 12,000 American lives, and more than \$11 billion in wasted resources. Annual costs of fire rank between crime and product safety in magnitude. These statistics are impressive in their size, though perhaps not scary enough to jar the average American from his confidence that "It will never happen to me." In a Washington hearing the Commission heard testimony from the parents of a 7-year-old boy who caught fire after playing with matches. They described the horror of the accident, the anxiety while awaiting doctors' reports, the long weeks of separation during the critical phases of treatment, the child's agony during painful treatment, the remaining scars, and the many operations that lie ahead. Multiply that experience by the 300,000 Americans who are injured by fire every year, and consider, as we did, that it could easily happen in your own family; then the Nation's fire problem becomes very immediate and very fearsome.

During its deliberations the Commission uncovered many aspects of the Nation's fire problem that have not received enough attention--often through indifference, often through 'lack of resources. It became clear that a deeper Federal involvement was needed to help repair the omissions and help overcome the indifference of Americans to fire safety.

We felt strongly that fire prevention and control should remain primarily local responsibilities. Local governments--through codes and fire safety laws, and through heavy investments in fire department personnel and equipment--have shouldered the major burden of protecting citizens from fire and should continue to do so. Those governments appreciate special local conditions and needs more fully than an arm of the Federal Government would be able to do. Roles for the Federal Government, in the Commission's view, are appropriately limited to lending technical and educational assistance to State and local governments, collecting and analyzing fire information, regulating the flammability of materials, conducting research and develop-

ment in certain areas, and providing financial assistance when adequate fire protection lies beyond a community's means.

To the extent these functions are being performed at all, they are scattered among the Federal agencies. The Commission feels there should be an entity in the Federal Government where the Nation's fire problem is viewed in its entirety, and which encourages attention to aspects of the problem that have been neglected. This same entity would serve as the conduit for the inter-governmental cooperation that is needed to combat the Nation's fire problem. Accordingly, the Commission recommends the establishment of a United States Fire Administration in the Department of Housing and Urban Development where the primary Federal responsibility exists with local government. The U.S. Fire Administration would not swallow all the ongoing programs of research and action, but would supplement them for the sake of a more coherent effort to reduce the Nation's fire losses. In this way, the special abilities of each Federal agency would be utilized.

The following summarizes briefly some of the aspects of the Nation's fire problem which the Commission studied and which the U.S. Fire Administration, through encouragement or direct sponsorship, could help to solve :

- *There needs to be more emphasis on fire prevention.* Fire departments, many of which confine their roles to putting out fires and rescuing its victims, need to expend more effort to educate children on fire safety, to educate adults through residential inspections, to enforce fire prevention codes, and to see that fire safety is designed into buildings. Such efforts need to be continuously evaluated, so that the Nation can learn what kinds of measures are most effective in reducing the incidence and destructiveness of fire.
- *The fire services need better training and education.* Training for firefighters and officers ranges from excellent, as in some large cities, to almost non-existent, as in many rural areas. Better training would improve the effectiveness of fire departments and reduce firefighter injuries. Better education provides the key to developing leadership for fire prevention.
- *Americans must be educated about fire safety.* Most destructive fires are caused by the careless actions of people, largely through lack of concern and ignorance of hazards. Many fires caused by faulty equipment rather than carelessness could



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be prevented if people were trained to spot the faults before it's too late. And many injuries and deaths could be prevented if people knew how to react to a fire, whatever its cause.

- *In both design and materials, the environment in which Americans live and work presents unnecessary hazards.* The hazards of flames have been studied and regulated to some extent, but recognition of the hazards of smoke and toxic gases has come belatedly. Ironically, efforts to make materials fire-retardant may have increased the life hazard, since the incomplete combustion of these materials often results in heavy smoke and toxic gases. While materials and products that present unreasonable hazards should be banned, the Commission believes the major emphasis should be on a labeling system (to be developed by the Consumer Product Safety Commission) for materials and products, so that consumers, at the time of purchase, know what risks are involved. The impact of new materials, systems, and buildings on users and the community should be assessed during design stages, well before use. Careful analysis and filing of a fire safety effectiveness statement should permit recognition of faults before tragedy strikes.
- *The fire protection features of buildings need to be improved.* There is a need for automatic fire extinguishing systems in every high-rise building and every low-rise building in which many people congregate. Economic incentives for built-in protection are not available today and should be provided. Many communities are without adequate building and fire prevention codes, and many nursing homes and other facilities for handicapped citizens are without adequate fire protection. Perhaps most important, Americans need to be encouraged to install early-warning fire detectors in their homes where most fire deaths occur.
- *Important areas of research are being neglected.* The state-of-the-art in firefighting, in treatment of burn and smoke victims, in protecting the built environment from combustion hazards, points to the need for a major expansion of research and development in these areas. Progress in most of these areas is hindered by a lack of fundamental understanding of the behavior of fire and its combustion products.

To encourage solutions to these problems, the Commission has made recommendations in this report to a number of bodies: the American public, the President, Congress, State and local governments, industries, professional organizations, and agencies of the Federal Government. It has also outlined important tasks for the proposed US. Fire

Administration:

- to develop a comprehensive national fire data system, which will help establish priorities for research and action ;
- to monitor fire research in both the governmental and private sectors, to assist the interchange of information, and to encourage research in areas that have been neglected;
- to provide bloc grants to States so that local governments may develop comprehensive fire-protection plans, improve firefighting equipment, and upgrade education of fire service personnel;
- to establish a National Fire Academy for the advanced education of fire service officers and for assistance to State and local training programs;
- to undertake a major effort to educate Americans in fire safety.

The Commission has also recommended the reinforcement of programs in other agencies, including: detection and alarm systems for federally assisted and insured housing, and built-in protection loan insurance (Department of Housing and Urban Development) ; extension of burn treatment facilities (Department of Health, Education, and Welfare) ; burn and smoke research (National Institutes of Health) ; rural fire protection (Department of Agriculture) ; and further research in the engineering-based technology programs of the National Bureau of Standards.

If these efforts are carried out we predict a 5 percent reduction in fire losses annually until the Nation's losses have been halved in about 14 years. A 5 percent reduction in resource losses alone would amount to \$350 million in the very first full year, which is considerably more than the annual costs of the projected Federal involvement of \$153 million annually, as discussed in Chapter 19.

The public members of the Fire Commission represent the Nation's firefighters, insurers, fire equipment manufacturers, testing laboratories, and other groups in the private sector concerned with reducing the Nation's fire losses. We reached the conclusion that there must be a significant Federal effort only after careful consideration of the shortcomings of present efforts to reduce fire losses in the United States.

Many of the Commissioners have devoted their careers to improving the Nation's fire record. We have become accustomed to public indifference to the fire problem. But we hold the hope that this attitude can be changed. It is our wish that this report will provide a turning point, by reaching-if only indirectly-the conscience of millions of Americans.



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THE NATION'S FIRE PROBLEM

Fire! Hundreds of thousands of times a year, that shout reverberates down hallways or the inner recesses of the mind as Americans come face to face with one of the most dreaded causes of death and disfigurement. Ironically, for every American who will confront flames or choking smoke this year, there are hundreds who give the threat of fire not a moment's thought, who will continue to take only the slightest precautions to guard against fire.

Fire is a major national problem. During the next hour there is a statistical likelihood that more than 300 destructive fires will rage somewhere in this Nation. When they are extinguished, more than \$300,000 worth of property will have been ruined. At least one person will have died. Thirty-four will be injured, some of them crippled or disfigured for life.

Annually, fire claims nearly 12,000 lives in the United States. Among causes of accidental death, only motor vehicle accidents and falls rank higher. Most of fire's victims die by inhaling smoke or toxic gases well before the flames have reached them.

The scars and terrifying memories live on with the 300,000 Americans who are injured by fire

every year. Of these, nearly 50,000 lie in hospitals for a period ranging from 6 weeks to 2 years. Many of them must return, over and over again, for plastic and reconstructive surgery. Many never resume normal lives.

The price of destructive fire in the United States amounts, by conservative estimate, to at least \$11.4 billion a year (see Table 1-1) . Beyond calculation are the losses from businesses that must close and from jobs that are interrupted or destroyed.

In an America that has only lately grown conscious of its ecological responsibilities, there is a need also to develop an awareness of fire's role as one of the greatest wasters of our natural resources.

Appallingly, the richest and most technologically advanced nation in the world leads all the major industrialized countries in per capita deaths and property loss from fire. While differing reporting procedures make international comparisons unreliable, the fact that the United States reports a deaths-per-million-population rate nearly twice that of second-ranking Canada (57.1 versus 29.7) leaves little doubt that this nation leads the other industrialized nations in fire deaths per



capita. Similarly, in the category of economic loss per capita, the United States exceeds Canada by one-third.

Table 1-1. Estimated Annual U.S. Fire Costs

Property loss	\$2,700,000,000
Fire department operations	2,500,000,000
Burn injury treatment.....	1,000,000,000
Operating cost of insurance industry.....	1,900,000,000
Productivity loss	3,300,000,000
Total	\$11,400,000,000

Among those paying most heavily for this poor record are the Nation's firefighters. Theirs is the most hazardous profession of all. Their death rate is 15 percent greater than the next most dangerous occupations, mining and quarrying. In 1971, the injury rate for firefighters was 39.6 per 100 men—far higher than that of any other profession. That same year, 175 firefighters died in the line of duty; an additional 89 died of heart attacks and 26 are known to have died of lung disease contributed to by the routine smoke hazard of their occupation.

While many firefighters, particularly in smaller departments, do not have adequate opportunities for training, the fact is that the best training available does not obliterate the risks that firefighters must take in the line of duty. Every fire is a gamble with the unknown, a venture into a unique complex of combustible materials and fire dynamics.

Risk substitutes for certainty, intuition for firm knowledge. As the Committee on Fire Research of the National Research Council pointed out in 1959, "growth in our knowledge of how to cope with fire has not kept pace" with the growth of the fire problem. This basic force of nature has attracted little interest in the scientific community, and its elementary characteristics remain mysteries. To cite an unanswered practical question, posed in the Committee's 1969 report: "When should the top of a building be opened by firefighters to minimize spread; when does opening it increase the spread?" Every fire chief, of course, has to answer that question many times at many fire scenes, based on his training and experience.

But little fundamental research has been performed to make one chief's answer better informed than another's.

America's poor fire record, and its failure to marshal enough scientific and monetary resources to improve the record, concerns those who work in the field of fire protection. Firefighters, individually and through such organizations as the International Association of Fire Fighters and the International Association of Fire Chiefs, have been outspoken on the need to improve fire protection. The insurance industry, fire equipment manufacturers, fire research scientists, code officials, government administrators: Each of these groups has sought to improve the Nation's performance in combating the fire problem. For three-quarters of a century, the National Fire Protection Association, representing a variety of interests, has compiled an excellent record in public education and in the setting of standards for fire safety.

Causes of America's Fire Problem

The efforts of individuals and organizations in the fire protection field have run against the twin tides of ignorance and indifference—tides which contribute substantially to the extraordinary magnitude of the fire problem in the United States.

While genuine economic problems often stand in the way of deeper investment in fire protection, lack of understanding of fire's threat helps to account for the low priority given fire protection. And while those who have survived a fire never forget its destructive potential, for most Americans fire appears a remote danger that justifies indifference.

But indifference exists where it is least excusable. For example, there are those in the fire services who are unaware of the technological state-of-the-art in their field. There are fire department administrators who pay lip service to fire prevention and then do little to promote it. The public shares their unconcern, for in the public's image—an image which firefighters share—the fire department is a heroic-proportioned battalion of people rescuers and fire suppressers, not a professional corps of fire preventers.

Designers of buildings generally give minimal attention to fire safety in the buildings they design. They are content, as are their clients, to meet the minimal safety standards of the local building code. Often both assume that the codes provide completely adequate measures rather than mini-



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