A REPORT TO

MILTON J. SHAPP
GOVERNOR OF THE
COMMONWEALTH OF PENNSYLVANIA

FROM THE

GOVERNOR’S COMMISSION
ON FIRE PREVENTION AND CONTROL

MARCH 1976
The Governor’s Commission on Fire Prevention and Control appointed by your Office July 26, 1974 submits this report in accordance with your direction.

The Commission finds that the carnage and loss of property from fire can be substantially reduced by allocation of effort toward certain priorities. Primary among these is the need for a focal point for matters of fire loss management within our State.

It is the hope of the Commission that State Government will, based upon these recommendations, begin a program that will encourage and assist local political subdivisions in improving fire prevention and control activities.

The report “Pennsylvania Burning” is submitted as a best effort consistent with time allocation and funding provided. The Commission asks your acceptance of the report and considers itself dismissed unless otherwise informed.

Yours respectfully,

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CHAPTER 1
THE STATUS OF THE STATE

Pennsylvania is burning – its homes, its woodlands, its buildings. It is burning at the rate of $700-million a year, $58 per resident – burning because of accident, arson, apathy.

It’s burning because Harry Lewis of Jamestown put off buying a smoke detector, because Tyrone hotel owner Dominick Turiano didn’t update his wiring, because architect James Westong’s client insisted on cutting costs.

Right now in Pennsylvania scores of destructive fires are raging; each day the Commonwealth experiences more than 400. And chances are that today someone will die by fire; a little more than one death per day is about average.

Pennsylvania is a progressive state, a leader in technological and sociological innovation, and America is the richest nation in the world, among the best educated, the most highly advanced in technology. And yet U.S. property and life loss per capita from fire is truly awesome, higher than any other country in the world – twice that of second-place Canada, six times that of Japan, 30 times that of Italy.

Nobody can calculate the total fire cost to Pennsylvanians, but add together property and forest destruction, burn-injury treatment, fire deaths, closed businesses and lost jobs, and the economic total is staggering. Those professionals who strive to save lives and property, the Commonwealth’s fire fighters, are in the most hazardous occupation in the state.

Those suffering burns in the line of duty, and civilians caught in the flames who survive (some 18,000 annually in the Commonwealth), live sheathed in scars – physical or emotional – throughout their lives. Many spend months in hospitals undergoing painful treatments, returning again and again for plastic surgery until savings or stamina are gone, as best they can, a life of disfigurement.

And why? Why are there so many fires, so many victims?

Because, according to scores of Commissions Witnesses, hardly anybody cares:

- **The average citizen doesn’t.** Fires happen, of course – you see it on the six o’clock news – but to somebody else. They’re as remote as a typhoon or an assassin’s bullet or a volcanic eruption. Fire just isn’t a personal worry, and few take precautions. How many friends can the average man name who have fire detectors in their homes?

- **Government bodies don’t.** Otherwise there would be more than only one-quarter of Pennsylvania’s municipalities with fire or building codes, there would be more paid firefighters, and volunteers would be spending their time training instead of having to resort to raffles, tag days, and carnivals to raise money for equipment and operations.

- **Builders certainly don’t.** They’re content to meet only minimum safety standards, and often not even those. How many sprinkler systems do you see in municipalities where they’re not mandatory?

- **Manufacturers don’t.** Otherwise no children’s synthetic nightgown would be flammable, no bed could become a pyre, no polyurethane wallboard would be labeled “flame retardant.”
- And even the fire service seems lackadaisical at least in prevention. More than nine times as much money – 95 cents out of each dollar – is spent on extinguishing fires than on forestalling them. Besides, inspecting is dull, climbing ladders exciting.

Some individuals and groups, over the years, have consistently fought for better prevention programs: the various model code organizations, the insurance industry, the National Fire Protection Association, the National Association of State Foresters, the International Association of Fire Chiefs, the International Association of Fire Fighters, and in 1972-73, the National Commission on Fire Prevention and Control.

Still, the public remains complacement. Sure, there’s a problem, thinks the average citizen, but it’s being taken care of. There’s a firehouse just down the street so everything’s under control. Besides, I’m insured.

But the fact is, as the Commission hearings repeatedly revealed, everything is not under control. Our lives are changing; we are beginning to die in a new kind of fire, the plastics fire – not from flames but from poisonous fumes – and we’re dying in new kinds of places: in high-rise buildings, for instance. America has been changing, but methods of handling the fire problem – the attitudes, equipment, and ideas – are still attuned to the past.

The Pennsylvania Commission on Fire Prevention and Control was appointed by Governor Shapp in 1974 to study the situation and report to the Commonwealth ways of “curing the fire epidemic.” His statement included seven directives:

1. Consider ways to prevent fire through technology and inspections.
2. Analyze existing state fire-prevention programs and recommend ways of strengthening them.
3. Evaluate existing fire-suppression methods and ways to improve them.
4. Assess present and future needs for training and equipping fire-fighting forces.
5. Analyze methods of assessing and reducing fire threat.
6. Evaluate burn treatment facilities.
7. Assess responsibility of state and local political subdivision for fire safety.

The Commission held hearings in five Pennsylvania cities, received testimony from more than 70 witnesses, and spent nearly a year in deliberations. It arrived at 30 specific legislative recommendations and another dozen recommendation to be implemented on the local level. When all recommendations are distilled, however, the Commission feels that the main fronts for attacking the fire problems are three: (1) Educate the fire specialist and general public. (2) Shift emphasis significantly from suppression to prevention. (3) Coordinate efforts among state and local prevention and suppression forces.

The fire toll in Pennsylvania, the Commission feels, can be reduced dramatically. The key is prevention. It’s not complete protection; that’s an impossibility. Human carelessness and technological failures will inevitable touch off some fires. But if fires are inevitable, death by fire is not. The question is this: What is the optimum fire-loss reeducation that realistically can be expected from a practical effort?

We feel that a reasonable goal is to cut fire losses in Pennsylvania by one half within a generation. In specific terms, that would mean:

- A reduction in injuries of 18,000.
- A total Commonwealth savings in lives of 3,000.
- A total dollar savings of $7-billion.
RECOMMENDATIONS

Central Focus

The Commission recommends:

- The Office of State Fire Commissioner be established.
- The State Fire Commissioner be attached to the State Department of Labor and Industry.

Prevention

The Commission recommends:

- All fire departments in the Commonwealth, with approval of owners, undertake an annual inspection of each domicile in its jurisdiction.
- The State require compliance with the National Fire Protection Association/American National Standards Institute standard for new mobile homes, with the additional requirement of at least one suitable early-warning fire detector.
- Commonwealth assist local communities in the construction of schools, only on the condition that approved life safety standards are included in the design of the structure.
- Every hospital in the Commonwealth employ a qualified Fire Officer and Safety Engineer, and that any hospital with more than 250 beds have a full-time Fire Officer and Safety Engineer.
- The commonwealth-adopted codes include single-family residents.
- The State Building Code and the State Fire Prevention code shall be annually updated.
- Building Code enforcement be that joint responsibility of state and municipality inspectors.
- Flame-retardant sleepwear be made mandatory in all Commonwealth-licensed nursing homes and hospitals.
- Within three years, all bathrobes and bed linens used in nursing homes and hospitals be exclusively of flame-resistant material.
- Minimum distances be established by State Building Code between occupied structures and high-pressure underground transmission lines for flammable liquids and gasses.
- The area of arson investigation, under the State Police’s Fire Marshal’s office, be expanded with personnel specially trained in arson diagnosis.
• The Legislature amend Section One of Act 291, April 27, 1927, to transfer the enforcement of regulations governing storage of flammable liquids (but not the movement of them) to the jurisdiction of the Department of Labor and Industry.

• Local administrators lean less heavily on the Insurance Grading Schedule as a guide to what is needed, and to reorient priorities to focus more directly on prevention, less on suppression.

• Local municipalities extend the regulations for burning to areas beyond suburban borders.

• All off-the-road recreational vehicles be prohibited from Commonwealth woodlands or grasslands unless equipped with a spark arrestor approved by the U.S. Forest Service.

**Training**

The Commission recommends:

• Nursing home employees be required to participate in semi-annual seminars on fire safety.

• All State and municipality code-enforcement officers be required to be certified and re-certified by the Commonwealth on a regular basis, based upon participation in State-approved educational programs.

• Under the direction of the State Fire Commissioner, and with the cooperation of the State Police Fire Marshal, a seminar in arson investigation be held annually.

• The State Fire Commissioner and the State Police Fire Marshal, in conjunction with the authorities of the Commonwealth’s larger cities, develop a method by which arson investigators can receive advanced training by working alongside recognized urban experts in the field.

• The State Police Fire Marshal, working in conjunction with the State Fire Commissioner, develop traveling arson squads, the primary purpose of which would be the training of local arson investigators.

• If put under the supervision of the State Fire Commissioner, the budget of the Pennsylvania State Fire School be substantially increased.

• The larger cities of the Commonwealth invite competent firefighters from rural areas to join forces with their own men as Visiting Firefighters.

• The classes offered at the Pennsylvania State Fire School be reorganized to intensify instruction in advanced firefighting, with the emphasis on tactics, command, and management.

• Those classes in elementary technique that are effectively being taught elsewhere in the Commonwealth be eliminated from the course structure of the State Fire School.

• The State Fire Commissioner be empowered to design a regional fire training school system to be operated under his direction, with close alliance with the Secretary of Education.

• To become a Certified Firefighter, a candidate must pass basic courses in firefighting (to be developed by the State Fire Commissions), and that to maintain his status, he must be re-certified every two years.
Before a firefighter is eligible to become a line officer, he must have been certified so by tests developed and administered through the State Fire Commissioner.

Data Gathering

The Commission recommends:

- Annual fire safety programs to educate occupants of multi-story buildings be implemented throughout the Commonwealth, and that such programs be mandatory in all Commonwealth-owned and operated multiple-story buildings.

- Under the direction of the State Fire Commissioner, a well-funded Office of Public Fire Protection Education be created.

- A continuing program of fire safety education be mandatory in all schools in the Commonwealth.

- At least one course in fire prevention education be required for inclusion in the curriculum of all teacher-certification programs in the Commonwealth.

- The State Fire Commissioner, in consultation with the Department of Education, with the Department of State, and with appropriate architectural societies, develop tests to determine current knowledge in fire and life safety among architectural and engineering students, registered architects and professional engineers.

- By using the results of architectural-survey tests, the State Fire Commissioner, in conjunction with the Pennsylvania Department of Education and appropriate architectural societies, develop, implement, and periodically evaluate and improve a model program in fire and life safety education for students of architecture and architectural engineering, as well as registered architects and professional engineers.

- The Commonwealth Department of State supplement is architectural registration examinations to include substantial material on fire and life safety.

Burn Treatment

The Commission recommends:

- A one-% (1%) surcharge to levied against all fine insurance premiums collected on property in the Commonwealth, and that the revenue be used for burn treatment.

Suppression

The Commission recommends:

- Commonwealth-adopted codes include a provision that all structures of a specified height or greater than a specified floor area be completely sprinklered.

- The companies legally responsible for hazardous material transmission lines supply detailed maps of their routes to the State Fire Commissioner, who shall prepare additional maps for use of interested parties, and that they also supply technical information on the lines and their contents.
• The Commonwealth Legislature mandate complete installation of the 911 emergency telephone system throughout the Commonwealth by December 31, 1981.

• Whenever possible, municipalities finance all but strictly social activities of their local fire service.

• To prepare for the future, urban municipalities begin to lay the groundwork for a system approach to fire by preparing and implementing master plans for the public safety.

• Commonwealth fire departments keep open minds concerning organizational setups, that they study alternate systems and explore the economics and practicalities of unorthodox structures.

• The State Fire Commissioner work with engine manufacturers to develop standardized designs to fill the needs of the Commonwealth.

• In order to achieve or remain at “Certified Firefighter” status, a firefighter must be examined yearly by a physician to determine the examinee’s physical fitness for active firefighting.

• When the proposed new fire and building codes are drawn up, sufficient thought be given to structures in forested areas.
PART 1
PREVENTING FIRES
CHAPTER 2

HAZARDS IN THE HOME

By the time it takes your child to grow into an adult, the odds are you will experience at least one fire. If someone dies during it, the tragedy is likely to occur when everyone’s asleep. The death won’t be caused by flames, but by smoke or toxic gas.

A few statistics:

- Of the 400 Pennsylvania fires that will burn today, almost eight out of ten will take place in residences.
- The Commonwealth will see nearly 120,000 residential fires this year, a hundred a day.
- Of the 380 Pennsylvanians who will die in building fires this year, 80% will be killed at home.
- Each day, one Pennsylvanian will die by a home fire, nine will be injured, and $223-thousand worth of residential property will be destroyed.

We react with horror when we read of lives lost in a nursing home or hotel fire, but tend to accept the report of a home loss as just another news item. Yet for every fire death in a nursing home, at least 50 people are killed in dwellings and apartments.

The causes of home fires and fire deaths are numerous and complex. They range from highly flammable furnishing (the American home contains more sources of ignition and combustible materials than house in any other country in the world), to building design that leads to entrapment rather than escape, to panic on the part of the occupant. The primary cause, however, is carelessness and indifference – such fate-tempting practices as smoking in bed or leaving children at home alone.

In his testimony before the Commission, Dr. Halbert Fillinger, Assistant Medical Examiner for the City of Philadelphia, said that his department is continually “finding bodies of people who’ve been smoking in bed, or in overstuffed chairs…and we’re seeing very high levels of alcohol in well over half of today’s fire victims.” More than 80% of home fire fatalities, in fact, can be attributed directly to human actions.

Pennsylvanians don’t worry about fire – at least not until they’ve had one. Then they can think of nothing else. As one man who suffered a loss told the Commission: “Nobody was hurt, thank God, but my home was gutted. I can remember poking through the ashes the next day and finding almost nothing recognizable. In my shock, it seemed the whole thing was a jigsaw puzzle: That must have been an FM receiver; that a piano, this, ski binders; that pile of still smoking paper, a library.

“I learned a lot that day,” he said. “I asked myself a lot of questions, too: Why didn’t I buy a smoke detector or two? That would have saved maybe five minutes, and perhaps most of the house. Why did I design those high, narrow, horizontal windows in the bedrooms — windows too small for firemen to enter? Why didn’t I plan for fire — figure beforehand what should be saved first? (I grabbed a pool cue and a library book on the way out.) Why didn’t I have the fire department number at the phone? I wasted more seconds looking it up. And why wasn’t I careful with my smoking; an ashtray that I emptied before I went to bed probably was the cause.”
The speed of a home fire can be truly amazing. A cigarette might smolder in a couch for hours. Then a small flame begins (its temperature always at least 1700 degrees F.), grows, ignites a curtain, and spreads. A room is a confined box; most of the heat stays in, and soon – perhaps in only a few minutes – flashover occurs, the point at which walls stop absorbing heat and start to release it as those surfaces vaporize and burn in solid walls of gas.

Suddenly, the whole room is aflame. Air temperatures can exceed 1,000 degrees F. Within two to four minutes of initial flaming, most of the contents are burning. Fabric flashes a fire. Plastics – wastebaskets, furniture, and containers – burn almost explosively. Furniture finishes vaporize. “Flame retardant” carpeting and other synthetics belch huge volumes of thick, rich smoke laden with poisonous gasses that fume from the room and race upward toward the bedrooms – and even pure air can kill when heated to 300 degrees F.

The time between point of ignition and that of toxicity throughout the house may span only three or four minutes. And that may be just long enough to rouse your children and get them out. Or it may not be. The fire service cliché “every second counts” is more than just a slogan.

Most people don’t know how to act in a fire. They’ve never really considered it, so they try to fill a water bucket before awakening the family, or run to a neighbor, leaving the front door wide open, or try a dash through the fire instead of climbing out a first-floor window – or even jump out a window before checking the stairs.

“We try everything to get our message across to the people of the city,” says Fire Captain Joseph O’Donnell of the Philadelphia Fire Department. “But the public simply is apathetic.”

Home inspection by fire service personnel would help, and in a few Pennsylvania communities firefighters are volunteering their time to visit their neighbors and point out unsafe conditions, suggest prevention techniques, and work out emergency plans. As an added benefit to the fire company, such home visits promote respect for the department, and recruit new members as well.

The Commission was unable to find firm figures on how well such a plan works in this state, but Baltimore’s experiences indicate its success: In 1972, when the city undertook a home-inspection program, dwelling fires dropped 47 %, life loss 38 %.

The Commission recognizes the amount of time needed for house-to-house inspection programs, and realizes the cost involved for a State-mandated program; but in recognition of the potential for life and property savings, it strongly urges local fire service personnel to consider such programs:

THE COMMISSION RECOMMENDS

That all fire departments in the Commonwealth, with approval of owners, undertake an annual inspection of each domicile in its jurisdiction.

Such an inspection program should be preceded by a public education campaign to reassure citizens that inspections won’t lead to fines, and that the inspectors aren’t looking for code or other violations. With advance notice, fire departments that have tried residential examination find that it is welcome.

The Commission also suggests that to accomplish the tasks in small departments, women should be encouraged to volunteer as inspectors. The fire service is an almost exclusively male organization, and thereby excludes half the Commonwealth’s talent. Changing the situation might begin with inspection, and the
placing of women in such visible programs would prove to the community that the fire service is not a male club nor firefighting a sport.

One important duty of inspectors should be to explain to homeowners the importance of early-warning fire detectors. The installation of such equipment, the Commission feels, is the single most important move for a homeowner to make to guard against fire loss. Most home fire deaths occur at night while the residents are asleep, unaware of the fire until too late. In almost all cases, an early-warning system – a smoke detector alone or in combination with a heat detector – would awaken them early enough to get out.

The importance of the smoke factor is underlined by a study of fire-related deaths in Maryland during the 2½-year period between October 1971 and January 1974. The study was directed by Byron M. Halpin of the Applied Physics Laboratory of Johns Hopkins, and it consisted of in-depth examinations of approximately 40% of all fire fatalities in the state during the period studied.

Autopsies were performed on the 133 victims (four were found to have died prior to the fire); Samples of burned material and scrapings of fire-deposited soot were analyzed to determine what they contributed to the toxic atmosphere or fire spread. Though the study continues (a detailed report is expected in 1976), preliminary findings include these:

- Nine out of ten (93%) of the fatal fires took place in residences.
- Most of the fires resulted from smoking – misplaced cigarettes, ashtrays thrown into wastebaskets, cigars dropped when the smoker fell asleep. The full list of fire causes (some multi-victim) include:

  Smoking 55
  Careless use of matches 7
  Flammable liquids 8
  Heating Equipment 6
  Electrical 4
  Careless use of candles 2
  Other 12
  Unknown 11
  TOTAL 105

- Alcohol was present in the blood of victims in more than half (56%) of the smoking-caused fires. (In no case was there indication of drugs involved.)

  The primary cause of death in 50% of the cases was carbon monoxide poisoning. In another third, carbon monoxide plus another factor – alcohol, heart disease, burns – was the cause of death. Burns alone counted for only one out of ten deaths. In 10% of the cases, cause of death couldn’t be determined.

  “It is obvious that carbon monoxide is a predominate factor in hindering an escape,” reported Halpin in the May 1975 issue of Fire Journal. “It is also obvious that alcohol is another important factor. Individually and in combination, carbon monoxide and alcohol are considered to have been the main factors in preventing the escape of 67% of the people in the study. (Other substances – acetaldehyde, metal oxides, hydrogen chloride, and plain soot were also found, but to date no conclusions have been drawn as to their significance.)

  Most of the victims – perhaps ¾ of them – tried to escape, and the study reveals this breakdown as to why they couldn’t:
<table>
<thead>
<tr>
<th>Reason for Failure to Escape</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon monoxide alone</td>
<td>32</td>
<td>29.9</td>
</tr>
<tr>
<td>Carbon monoxide plus alcohol</td>
<td>37</td>
<td>34.7</td>
</tr>
<tr>
<td>Alcohol alone</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>Burn (incl. Respiratory)</td>
<td>5</td>
<td>4.7</td>
</tr>
<tr>
<td>Coronary occlusion</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>Infant</td>
<td>13</td>
<td>12.1</td>
</tr>
<tr>
<td>Explosion</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>Clothing fire</td>
<td>5</td>
<td>4.7</td>
</tr>
<tr>
<td>Suicide</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Car accident</td>
<td>1</td>
<td>0.9</td>
</tr>
</tbody>
</table>

This listing, of course, doesn’t tell the whole story. “In many of the cases, irrational acts were committed by the people,” says Halpin. “Children tend to run and hide. Are they running from the fire or because of the fear of the reactions of their parents? People re-enter the fire to save someone or something. The motivation factor is still a large unknown, and the appropriate method of conditioning people to react rationally to fire stills needs to be determined.”

The fact remains, however, that had the victims been alerted earlier, before dense smoke and flames precipitated panic, the likelihood is that the great majority of them would have escaped. A detector would have sounded the alarm.

Philadelphia’s Dr. Fillinger, who has been investigating fire deaths for the past 15 years, agrees with Halpin. “Almost nobody dies of fire per se,” he told the Commission. “Rarely, except in a case like an explosion, do we see people killed by fire itself. Most die from fumes. If we could rapidly alert the inhabitants to the presence of fumes, the rate of fire deaths would plummet.”

If every resident in the Commonwealth were properly outfitted with early-warning devices, home fire life loss would drop by an estimated 80 to 93%.

Unfortunately, few people have heard of early-warning detectors, despite the fact that home units have been available for a quarter of a century. Pennsylvanians invest in double-door locks and burglar alarms and handguns to protect their property from thieves, but few consider protecting their property from fire. They may spend a small fortune for insurance, but never think of adding a modicum for an alerting device.

Two types of fire detectors are in use in those few homes that have them: detectors that sense heat, and those triggered by products of combustion – particulate matter and gasses (in this report, consolidated to “smoke”). Heat detectors sense high temperatures or high rates of temperature climb, while smoke detectors check for gasses and suspended, air-borne particles. In both cases, when a critical state is reached, an alarm sounds.

The best system, according to the National Fire Protection Association (NFPA) is a combination of the two – smoke detectors outside sleeping areas, heat detectors in all other rooms. Such a system is expensive: For a standard three-bedroom house, prices range from perhaps $250 to about $1,200.

Opinions differ sharply, but the prevailing feeling today is that early-warning detectors have advance far enough technologically that when correctly placed – usually one on the ceiling near each sleeping area – smoke detectors alone are enough. One study showed that of 4,151 residential fires, 75% began by smoldering. However, in that other 25%, fire may have flamed so fast that little forewarning smoke was expelled. In those cases, a heat detector might have sounded an alarm earlier.
Since the threat of fire can stir a family into an emotional state, unscrupulous detector vendors often panic homeowners into quick purchases of sub-standard products. Detectors should bear the seal of approval of a national testing laboratory, such as UL – Underwriters Laboratory – or FM – Factory Mutual Engineering.

A few places across the country now require early-warning detectors in new houses and those remodeled or improved at a cost of 50% or more of valuation – and in the chapter on codes, this Commission recommends such a regulation in Pennsylvania.

In a few situations, detectors have already been required in the Commonwealth. In 1972, in the wake of Hurricane Agnes, the U.S. Department of Housing and Urban Development provided Pennsylvania victims with mobile homes, each equipped with early-warning devices. Today the National Bureau of Standards is collecting data on their effectiveness. No figures on fires are available so far, but some maintenance statistics have already accumulated. Over a period of two years a record was kept of problems experienced by owners of 2,881 homes. Of the roughly 22,000 total complaints received, some 2,000 of them, for example concerned exterior doors. That’s about 10%. Complaints about the detectors numbered only 37, or less than 1/5th of one percent of the total. Of course, some detectors probably are inoperative, but the owner either doesn’t know or doesn’t care.

Early-warning devices, though reliable, are not necessarily foolproof. Some are placed in wrong locations. Others, presumable waiting for fires, are actually unplugged or battery less. A few have activated when there is no fire. But NASA, the Bureau of Standards, the National Science Foundation, and the industry itself are all supporting development efforts not only to make the devices problem-free, but inexpensive enough for mass use. Today battery-operated smoke detectors cost from about $35 to $60 or so, heat detectors $10 to $74. As soon as they become widely accepted, mass production should lower prices.

Detection-system manufacturers often quote price breaks for large quantities, and the Commission urges communities to look into the possibilities of buying quality systems in quantity and re-selling them to homeowners, permitting them to pay in conjunction with their property taxes.

The best kind of early-warning system is one that transmits a call for aid directly to an emergency center. With present day technology, such systems are usually very expensive. However, some cable-TV networks are now being installed with what is called two-way capability, an ability not only to send a signal, but to receive one from the home. Among numerous other advantages of such a system is the transmission of fire alarms.

The installation of two-way equipment is only slightly more costly for the cable-TV company than conventional installation, but without public pressure a utility tends to be shortsighted.

The Commission feels that cable-TV companies should be encouraged to install two-way equipment, and further suggests that municipalities, when granting cable-TV franchises, thoroughly review the two-way question, and if convinced of eventual usefulness, require such capability.

If the installation of early warning systems in conventional homes is urgent, their inclusion in mobile homes is imperative. A fire in a conventional home usually starts some distance from the bedroom; in mobile homes, the whole house – usually including the heating system – is essentially a single, metal room with partitions.

Other characteristics of mobile homes also pose special fire dangers:

- Ceilings highly combustible and low.
- Small ventilation areas
- Blockage of escape routes
- Furnace often placed between bedroom and exit
- Windows often too small for escape.

The Center for Auto Safety, a group financed by consumer organizations and private citizen donations, after studying mobile homes for two years, stated that “in the course of our research we have been told repeatedly by state and local officials that mobile homes burn with a speed and intensity unparalleled in dwelling structures. Once fire starts in a mobile home, the unit is usually gutted.”

Although the frequency of fires in mobile homes is on a par with, or slightly below, that of conventional homes, the destructiveness of their fires is considerable greater – probably four or fives times as high as in conventional residences. The fatality rate is also higher – at least twice that of other housing, and perhaps as much as eight times, depending on which figures you select. Insurance rates reflect the fire potential: Premiums cost as much for an average $10,000 mobile home as for a $40,000 conventional one.

Still other factors add to the problem. Zoning, for example, has pushed mobile home parks to the outskirts, far from the nearest firehouse, far beyond fire hydrants, often to sections virtually inaccessible to fire apparatus.

As of now, mobile homes in Pennsylvania constitute something less than three percent of the total housing. But because they are relatively inexpensive, production continues to increase. By the end of the decade, housing experts forecast, mobile homes may represent four to eight percent of the total.

In light of special fire problems associated with mobile homes and the probable expansion of their use, the Commission checked current mobile home “model” codes, recommended by national code groups – and found them inadequate. The one coming closest to the desired requirements, we feel, is the fairly comprehensive minimum standard list of the American National Standards Institute (ANSI), developed by NFPA. The biggest negative factor is the standard’s disregard of early-warning fire detectors. Therefore:

THE COMMISSION RECOMMENDS

*That the State require compliance with the NFPA/ANSI standard for new mobile homes, with the additional requirement of at least one suitable early-warning fire detector.*

Older mobile and conventional homes should also be protected, of course, but the Commission concludes that mandating across-the-board codes for both new and old domiciles would lead to overwhelming enforcement problems. However, the Commission recognizes two potentially significant levers to induce homeowners to think of fire safety: One is insurance, the other, taxes.

Now is the time, we feel, for insurance companies to begin to reward those homeowners with no fire losses, and to penalize with higher rates those who by pure carelessness cause fires – much as automobile insurers raise rates of habitually negligent drivers. We also suggest that insurance companies include with premium notices literature recommending installation of approved smoke detectors.

The Commission also feels that the State should offer tax incentives to those citizens willing to protect themselves (and to save public funds as well) with fire-safety equipment. Such incentives should include waivers on all State sales taxes on early-warning detection and fire extinguishing equipment and State Income Tax credit allowed for all such equipment for private residential use.
CHAPTER 3

HAZARDS IN BUILDINGS

You walk into a modern building and you note the cement floor, the concrete-block walls, the partitions of metal – and you wonder: How can such a building burn?

Perhaps it can’t, but the furnishings and people can. As one Commission witness put it, “A furnace is fireproof, too – but a hell of a lot of burning can go on inside.”

Most of our building laws and codes are designed to protect the building, not necessarily the people in it. Standards call for stable design, construction, and materials, but are woefully lacking in fire safety provisions. Conventional fire insurance covers property, not people, and over the years codes and standards have focused on the fire itself; only recently have regulations begun to take note of the prime killer: smoke.

A small fire starts in an apartment and burns a slipcover, then a lampshade, and curtains, the false ceiling. The smoke pours up through the concealed ceiling space, through openings where pipes and communication ducts pierce the concrete floor slabs – and the openings form flues, floor after floor upward. Smoke and gasses made up of dozens of noxious substances generated from volatized paints, from vaporized plastic, from melted carpeting and pyrolyzed insulations, belch out at each floor to strangle the unwary. The fire itself may be contained in a single room – hardly any damage to the “fireproof” building. But it effects may turn the whole structure into a gas chamber.

Where does Pennsylvania stand in regard to fires in buildings? (For purposes of this report, a “building” is any structure other than private residences and industrial plants.) The total cost in lives and property loss continues year after year, curving slightly upward to parallel population.

Surprising. One would think that with advancing technology, with broadening social consciousness, with increasing emphasis on safety, the fire loss totals would be dropping.

But somehow they’re not. Here’s the broad picture:

Public Accommodations

The Holiday Inn in Meadville, Pa. was typical of those stretching across the country: modern, clean, an atmosphere of security. Behind the latched door of a Holiday Inn room one tends to feel safe.

Shortly after midnight on October 20, 1973, the couple in Room 137 checked out. But they left behind; investigators concluded later, a smoldering cigarette. Two hours afterward, a late-arriving guest saw smoke curling from under the door. By the time firefighters arrived, the fire had burned through the flimsy, hollow-core door, spread to the highly flammable acoustical ceiling, and flash-fired the corridor’s rubber-backed carpeting.

The flames were extinguished in less than a half hour. No fire reached the second floor. The two people found dead there were killed by fumes.

The motel had no smoke detectors, no sprinklers, and no fire-house-monitored alarm system. Hardly any motels in Pennsylvania have fire detection and suppression equipment. A Meadville-type fire could happen anywhere – and will, unless fundamental life safety action is taken.
Schools

The record on Pennsylvania school fires is neither appalling nor outstanding. For the most part, schools have been built with safety in mind, and fire drills have been going on for generations.

Lately, though, according to some Commission witnesses, the number of fire drills has been drastically cut, and neither students nor teachers are taking them seriously anymore.

Safety seems to be taking second place to aesthetics and convenience. For example, in a new elementary school in Allegheny County (a school with no sprinkler system), highly flammable carpeting was placed in the hallway – not only covering the floor, but also the walls.

In some schools, glass blocks have been substituted for window glass, limiting firefighter entranceways and emergency ventilation. And in the few schools that are sprinklered, we have found, many systems don’t work, and the fire extinguishers won’t work either. Children have mad them inoperaive, and nobody tests them. “We spend more time and money landscaping our school buildings than we do protecting the children studying in them,” says Wallace Merrill, Chairman of Western Pennsylvania Fire & Disaster Defense Council.

“One fire, that’s all we need,” said another witness. “If one school would burn up, then everybody would think safety.” Most experts think it’s only a matter of time.

THE COMMISSION RECOMMENDS

That Commonwealth assistance to local communities in the construction of schools be granted only on the condition that approved life safety standards are included in the design of the structure.

High Rise

As skyscrapers grow ever taller, as high-rise apartment houses and office buildings proliferate across the Commonwealth, worried firefighters, whose obligation it is to protect the people living and working inside, check their equipment, study the buildings, and sweat, waiting. Most floors are out of ladder reach, building height causes increased problems with flue effects, complete air conditioning may mean complete smoke contamination, and no reasonable way exists for quick evacuation.

So far, Pennsylvania has had few high-rise disasters. “But such tragedies are primed and waiting,” as one witness put it. “All that’s needed is a spark.” We have learned to build higher than we can protect and control.

What could happen?” Here’s a scenario of possibilities:

As an 11th-floor apartment dweller leaves for work, he carelessly tosses the morning newspaper onto the range. It gradually crisps over the pilot light, then at 11:38 a.m., bursts into flame. One burning piece slips over the stove edge into the polyethylene wastebasket. The paper flames and the basket flares up, lighting the curtains.

Heated air and smoke rise to the ceiling; cooler air rushes in, insuring a good oxygen supply.

The fire spreads to the kitchen carpeting, a cabinet, a plastic canister set. The temperature rises to 300 degrees F., 400, 600; the ceiling blisters, the cabinet finish bubbles, and flashover occurs; the whole room
suddenly is aflame and spills out to the living room, jumping from tablecloth to polyurethane sofa to synthetic carpeting. Only five minutes have passed since ignition.

A neighbor passing through the hall smells smoke, hears crackling, feels the door – it’s hot – and runs to his apartment to call the fire department. The fire eats through the hallway door and partitions; thick toxic smoke fills the corridor and vents up air-conditioning ducts, utility cable conduits, and the elevator shaft. Soon the 12th, then the 13th floors are smoke-filled. The fire department arrives, its 100-foot ladders too short to rescue the residents, now breaking out their immovable picture windows in frantic attempts to vent the smoke.

The fire must be fought from inside. But the first battle is on the stairways as hundreds of residents scramble down through the smoke, and firefighters plod upward, awkward with their heavy breathing systems on their backs. Nobody can take the elevators; call buttons have summoned them all to an upper floor, and there they remain, doors agape; the dense smoke has cut off the electric-eye beams.

And then, as the fire breaches the main power lines, the lights go out.

The intense heat is too much for the firemen’s turnout coats, and air supplies run out far too soon. Standpipes and hose connections stand ready on every floor, but nobody can get to them.

Eventually the fire is brought under control, with only the 11th floor seriously damaged. Though the flames were contained there, the toxic smoke and gasses were not. Had the fire happened at night, when the tenants were asleep...

The imaginary situation points up a number of things:

- The apartment had no early-warning system. A smoke or heat detector could have been tied in to the manager’s office, or perhaps directly to the firehouse.
- The building was unsprinklered. Hallway sprinklers would probably have limited the fire to the room long enough for firemen to reach the involved floor. Sprinklers in the ignition apartment would have confined the fire there.
- No elevator call bypasses have been installed; they would have permitted elevators to continue to operate under the chief fire officer’s control.
- Firefighting equipment inadequate.
- Stairways and elevators weren’t sealed against smoke.
- Plastics and other synthetics, making up a significant part of modern furnishing, multiplied the smoke hazard.

Older high-rise buildings – usually composed largely of tinder-dry wood – add other problems. Many old, multiple-occupancy buildings were designed for some other use, and years ago, little thought was given to fire during conversion. Many apartment houses have open stairways, for instance, perhaps the single most dangerous kind of construction; a first-floor fire can quickly climb the stairs, blown upward by the flue effect.

Trim, warped over the years, causes openings to appear around doors and windows; in a fire they allow heat and fumes too get out to the rest of the building, and permit fresh air to flow in to the fuel the flames.
Renovations often add heavily to the fire load. Plywood or composition paneling for example, separated from old walls by furring strips or glued in place with combustible contact cement, burns with high heat, dense smoke, and speed. Suspended ceilings of flammable composition tile enormously increase the available fuel.

And the big problem: Many old firetraps aren’t even accessible to inspectors. If they were built before 1927 when the Fire and Panic Act went into effect, grandfather clauses exempt them from statewide regulations. Unless remodeling is done, they can’t be touched.

The law cannot decree that there shall be no high-rise fires, that all occupants will be safety-conscious, alert, and accident-free. The State can insist, however, on the design and construction of buildings so that fires are confined to limited areas, that safe refuges be provided for people (seeing that complete evacuation is rarely possible), and that building design will help rather than hinder firefighters.

We recommend that in the development of the proposed Commonwealth-wide Fire Prevention Code and Building Code (discussed in Chapter 4, “Condition of the Codes”), extensive thought be given to such high-rise considerations as:

- Elevator shaft ways that include manually operated, remote-control hatches atop slantways (to allow fire officers to vent smoke).
- A means for forced smoke removal on every floor.
- Fire department equipment stations (or closets) on every third story, containing breathing units, fire axes, hose, nozzles, extinguishers, lanterns, forcible-entry devices, etc.
- Smoke detectors in each living unit as well as the storage boiler, and laundry rooms, with location transmitted to a central station within the building and/or to a fire dispatcher.
- Compartmentalization, or the splitting of each floor into two or more sections, each isolated from the other, so that each floor will have a fire safe area with first aid and fire hose station.
- Stairwells built to be “smoke towers”, segregated units that can be ventilated, automatically pressurized) to hold smoke out by forcing air into the stairwell automatically when alarm sounds), and isolated from the main building to guarantee a combination “fire escape” and sanctuary.
- Voice communication systems (hallway speakers or common phone systems) to alert and direct occupants in time of danger.

**Nursing homes**

Homes for the aged and infirm pose particular concern to fire officials and communities. At least half the structures are old – some dating back to the early 1880’s – and were never designed for multiple occupancy, and certainly not as semi-hospitals. Their design, construction, and room layouts are hardly conducive to quick evacuation.

As time goes by, a building ages; the framing wood dries, the electrical insulation deteriorates, dry-rot eats away at the beams, slow leaks rot and soften wood, turning it to tinder. Hugh amounts of money for reconditioning are poured into aging nursing homes each year, but slowly the battle is being lost to time.
The nursing home occupant himself poses the biggest problem. Exterior fire escapes are of little use to the infirm, and because most of the floor-to-floor movement is by elevator, many old people have no familiarity with stairs or alternate escape routes. Feeble, confused, bedridden or wheelchair confined, unable to plan and act rationally, often stubborn and reluctant to take directions, the very old person places enormous burdens on rescuer’s, usually untrained in the handling of the infirm.

The reaction of the elderly is often illogical and unexpected. On discovering a fire, a patient may be amused by it, or transfixed, or he may simply ignore it. He may return to his room, where he feels safe, without notifying anyone. In an article in the July 1969 issue of Fire Journal, Richard E. Stevens, NFPA Director of Engineering Services, talks about typical behavior:

“The elderly are extremely reluctant to leave their rooms when an alarm of fire is sounded. As a matter of fact, many patients refuse to leave their room’s event though fire is obviously threatening them. They will forcefully resist any effort to remove them from the building. Often frightened, patients approached by firefighters for rescue will begin striking firemen and have to be forcible removed. This requires enough men to carry each patient out while prying the patient’s hands from doorframes and stair railings. Some of the patients may be sedated or strapped in their beds – which makes it extremely difficult for firemen attempting to rescue them in darkness.

“Once having been taken out of the building, the patients may return to the burning structure unless restrained. The reasons for re-entering the building vary, but the most common one seems to be that the patient simply wants to return to his room because he is cold or tired.”

Many times an elderly patient lights fires on purpose. One woman tried to burn through her restraining straps, and the fire spread to her clothing. Another patient, upset because the attendant asked him to clean up litter in his room, removed it with a match. And another man, angry with his fellow patients, took a volatile fluid from the cleaning closet, poured it around the floor, and lit it; in the fire that resulted five died.

Some patients use fire to commit suicide, often the only method left to one who is weak and bedridden.

Most patient-caused fires, however, are simply a result of carelessness with smoking material or room heaters. And after having started a fire, patients often are too ashamed to alert anyone. Further, during nighttime hours, most homes are sparsely staffed, and the occupants are often trained not to make late night commotion.

Compounding the problem is the fact that patients of advanced age are highly susceptible to smoke, toxic gas, and heat. A fire in Yeadon, Pa., once again points out the fact that most fire fatalities result from smoke, not flame. It started in a nursing homes basement, from an electrical short, authorities concluded, and flames were almost entirely confined to the basement. Within a half hour or so all patients were either led or carried out. None have been burned. Yet nine died.

In 1972, nursing home fire protection took a giant leap forward: Pennsylvania adopted the provisions of the HEW-sponsored Life Safety Code, which considerably strengthened the Commonwealth’s antiquated 1927 Fire and Panic Act, statutory authority for the Department of Labor and Industry to regulate and implement regulations covering most types of buildings, including nursing homes and other health care facilities. (The act exempts Philadelphia, Pittsburgh and Scranton; L & I has no authority to enforce regulations in the three cities, which contain a population of 2,575,000, or about one fifth of the Commonwealth.)

The prime reason the strong code was adopted was that HEW notified the State that unless existing provisions were radically strengthened, federal medical assistance funds could be withheld. Working with
HEW, the Pennsylvania Department of Public Welfare – licenser of health care facilities – developed a priority list for inspections.

To deal with Pittsburgh, Philadelphia and Scranton health care facilities, L & I contracted with the Pennsylvania Department of Health to perform inspections, and now have 40 full-time inspectors for those cities alone. With the contract L & I became the “fire agent” for HEW, which does the actual certification. If an inspector feels that a facility should be certified despite deficiencies, only HEW can grant it. For example, a three-story, converted mansion wouldn’t ordinarily qualify for HEW aid, but if it includes a full, automatic sprinkler system and conforms to all other provisions of the code, HEW may waive the two-story limit.

Since the Life Safety Code came into effect, some 2500 buildings have been inspected at least once, and most of them twice or more – because few pass the first time through. In fact, so many homes were installing sprinkler systems that at one-point contractors were running six months behind.

Unfortunately, many facilities couldn’t afford to come up to standard. Most of them – an estimated 60% -- are multi-storied, non-fire resistive, and old, usually built as private residence. And the money needed for conversion is often immense. In the first two years after Life Safety was adopted, 33 facilities containing 1,600 beds were forced to close.

The Committee recommends that the Commonwealth pass legislation intended to assist facilities for the care and housing of elderly to meet minimum code requirements. Even with superior fire codes, of course, deficiencies continue to exist, including those facilities currently being constructed. For Example, just outside the North Towanda borough line, the four-story, 100-unit Senior Citizens Apartments was built in early 1975. Many of the elderly patients are blind, deaf, or amputees. Though the building conforms to all applicable codes, local fire service officers point out that:

- Early warning detectors are installed in only unoccupied rooms rather than in each apartment.
- Detectors and hand-pull alarm boxes activates alarms only within the building instead of tying in with the Towanda Fire Department.
- Only the garbage chute is sprinklered, not the halls of apartments.
- Samples of the carpeting flame readily, and emit an unreasonable level of toxic gasses.
- Extinguishers can be found only in hallways and unoccupied rooms, not in apartments.
- There are neither fire hydrants nor stand pipe systems. The nearest water source adequate for fire flow is a private pond nearly 1,000 feet away, a distance that requires multiple supply lines an relay pumping by fire departments, a time-consuming activity requiring a large amount of mobile equipment.
- Fire trucks can drive adjacent to only one-fourth of the building area; no hard-surface fire lane is available for use of aerial rescue on three sides of the building.

This is just one of scores of such homes built in the past ten years.

Fire Service engineers hold varying opinions on methods for preventing life loss in nursing homes. Some advocate complete compartmentalization, others, extensive extinguishing systems, and still others, multiple early detection and warning systems. We, of the Commission, feel that a systematic combination of all
approaches is best. The Commission is tempted to recommend regulations that would attempt to attach from all sides, that would be all-encompassing, that would require, for example, all housing intended for the aging to be required to complete fire detection and suppression equipment, and that all prevention regulations be enforced.

But we realize that any set of requirements must be realistic, and that only measures that can reasonably be expected to be followed should be enacted. That is especially true in the area of nursing homes, where many facilities operate on financial brinks, and attempts to correct all deficiencies in existing structures would simply lead to mass discharge of patients. So far, the new Life Safety Code, though somewhat deficient in some areas, seems to be working quite successfully.

There is one thin the Commission would like to emphasize, however, and that is the important contribution nursing home staffs can make in preventing fires and in protection patients. Therefore:

THE COMMISSION RECOMMENDS

That nursing home employees be required to participate in semi-annual seminars on fire safety.

It is especially important, the Commission feels, that such instruction be personalized, that those who teach the classes center their remarks on individual facilities, that staff people be made aware of deficiencies in their own structures, and that step-by-step procedures to be followed in case of fire be worked out in great detail.

To determine precisely what causes nursing home fires and what happens during them – and therefore what to do about them – full information must be gathered on each incident. Therefore:

THE COMMISSION RECOMMENDS

That administrators of all licensed health care facilities be required to submit detailed reports of every fire incident to the local fire department to be forwarded to the State Fire Data Bank.  

(The data bank will be under the jurisdiction of the proposed State Fire Commissioner, detailed in Chapter 7.) Summaries of all reports, with evaluations of employee and fire department actions, pro or con, should be periodically distributed to all facilities in the Commonwealth. (No identification of facilities should be made.) Such reports would not only inform and educate nursing home employees, but would serve to publicize the fact of fire, and to help develop a sense of awareness.

The above section of the report concentrates on homes for the elderly – but obviously many of the same provisions should be incorporated into other institutions for the ill or handicapped, for the mentally retarded, the blind, and the deaf. All facilities need certain basics for safety – minimum chances for ignition (good wiring, safe heating devices, circumspect smoking), superior building design and construction, early detection and suppression equipment, fire-resistive furnishings (including curtains, bed clothes, clothing, linens, and furniture), and a thoroughly trained and competent staff.

Hospitals

Much of what has been said applies to hospitals, with only a few obvious differences. The Commission surveyed the hospital situation in Pennsylvania, and found it sufficient – except for an across-the-board lack of what we feel is an adequate number of early-warning devices and complete sprinkler systems.
(An example of the myths that surround the subject of fire prevention and suppression is the statement presented to the Commission that malfunctioning sprinkler systems have drowned hospital patients and that in event of a fire they might vent live steam. For the record, nobody has ever drowned from sprinkler water, and no record exists of anyone having been scalded with sprinkler steam.)

The Commission noticed two trends which we applaud: compulsory fire training for all hospital personnel at least twice a year, and limiting visitor smoking to cafeterias and lounges, patient smoking only when a staff member will accept responsibility for seeing that matches and cigarettes are extinguished.

One Commission witness recommended the use of fire marshals, and we agree with that, too. By its nature, a medical facility consists largely of non-ambulatory patients in various stages of illness, some tied to their rooms with monitoring and life-sustaining equipment. A fire must be fought around them, and before the arrival of municipal fire fighters, it must be handled by someone on the spot. This requires a well-trained staff and someone in a leadership opposition who is knowledgeable, who can run training sessions, and who, in an emergency, can make decisions. Therefore:

THE COMMISSION RECOMMENDS

That every hospital in the Commonwealth employ a qualified Fire Officer and Safety Engineer, and that any hospital with more than 250 beds have a full-time Fire Official and Safety Engineer.

We are concerned with one other danger in the Commonwealth’s hospitals: combustible sleepwear and bedclothes. In one hospital in Pennsylvania – an institution, ironically, specializing in burn care – in the year the Commission was operating, two patients burned to death, and we understand that such occurrences are not unusual. Flame-retardant sleepwear would have saved both patients, according to the hospital’s chief surgeon. (In the following chapter we present a recommendation covering this.)

Public Buildings

In mid-1973, one of the employees of the five-story William Penn Memorial Museum happened to mention to Ferne Hetrick, Chairman of the Pennsylvania Historical and Museum Commission, that the museum wasn’t running fire drills. Ms. Hetrick called Harrisburg Fire Chief Charles Henry to see if such drills were required, and he offered to stop over and check out the building.

He was appalled at what he found. Among the items:

- Obsolete extinguishers, improperly labeled, in the wrong places.
- Leather being tanned with large amounts of highly flammable chemicals in a room with no windows or other ventilation, and no extinguishers at all.
- Floors with large openings where the main power line penetrated, openings through which smoke could rise in time of fire.
- Most of the illuminated exit signs either burned out or missing.
- Stairways unlit.
• The frame of at least one emergency exit so warped the door wouldn’t open

• Other fire doors either broken, propped open, or missing altogether. For ventilation, one installed with louvers.

• On the fifth story -- a floor with no windows at all – stuffed animals being preserved with huge quantities of such virtually explosive chemicals as acetone, alcohol, toluene, turpentine, and lacquer thinner, stored in glass. No ventilation here, either, and nearby were hotplates and Bunsen burners.

“So here we were,” Ms. Hetrick told the Commission some time later, “the heart of the Pennsylvania Historical Museum Commission, and we found ourselves to be a $15-million fire trap.”

When brought to the attention of museum authorities, the problems were all quickly solved – and not with overwhelming expense.

The point is not that the museum was an extreme hazard, but that nobody had noticed. Only by chance was the condition discovered. And undoubtedly this museum isn’t unique; such situations, or worse, exist all across the Commonwealth.

Today the museum requires all of its employees to attend a four-session, fire-training course administered by the Harrisburg Fire Department. It’s the first attempt by any State agency to train its entire staff in fire safety. The Commission endorses the move.

THE COMMISSION RECOMMENDS

That annual fire safety programs to educate occupants of multi-story buildings be implemented throughout the Commonwealth.

And further

That such programs be mandatory in all Commonwealth-owned and operated multiple-story buildings.
CHAPTER 4

CONDITION OF THE CODES

Early in January 1972, Dominick Turiano, owner of the 75-year-old Pennsylvania House Hotel in Tyrone was having trouble with the wiring. Fuses in the main disconnect panel were blowing. Not surprising. No changes in the service had been made since World War II, yet every so often an additional circuit had been added.

An electrician was called in to survey the job of rewiring but when he arrived the owner told him the problem had been solved. It was “solved”, authorities concluded later, by the insertion of larger fuses. A prime safety device had, in effect, been discarded.

On January 16, sometime around 2:30 am, Mr. Turiano thought he smelled wire insulation burning. He and the hotel bartender searched for the source, but found nothing unusual. The bartender went home, Turiano to bed. At 5:25, a man living down the block saw the reflection of flames. He called the fire department. About the same time, a guest living on the hotel’s third floor, hearing what he thought was someone knocking, opened the door and found the corridor full of “hot, black, greasy” smoke, he reported later. He jumped to an adjacent roof and made his way to the ground. Another resident, smelling smoke, left through a second-story window. Twelve other people staying in the hotel never made it out.

The hotel had no alarm system, no sprinklers, no smoke detectors, and no stairway fire door. No safety precautions at all were required when the building was constructed, and because of grandfather clauses in existing State laws, nobody could require the owner to bring the building up to standard. A local code could have done it, but Tyrone had none.

The whole question of inspection, codes and code enforcement in Pennsylvania, in the words of more than one Commission witness, is a mess. Some communities have codes that are outdated or confusing. Others are saddled with two or more conflicting codes, administered by enforcement agencies rarely in communication. Of Pennsylvania’s 2,550 municipalities, fully three-fourths of them have no local building codes at all. Whole counties have none: Cameron, Forest, Fulton, Perry, and Wayne.

Here’s the breakdown by county, as compiled by the Department of Community Affairs:
### SUMMARY OF LOCAL BUILDING CODES & BUILDING INSPECTORS

#### IN

#### COMMONWEALTH OF PENNSYLVANIA

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Pennsylvania Municipalities with Local Building Codes = 24%

Note:
1. Pittsburgh and Scranton are included in Allegheny and Lackawanna Counties respectively.
2. Philadelphia is not included.
Americas, as a whole, have resisted codes. Yet as far back as recorded history can establish, governments have attempted to protect their citizens from faulty building construction, often imposing severe penalties on builders responsible for practices leading to injuries. Hammurabte, King of Babylonia, for instance, instituted a construction code in the 18th century B.C., and punished by death any builder of a house that collapsed and killed its inhabitants. And in America, in 1647, Governor Peter Stuyvesant outlawed wooden chimneys in the village of New Amsterdam.

Those early laws, and those in force today have, have four generally accepted objectives: (1) the safe evacuation of inhabitants in case of fire. (2) The safety of firefighters. (3) The minimization of property damage by limiting the spread of fire and smoke. (4) The projection of adjacent properties.

Public interest demands codes, demands certain intrusion on individual liberty. It is the government’s responsibility to protect the citizen against the unscrupulous – particularly in a technological society. A hotel guest, a school child, a hospital patient has a right to know his surroundings are as safe as they can be.

And it is the duty of someone to protect the homeowner – against even himself. The do-it-yourselfer cannot be expected to know that exposed polyurethane is highly flammable and its combustion fumes poisonous, that 16-guage electrical wire for house circuits is inadequate, that a fire-resistant ceiling is ineffective if holes are punched through for pipes, lighting fixtures and ducts. And unless a homeowner has studied the fire problem or lived through a fire, he can’t be expected to know the vital necessity for smoke detectors.

Those Pennsylvania communities that have adopted codes either have developed their own or are using some of the various “model” codes. But tow adjacent communities may have widely differing laws.

Why? The Pennsylvania Department of Community Affairs booklet, “Building Codes in a Nutshell,” (January 1975) offers these primary reasons:

“The local governing body frequently rewrites or deletes provision from the model code . . . This type of alteration . . is normally a reflection of pressures brought by local economic interest groups, such as labor, builders, or material supply interest. And locally enacted codes are infrequently updated. This may be a consequence of legislative inertia in the face of more pressing problems. Updating through administrative process is not generally allowed.”

Most communities based their local codes on one of two national models: The National Building Code, published by the American Insurance Association (AIA); or the Basic Building Code, developed by the Building Officials and Code Administrators International, Inc. (BOCA). Both codes apply principally to new construction.

Once a structure is completed, a fire prevention code may apply, stipulating maintenance and such fire-safety equipment as extinguishers. (Few Commonwealth municipalities have adopted a fire prevention code.) Often other codes govern installation and maintenance of special phases of construction, such as electrical, plumbing, mechanical, elevators, and so on. In addition, various federal agencies require minimum standards for federal-financed housing.

Pennsylvania currently has in effect only one statewide code, the 1927 Fire and Panic Act, which directs the Department of Labor and Industry to enforce certain safety regulations of health-care facilities and buildings open to the public. But most structures constructed before 1927 (such as the Tyrone hotel) aren’t subject to the provisions unless they are renovated.

The diversity of local codes was revealed when the Pennsylvania Department of Community Affairs surveyed the Commonwealth. Of 661 municipalities with building codes in effect, more than half use the
BOCA Basic Building Code, while 15 percent use the AIA’s National Building Code. The remaining third use an amalgam of BOCA and AIA. And a few have written their own.

Further complicating matters is what’s called the “layering” effect. Through honest attempts to update codes -- or through political pressures – municipalities tend to add to regulations, year after year, to a point where the codes become bureaucratic gibberish. Fire-prevention and suppression officials, community officials and building inspectors wallow in confusion. The result: ineffective enforcement.

The consequences of hodgepodge coding are significant:

- When faced with a strong code in one municipality, a prospective investor may simply move across a political line into an area with weaker codes, or none.

- Local codes become subject to special interest groups. Again from “Building Codes in a Nutshell”:

  “Requirements that specify particular materials or techniques of construction may reflect pressure from interested special labor groups whose services are required for that type of material or technique, but not for its substitute. Fore example, it is not only the suppliers of cast iron pipe that benefit from prohibitions on plastic pipe, but also the plumbers that install it.”

  On the other hand, if plastic interests dominate a town, the code-developing group could feel compelled to specify that only plastic pipe be used. Further, as has been brought out by numerous Commission witness, codes devoted to fire protection are generally least appreciated and most railed against by developers. And the result, again, is slovenly enforcement.

- Multiplicity of codes, directive and regulations cause undue hardship to architects and consulting engineers who design projects throughout the Commonwealth. Construction techniques, which are legal in one municipality, may be outlawed next door. The resulting confusion, on a statewide basis, adds to the cost of new buildings and homes.

  Worst of all are those codes inadequate to today's needs. Few municipalities have available the technical capacity to make valid code-writing decisions. Throughout this report can be found numerous instances of disastrous fires in homes and buildings, which conform to outdated codes.

  During many Commission hearings held across the Commonwealth, the matter of codes emerged as the single most important step to cut Pennsylvania’s fire losses. Therefore:

  THE COMMISSION RECOMMENDS

  That a State Fire prevention Code and a State Building Code be adopted, replacing municipal codes.

  Of the 400 Pennsylvanians who will die this year by fire, most will be killed in their own homes. Yet, almost no fire-prevention code in the Commonwealth includes single-family dwellings.

  THE COMMISSION RECOMMENDS

  That the Commonwealth-adopted codes include single-family residences.

  Though the Commission hesitates to recommend specifics for inclusion in the statewide codes, it does advocate using two fire-protection devices: the early-warning detector, and the automatic extinguishing
system. As discussed in other chapters, the Commission feels that a fire-detection device (particularly a product-of-combustion sensor) is the single most important life-saving piece of apparatus presently available for home use, and we urge their mandatory installation in all new dwelling units.

Similarly, we feel that sprinkler systems should be mandatory in all high-rise buildings and low-rise structures in which people congregate – theaters, shopping malls, restaurants, and nursing homes. (The cost of sprinklers may often be partially paid for by trade-off provisions and such other safety features as building materials, maximum travel distances to points of exit, and area limitations.)

THE COMMISSION RECOMMENDS

That Commonwealth-adopted codes include a provision that all structures of a specified height or greater than a specified floor area be completely sprinklered.

Which code should the Commonwealth adopt? The Commission spent considerable time wrestling with the problem of code selection. Our conclusion: Although the adoption of a single, existing building and fire code system would be expedient, each one has its deficiencies. Ideally, a totally new code system, specifically designed for the needs of Pennsylvania, should be developed. But such a process is extremely costly; in preparing its 1968 building code, New York City spent more than $1-million over a six-year period.

Therefore, we believe that Pennsylvania’s Building Code should include several model codes molded into a single homogenous unit.

THE COMMISSION RECOMMENDS

That the BOCA Basic Fire Prevention Code be adopted as the State Fire Prevention Code, and that compatible features of the BOCA Building Code, the updated Pennsylvania Fire and Panic Act, and the National Electric Code be incorporated into a new State Building Code.

Some municipalities have made the mistake of adopting codes with no provisions for updating. As a result they often find themselves with codes outmoded by technical advancements in materials and construction techniques, or find that new requirements are piled atop the old instead of replacing them. Either procedure results in needless duplication, added expense, and confusion.

THE COMMISSION RECOMMENDS

That the State Building Code and the State Fire Prevention Code shall be annually updated.

Many catastrophic Pennsylvania fires have resulted not from lack of codes, but from inadequate enforcement – because of lethargy, corruption, political pressure, or, more commonly, inadequate technical knowledge on the part of building inspectors.

Some local inspectors are truly experts, knowledgeable in construction techniques, in fire safety, in the law. But most, according to Commission witnesses, have neither the background nor the experience necessary. Training of building inspectors in often grievously inadequate; some training consists exclusively of a few rounds with the inspector to be replaced. And inspectors seldom have formal training in building construction and code interpretation. Further, because many inspectors are employed only part time, they have neither the time nor inclination to learn construction and codes. And an additional problem is that many inspectors have been associated with the building industry, resulting in inspection of projects being constructed by their friends and associates.
The Commission believes that the ideal situation would be a mandatory rotation of State Building Inspectors, but realizes that such is financially impractical. Enforcement of Pennsylvania’s Fire and Panic Code cannot possibly be done by the current 225 State Building Inspectors, and the law doesn’t permit the present 611 municipality-building inspectors to enforce the Fire and Panic codes.

THE COMMISSION RECOMMENDS

That Building Code enforcement be the joint responsibility of State and municipality inspectors.

Because new technology in construction – materials, building techniques, complete building systems – presents major problems in code interpretation and enforcement.

THE COMMISSION RECOMMENDS

That all State and municipality code-enforcement officers be required to be certified and recertified by the Commonwealth on a regular basis, based upon participation in State-approved educational programs.

The Commission has two additional recommendations – not for legislative action, but for consideration by local officials. First, we find that fire-control personnel are seldom used in the design of structures. Their responsibility will last the life of each building; their expertise should be used in developing fire-safe structures.

Second, we feel it highly desirable that programs of continuing fire inspection be implemented. We recognize the financial burden of complete programs, but urge local officials whenever possible to implement schedules for periodic inspection of all buildings in the jurisdiction.

Why? One example: Late in the afternoon of March 23, 1974, a man burst through the front door of Allentown’s Caboose Bar, threw some gasoline on the floor and tossed in a match. The billowing flames instantly blocked the door. The 19 customers rushed to the rear door, but it had been nailed shut with two-by-fours. They tried the side windows, but found them covered with plywood. The customers then ran to the kitchen windows. Bars covered them.

When Allentown firefighters broke down the rear door seven minutes after the alarm, eight people were dead. Another died later.

Sometime before, the bar had been inspected. But at that time the rear door opened freely.
CHAPTER 5

THE HAZARDS THAT SURROUND US

The medicinal examiner of Philadelphia is charged with investigating all sudden, suspicious, and violent deaths – including those resulting from fire. About a dozen years ago, burn victim autopsies were beginning to reveal a peculiar thing: cyanide. “Frankly, we were nonplussed,” recalls Assistant Medical Examiner Halbert Fillinger. “The report would list cyanide, and we naturally thought of homicide. We’d roust out the cops, but they’d find no evidence of criminality. When this began to happen regularly, we pulled back on the homicide idea and looked around for another answer.”

The answer, says Dr. Fillinger, was plastics. Many burning materials produce hydrogen cyanide, but when synthetics burn, they produce huge quantities of it (along with countless other compounds). When Fillinger first recognized the increased cyanide, two things were happening: Medical techniques for detecting cyanide were being perfected, and the use of plastics was mushrooming.

At that time, discovering cyanide in a victim’s tissues was surprising. Today, it’s commonplace. Just a few weeks before this report went to press Fillinger investigated the fire death of five children in Northeast Philadelphia. Three were killed by carbon monoxide, two by hydrogen cyanide.

The fire service is finding increasingly that it’s fighting a new kind of fire today: the plastics fire, and the key word is unpredictability. We don’t know what to expect when synthetics burn – how fast the flame will spread, how hot it will get, what kind of smoke and gases it will produce. And we hardly know how to fight it.

As of today, plastics make up only a small fraction of the fuel load – approximately six percent. But until the oil squeeze, at least, the production of synthetics was doubling every seven years or so as its volume ballooned. Plastic foam continues to gain on glass-wool insulation; synthetic carpeting has all but wiped out wool; glass windows are beginning to give way to plastic; flowerpots and finished, tabletops and toys – all plastic. A bathroom used to be the one place you could be sure wouldn’t burn. Now the whole thing – from the bathtub to the popes to the walls – might be molded plastic.

Though all smoke is poisonous to some extent (even that from cigarettes), some kinds kill more quickly than others. Particularly lethal are toxic gases that are odorless and invisible, and are released in large quantities at relatively low temperatures – the kind of smoke that synthetic materials tend to produce.

Unfortunately, determining the products of combustion generated by fire is virtually impossible, no matter what the fuel. The chemical makeup of smoke is extraordinarily complicated, its content varying dramatically depending on how and under what conditions it developed. And a burning synthetic may produce a hundred or more compounds. The complexities of destructive fires thus far can’t be quantified because there is no nationally – recognized testing procedures by which smoke – in makeup or amount – can be effectively measured.

The only workable approach right now to evaluate the toxicity of a product is (1) to burn it, (2) to analyze as best we can the combustion products it produces, (3) to estimate the probable volume of output, and (4) to somehow come up with a toxicity rating. Not very satisfactory, but for now, about the best that researchers can hope for. At this point it’s best to err on the side of caution, because noxious gases often have a synergistic effect; two substances mixed together may be much more toxic than either alone.

The other big measurement problem seems to be a simple one: burn rate. But here, too, solid standards have never been established or agreed on.
A material burns quickly or slowly depending on how fast it vaporizes. When a substance burns, it pyrolyzes, that is, decomposes or chemically breaks down into a gas. Heat from an outside source — a match, radiant energy reflected from the ceiling, an adjacent burning section of the object itself — causes the substance to emit vapors, which combine with oxygen and ignite. These flames then heat the adjacent material, which gives off more vapors that burn...and so on.

The flam-spread index is a relative measure of how fast a flame moves across a surface compared to red oak flooring, which has been given an index of 100. All the way down the scale, rated at zero, is asbestos board; near the top is latex rubber foam, with an average index of something around 1,000.

The trouble is, controversy has raged for years as to proper test methods. Some ratings, critics charge, are way to low — and that's a point that was pretty well proven in 1970, by the BOAC Terminal fire. The facts of the BOAC fire are well known by now, but perhaps a review is in order.

On August 26th of that year, the new 330-foot wing of the British Overseas Airways Corp. terminal at Kennedy International was just nearing completion, and a few passengers were already using it. It was an impressive building — a sculptured, contemporary architecture masterpiece. It was a clean structure, with little superfluous decoration, and because it was built almost entirely of concrete and glass, it was considered to be “noncombustible”. What few furnishing there were — mainly some 600 seats arranged in clusters around arrival gates, had been bought under specifications that called for low flammability.

A few passengers were waiting for planes, and workmen were clearing out the last few piles of construction debris when suddenly a small fire erupted in one of the piles — probable set by an arsonist. Nobody noticed it at first, and by the time the alarm was sounded, the fire was blazing with the intensity of a small bonfire. Unfortunate. Embarrassing, perhaps, for BOAC. But no big deal.

Slowly it grew larger — still not much to worry about — and larger while employees and patrons stood around waiting for the fire department. The suddenly, it grew huge, wild, out of control. By the time the first engine arrived, the terminal was a holocaust, and when the 80 firefighters and their 15 trucks finally have things under control an hour later, $2-million worth of damage had been done.

“We wondered what in God’s name could do this,” reported Joe Klementowicz, Safety Engineer for the Port Authority, the agency responsible for establishing the fire-safety standards. “What kind of flame could melt aluminum, explosively blow out huge plate glass windows, and cause patrons to run down corridors in mortal fear? We didn’t know.”

The only possible combustion source: those chairs, stuffed with polyurethane foam. So Port authority research personnel tested samples, and what they found was stunning: At temperatures only slightly above that of boiling water, the material began to release flammable gas. In the terminal fire, researchers later calculated, gas from heated chairs would rise to the ceiling; then as flames reached the gas clouds, they’d explode, blowing out windows and spreading fire to other seat banks – the foam, meanwhile, melting and running to the floor to spread more fire underneath the seats.

“Well, we got worried,” says Klementowicz, with some understatement. “We decided to see how much of this material existed in our other office compounds, so we sent a crew to take samples of the furniture in all of our facilities. Unfortunately, every piece of material they brought back behaved in the same way.”

As a result of the findings, the Port Authority tightened its standards. Now, all such furnishings must (1) be basically self-extinguishing (when lit, it may burn slightly, but must eventually go out), and (2) have a flame-spread index of not more than 100 — that of red oak.
Polyurethane, they found, has a flame spread ranging from about 600 to 3,000. Latex foam rubber—with an index of 1,000 was also rejected; not only was the flame spread too high, but the samples gave off hydrogen cyanide in a dense black smoke, capable of killing in seconds. Officials finally settled on a chair of polychlorophyline material with a flame-resistant wool-blend covering, which well satisfies the demands. And it cost only 13% more than the standard polyurethane chair.

Chairs of that standard, BOAC-type polyurethane are used throughout Pennsylvania—in lobbies, motels, private residences, and theaters. And the thing is, hardly anyone knows they’re hazardous.

That lack of knowledge extends, even more so, to potentially dangerous things found around the home, office, or hotel. Few stop to think, for example, that metal wastebaskets tend to contain flames while plastic baskets increase them. When buying draperies, few people ever consider fire risk—whether the material is flame retardant or explosively flammable—even if they’re to be placed right next to the fireplace. Few homeowners thing to check the flammability of their mattresses (often, today, of polyurethane), even if they make smoking in bed a habit.

Even if one were concerned, however, flammability of household materials may be troublesome to ascertain. For example, manufacturers offer a myriad of synthetic carpeting—from austere nylon to luxurious shaggy blends. But the products have no label to reveal flammability, and the salesman probably neither knows what it is nor will bother to find out for a customer.

The Commission feels that the customer has a right to know if a product is dangerous—if a certain curtain is appropriate to use near a kitchen stove, for example, or if a particular rug should be placed on a fireplace hearth. The Commission especially feels the need for cautionary notices on highly flammable wastebaskets.

The Commission stresses the need for labeling fire-hazardous products, and it argues that the regulatory function of the State should be invoked if necessary.

In addition to alerting the potential buyer, a labeling system would enable inspectors of nursing homes and public buildings to determine adherence to fire-load requirements.

In an allied area, the Commission is concerned with the lack of information on do-it-yourself construction material. Some acoustic tile, for instance, is truly fire retardant; yet other kinds burn like fluffy cardboard. But the homeowner can’t tell which is which.

An even more poignant case: rigid polyurethane.

Polyurethane is an excellent insulator. It’s not very expensive, is readily obtainable, is lightweight, and when sprayed on, adheres to odd shapes. In sheets, it’s easily installed by the home craftsman.

But it’s a killer, and it has killed. Under the right conditions, it burns fiercely, the flash fire generating volumes of toxic smoke and spilling molten plastic on anyone trapped below.

One of the reasons it has killed is that the tests it was originally given were inadequate (if not deceptive), and the fire rating awarded was misleading (if not fraudulent). At least until 1973, polyurethane foam was being advertised as having “self-extinguishing qualities”.

Yet four years earlier, Underwriters Laboratory reported to the Society of the Plastic Industry (made up of 1200 member-companies) that polyurethane actually was highly flammable. “The tests showed that the fire behavior of the polyurethane foam, with adequate oxygen supply, is one of a very rapid flame spread, high early heat
output rate, and produces large quantities of dense, black smoke,” said the 1969 UL report. “This indicates that manual firefighting of such a fire would be difficult . . . .”

Not only was the report ignored (some say suppressed) by polyurethane manufacturers – who largely continued to advertise their products in the same old way – but UL felt no need to release its findings to the public, not even to governmental agencies.

Finally, after a sufficient number of people had been killed and a billion dollar class action lawsuit was filed against five plastics companies for misrepresentation, the truth became public.

At least, public so far as the trade is concerned. Polyurethane still is often sold to the do-it-yourselfer by the sheet, with no label informing that the product he’s going to line his den with is lethal. This Commission feels that the home craftsman is entitled to have such information.

Even more important than cautionary labeling of home building products is the identification of hazardous clothing. An enormous number of Pennsylvanians are injured each year when clothing catches fire – the housewife whose loose-sleeve smock passes over the stove, the ten-year-old, burning a tire behind the garage, the invalid who, while lighting his pipe, drops the match.

With few exceptions, all untreated fabrics, both natural and synthetic, burn. On the whole, natural fibers (loose-weave and lightweight cotton, silk, linen) flame more quickly than the synthetics (acetate, nylon, acrylic, polyester, and so on). But when synthetic fabrics do burn, most of them melt, and the searing fluid sticks to the skin and causes deep wounds. Worst of all are natural/synthetic-fiber blends that combine swift burning and melting.

Power to set standards for clothing flammability rests primarily with the Federal Consumer Products Safety Commission. But so far, only two clothing standards have been established – that of sleepwear for young children, size 0 to 6X, and more recently, 6 to 14X. No standard exist for sleepwear larger than size 14 – or for any other clothing, for that matter.

Along with expanded standards for children’s clothing, a great need exists, it seems to the Commission, for some kind of flammable-clothing protection for the hospital patient and the infirm elderly. The nursing home patient – often feeble, confused, and uncoordinated – all too often drops lighted matches into his lap. The Commission feels that society owes it to him to see that he doesn’t erupt in flames.

Since 1972, the Veterans Administration has issued flame-resistant pajamas to each of its 85,000 hospital patients. (Through initial costs are higher, the VA-sponsored fabric is expected to last ten to fifteen times longer.)? The Commission feels that Pennsylvanians can do the same, and that extending this step into the Commonwealth’s nursing homes is a moral obligation. Therefore:

THE COMMISSION RECOMMENDS

That flame-retardant sleepwear be made mandatory in all Commonwealth-licensed nursing homes and hospitals, and further
That within three years, all bathrobes and bed linens used in nursing homes and hospitals be exclusively of flame-resistant material.

This does nothing for the elderly person living at home, of course. The one who buys sleepwear for the homebound infirm usually has no way of determining its flammability. Recently, an 85-year-old Pittsburgh man, confined to a wheelchair, accidentally dropped a match in his lap as he tried to light a cigarette. His pajamas flared up. His wife, standing next to him, grabbed a blanket and threw it on the flames to smother
them. But the blanket flared up, too, burning both the man and his wife. She ran to the sink, and with a pail of water finally doused the flames. But the synthetic pajama material had melted, and the fluid was sticking to her husband’s skin like napalm. He died two days later.

Had the garment borne the label “WARNING! HIGHLY FLAMMABLE”, perhaps the woman would have bought pajamas of some other material.

The Commission does not feel that flammable fabrics should be banned – even those found to be grossly hazardous. But it does feel that the manufacturer has the responsibility to inform the potential purchaser. Labeling, in fact, should serve a triple service: It would (1) inform the buyer of the risk, (2) increase fire awareness in the mind of the consumer, and (3) encourage manufacturers to suppress flammability.

Chemists have the technological know-how to treat almost all fabrics – natural and synthetic – for flame resistance, and such processing increases the cost of a garment by only about 20% a dollar or so for a child’s nightgown. Some materials still do give trouble – polyester, nylon, and flocked velvets, for example – and more research should be directed toward these materials.

More effort should be focused, too, on the establishment of flammability standards. The whole area of textiles and their relationship to flame is confusing, the Commission finds, with current inconsistent testing procedures and widely varying interpretation of results.

The obvious place for material research is in the laboratories of the manufacturing of companies. But the development of standardized tests probably should take place outside commercial circles. Some Commission witnesses suggest that the Commonwealth itself establish a fire research and safety center. This is an attractive suggestion and has much to support it, but the Commission concluded that such an installation is not presently needed” Pennsylvania has a wealth of university research labs and private testing centers, and it is they who should be tapped to handle these research programs.
CHAPTER 6
FLAMMABLE LIQUIDS AND GASSES

An enormous amount of explosively flammable liquid and gasses is being transported back and forth across the Commonwealth. Tank trucks cover roadways, pipelines crisscross the topography, and every car on the road carries within it the equivalent of a small bomb. The total gasoline in Pennsylvania vehicles at any one time, in fact, would nearly fill the Kettle Creek State Park Reservoir.

Does all this fuel being moved around the Commonwealth constitute a hazard? The figures seem to say so. For one thing, nearly a third of all Pennsylvanians who die by fire do so in some form of transportation. Additionally, when a tank truck of flammables is involved in an accident, the whole neighborhood may be threatened, including the fire-fighting personnel. Further, commercial transportation of anonymous, hazardous material is increasing rapidly. On a national scale, the Department of Transportation predicts a 55% increase over the next decade. And a given shipment may be carried in a number of ways during the trip: pipeline to truck to piggyback-rail to truck to line-and-storage to truck to final use – each shift adding another risk.

Though hazardous material must continue to be transported in massive quantities, the Commission feels that steps could be taken to lessen the threat.

One step is standardized markings of what hazardous material is being carried. This is the item cost often cited by witnesses as necessary for effective action in case of accident. Should the street be washed down? Should the neighborhood be evacuated? Should specialist be called in? In fact, is the vessel actually full or empty? The answers should be obvious from clearly understandable, universally recognizable placards on the shipping vehicle.

The fact is, however, that a marketing system presently in effect in Pennsylvania. The trouble, the Commission concludes, is in enforcement, and it views the lack with alarm.

The question of judgment in combating hazardous-material fires and potential fires was also brought up by a number of witnesses. The problems to be handled can be highly complex: Chemical foams are effective in extinguishing some tanks fires, but are virtually useless if certain solvents have been added. A fuel shipped in gaseous form likely has considerably different fire and explosion characteristics than the same in liquid form. A mixture of flammable liquids may behave quite differently than they do separately.

The problem can be approached from two directions: education of firefighters and instantly recognized information, and the Commission supports both.

The training of firefighting personnel, uneven at best, is practically non-existent in the area of hazardous material, whether moving or stored, liquid or gas, in automobile or tank truck. This should be rectified to a large degree by the training recommendations developed in Chapter 13.

In the area of automobile accident fires, it is doubtful that something on the State level can be done about the incidence, short of somehow reducing the number of rear-end collisions or disallowing automobiles with hazardous gasoline tank locations to be sold in the Commonwealth. The federal government has the obligation to insist on automobile and truck fuel systems that present a lower likelihood of fuel tank rapture in accidents (unnecessarily high now, despite the fact that improvement technology exists), and there is some indication of forthcoming federal-level movement.
(Incidentally, the figures cited for vehicle-burning deaths may be misleading. Though a high figure is likely, because of the suddenness of the fire and the fact that occupants may be injured, unconscious or trapped, some victims may already have died before flames ever got to them.)

Whatever the case, one step that would immediately reduce the amount of automobile fire loss is the carrying of fire extinguishing equipment in personal vehicles. (Most trucks already carry extinguishers.) Additional fire extinguishers in Pennsylvania automobiles can be achieved either by (1) requiring each automobile driver to have a working extinguisher in his car, (2) requiring a fire extinguisher to be included among standard items sold with new cars, or (3) an education campaign aimed at convincing the public of the need of carrying extinguishing equipment. The Commission favors number three, a campaign that should be developed by the Public Education Office of the State Fire Commissioner.

One other area of flammable-substance handling is of concern to the Commission, and that is the question of transmission lines carrying such material as natural gas and petroleum products. Numerous transmission lines run though the state, with innumerable branch lines, some active, some inactive. Some have been in place since 1932, nearly half a century, and they’re badly corroded, and in some cases, leaking. Some run close to public buildings and private residences, and many are unmarked or even unknown, except on yellowing maps buried in remote files.

THE COMMISSION RECOMMENDS

That minimum distances be established by State Building Code between occupied structures and high-pressure underground transmission lines for flammable liquids and gasses.

Here is a listing of some of the major active lines (courtesy of Stephen Waltham, Mt. Lebanon Fire Department):

MOBIL OIL LINE. Size 8", pressure 1200 lbs, age 1946. Runs from Paulsboro, N.J. to Midland, Pa., with a spur from Paulsboro north to Binghampton, N.Y.

LAUREL PIPE LINE COMPANY. Size 24" to 14", Pressure 600 PSI, age 1958. Runs from Philadelphia to Cleveland, Ohio.

BUCKEYE PIPE LINE CO. Size 10", age 1951. Runs from New Jersey to Toledo, Ohio, with a spur from Allison Park south to Exxon Oil on Butler Street, Pittsburgh, and another spur from Clenwillard to Boron in Coraopolis.

ATLANTIC RICHFIELD COMPANY (Formerly Keystone Line). Size 8", age 1956. Runs from Philadelphia to Butler Street number 5733, with a spur from Altone and Mechanicsburg to Hays American Oil Co.

SUN OIL COMPANY, Size 6 & 8", pressure 1200 lbs., age 1932 (and reconditioned in 1954). Runs from King of Prussia to Toledo, Ohio and beyond.

TEXAS EASTERN PIPE LINE, also known as ALLEGHENY PIPE LINE in South Pennsylvania. Size 6 & 8". Runs from Delaware to West Virginia in the south with a spur from Greensburg to New York via Tioga County.

GETTY LINE. Size 6". Runs from Northampton County to New York via McKean County.
COLONIAL LINE. Size 30”. Runs through Chester and Delaware Counties along the Pennsylvania border.

In December 1974, a situation developed in Castle Shannon that is typical of the kind of problems transmission lines cause. In this case the trouble was easily corrected, with no harm to the residents. Had someone thrown a cigarette butt in the wrong spot, however, things might have been different.

On December 19th, the Castle Shannon Volunteer Fire Department began receiving calls from residents reporting the odor of gasoline. Through a fine bit of detective work, members of the department, working through most of the day, pinpointed the source of the problem: an eight-inch Mobil Oil Company line, running from New Jersey through Pennsylvania and on West, pimpping petroleum at pressures up to 1200 PSI. Where it crossed Greenridge Road, some six feet from a storm sewer, the odor was very strong, and Chief Harry Maenz discovered that gasoline was leaking into the sewer. From there it flowed some blocks downhill, straight through the business district.

Where the pipeline crossed a highway, a sign gave an emergency phone number. Chief Maenz called, and then set guards along the sewerage route. Four hours later Mobil finally shut off the line. Still later, when a backhoe uncovered the line, “several holes” and “tremendous corrosion”, was found in the pipe, the Commission was told. The corroded piece was replaced; the line put back in use, and today continues to carry petroleum.

The fact that the pipe was corroded is not surprising. It’s been there since World War II.

“Many of the fire chiefs who have these lines cross their communities are unaware of the pipes’ existence, what the lines are carrying, how much pressure is involved, where they’re pumped at, and who to notify in the event of a leak or accident, “Mt. Lebanon Volunteer Stephen C. Walther told the Commission. “In Allegheny County alone there are six different companies who have these lines . . . ranging in size from six to thirty inches. . . I am amazed at how little most people know about their existence. In some cases I ran into great reluctance on the part of the oil companies to give the information out.”

What should be done to lessen the threat of potential disaster? The pipelines are there, they are performing a vital function, and the reality of economics precludes any demand that they be replaced. Therefore, the Commission sees only one-way in which to move: education.

THE COMMISSION RECOMMENDS

*That the companies legally responsible for hazardous material transmission lines supply detailed maps of their routes to the State Fire Commissioner, who shall prepare additional maps for use of interested parties, and that they also supply technical information on the lines and their contents.*

As the maps are being distributed, the Commission believes, instructions regarding procedures in the event of leaks, breakages, or fires should also be circulated, the material to be supplied either by the corporations involved or by the proposed State Fire Commission, with details to be worked out at that time.
CHAPTER 7

THE NEED FOR A STATE FIRE COMMISSIONER

Throughout this report we point to considerable confusion in delineating Pennsylvania’s fire experience. We talk about overlapping jurisdictions, bewildering communications systems, widely varying standards. We discuss the approximate number of fires caused by defective wiring, the best guess of property damage, and the probability of a trend toward high-rise fires.

But the fact is, we just don’t have the figures.

Further, Commonwealth fire laws are so complicated few thoroughly understand them. And for help in interpretation, one has the choice of at least five different departments of State government overseeing at least 15 separate sub-divisions with fire “responsibility”. Responsibility for nursing home safety is given to one agency, hospital safety to another, store and office buildings to a third, outside storage of flammable liquids to still another, inside storage to one more, and fire prevention in schools and forests to two other parts of the State government.

And the cooperation and communication among all departments often is minimal, so witnesses have told us. “In many cases, when you have a problem, you are referred from one department to another,” said one, “and finally you wind up back where you started – without an answer.”

Fire fighters don’t know where to get training films. Communities can’t find help in long-range planning. Even legislators have difficulty finding data on which to base new laws.

The need is clear: a central authority, a single agency charged with the responsibility of coordinating, interpreting, and (with some exceptions), enforcing Pennsylvania’s fire program. Therefore:

THE COMMISSION RECOMMENDS

That the position of State Fire Commissioner be created.

We, on the Commission, remain emphatically in favor of local control. Both prevention and suppression of fire should remain primarily in the hands of communities familiar with local conditions and close to the people served. What is not needed is a new bureaucracy appropriating responsibilities that should be retained by local governments.

But the Commission feels that there must be a central focus whose office acts as a clearing house, an authority for recommending administrative improvements, a guide for communities to get more for their money in fire-fighting equipment, and a strong State influence to help shift the present emphasis on strict fire fighting to a broader “fire loss management”.

The office would have a number of functions:

- **Fire Prevention Codes.** Under a new statewide fire prevention code system (see Chapter 4), the Commissioner would be responsible for updating all State-mandated fire prevention codes, standards and regulations.

- **Fire Training.** He would be responsible for the training of fire prevention and suppression personnel. He would establish training standards, develop facilities, and assist local municipalities in taking
advantage of them. And he would work toward a certification program for fire service personnel (see
Chapter 13).

- **Public Education.** The Commission feels that in the whole area of fire prevention, the single biggest
factor in allowing the enormous number of fires to continue is public apathy. A politician speaks of
“crime in the streets” and he gets votes; he talks of fire and gets yawns. The Commission is convinced
that the public must be made aware, must be made to care. And we see the State Fire Commissioner’s
office as the unit to spearhead a drive toward public awareness. Pamphlets, television spots, posters,
contests, public speakers – a complete public education program should be developed and
implemented. It should be the Commissioner’s responsibility, for example, to teach the public the
difference between a class A and B fire extinguishers, the function of fuses, the in the danger of using
ashtrays without central islands, the facts of early-warning systems. He should be the one who
motivates homeowners to make emergency exit plans, to clean fireplace chimneys, to shun the use of
kitchen curtains near the range.

The campaign of Smokey the Bear is enormously successful in combating forest fires. Pennsylvania
needs a similar program aimed at the rest of the fire problem.

- **Formal Education.** The State Fire Commissioner’s responsibility for education should extend into the
schools. He should (1) be responsible for the basic fire education of children through the 12th grade (as
detailed in Chapter 8), and (2) in cooperation with the Department of Education, develop and supervise
continuing education for fire investigators and officers, for architects and engineers.

- **Firefighter Equipment and Operation.** The State Fire Commissioner should adopt and regulate
minimum standards for firefighting equipment. His focus should be on equipment compatibility, and on
the distribution of current information to fire service personnel. He should also help in planning new fire
stations – location, size, organization, equipment, acquisition, and operations.

- **Library.** Pennsylvania now has no central clearinghouse for fire prevention, suppression, and research
information, no comprehensive film library, no repository of training aids. The Fire Commissioner would
establish and maintain such a library.

- **Bridge Between Federal Government, Private Organizations, and the State.** More and more federal fire
safety regulations are coming out of Washington. Interpretation and enforcement must be coordinated
at the State level. The Fire Commissioner would pull together new and existing regulations, interpret
them, and integrate them with the old. He would also act as a liaison with insurance companies, and
keep abreast of product testing by such organizations as the National Bureau of Standards, the
Consumer Products Safety Committee, the Flammability Research Center, the National Fire
Administration, the American Society for Testing and Materials, Underwriters’ Laboratories, the Factory
Mutual Research Corporation, and the Society of Plastic Industry. And he would follow the testing of
construction materials and interior furnishing – areas about which the Pennsylvania fire service is now
largely unaware.

- **Liaison Between Intra-State Organizations.** Pennsylvania today has about 3,000 fire departments, with
nearly 100 State, county, and regional organizations representing the Commonwealth’s 300,000
firemen. Today, with minimum communication and only slight awareness of what the others are doing,
little ties them together. The Fire Commissioner would act as a binder.

- **Data Bank.** The Fire Commissioner should establish a system of Statewide fire reporting and
information gathering. For the sake of future planning, Commonwealth decision-makers must have
access to data on property loss, death and injury statistics, causes, locations, and number of fires.
With sufficient information, the Commissioner could determine, for example, the frequency of fires by time of day for different localities (the number varies with locale), and local fire chiefs could man their stations accordingly.

Or he could follow trends in ignition sources, and concentrate efforts to combat them. For example, his data might show a surge in wood-stove fires. The Commissioner could then mount a publicity campaign advising the public to use insulated flue pipes, for instance, if faulty flues were found to be the cause.

Or a statistical breakdown on alarms might show that virtually no one is using fire alarm boxes that reports are coming in exclusively by telephones. If so, municipalities might find the investment in new street alarm=box systems uneconomical, that the money could more wisely be used elsewhere.

The figures used now are largely estimates, projected from sample areas, and admittedly highly inaccurate. What is needed is a continuing supply of data – and that can come only from the firefighters themselves. Because we feel that the establishment of a data bank is an item of the highest priority.

THE COMMISSION RECOMMENDS

*That fire chiefs be required to submit monthly reports on fire and station status to a central collection agency.*

Some witnesses (and one of the 21 Commission members) feel that the State Fire Commission’s office should be an independent agency, unencumbered by established bureaucracy, an agency free to blaze new and innovative trails, patterned along the lines of the present State Police Commission. But after giving considerable thought to the directives, the proposed Commissioner would be given, we feel that the office would best be placed in a State department already operating in a number of critical areas. Therefore:

THE COMMISSION RECOMMENDS

*That the proposed State Fire Commissioner be attached to the State Department of Labor and Industry.*

Although no official connection would exist between the Fire Commissioner’s office and that of the State Police, the Department of Education, and the Division of Forest Fire Protection, it is expected that because of mutual interests a close working relationship would develop.

During our hearings, a number of witnesses suggested that under a central authority each county be mandated to appoint and support a County Fire Marshal. The Commission, however, has concluded that such a step is now premature. But it recognizes that the fire service would gain much from such a system, and that the idea should be seriously considered for future adoption.

A number of witnesses also were emphatic in their recommendations that the appointed Fire Commissioner be well versed in the art of fire suppression and safety. Some suggest that a minimum of ten years experience be required. Though we make no such recommendation, we agree with the importance of both practical and executive experience in the field.

*One Commission member feels that this recommendation is inappropriate, that the organizational decision should be left up to the Governor. As an alternative, he recommends that, to centralize control over all emergency situations, a Department of Public Safety be created on the Cabinet level. It would oversee fire, police, National Guard, Civil Defense and emergency health care, with a deputy in charge of each division.*
The Commission also wrestled with the problems of funding and budget, but concluded that in the limited time of this commission, a thorough analysis couldn’t be made. Rather than outline an unworkable program, we chose to leave the question open. However, we do urge the Governor and Legislature to finance the position as generously as possible.
Harry J. Foster, Warminster Township Fire Prevention Officer, as a witness before the Commission, stated the problem well:

“With nearly 100 years of fire prevention history behind us I feel that an honest appraisal clearly indicates that we have failed. . . .When less than 5% of everything in the fire service relates to prevention, we can expect on 5% results. Only 5% of the fire service personnel practices EDITH, the home escape plan (Exit Drills In The Home), and less than 5% have detection systems in their homes or sprinklers in their fire stations, or even talk about fire prevention. If the people who know about fire can’t believe that they need fire prevention, then how in God’s name can we ever convince the rest of the people that they do?”

Yes, how? That the need exists to educate the public is in little doubt. Nearly all Commission witnesses cited education as one of the top objectives to cut fire losses. They pointed out the two sides of the education coin: first, the accumulation of information, the facts about fire – what the possibilities of personal risk are, how to minimize those risks, and how to cope with fire once it begins.

And second, perhaps even more important: the development of a concern, simple awareness of fire, and a sense of the possibilities, a feeling for safety. A driver thinks safety when he gets into his car, a home craftsman when he picks up his power saw, an architect when he designs a flight of stairs; but does the architect think about fire escape routes, the homeowner about electrical-wire overload, the driver about his vulnerable gas tank?

Today, as throughout the Commonwealth’s history, the bulk of the fire related educational effort is shouldered by the fire departments – and the Commission feels that the weight is on the wrong shoulders. Listen to fire officer Harry Foster again, speaking of the volunteers:

“The problem of selling the intangible commodity of fire prevention has been left in the hands of the fire companies, made up of carpenters, brick layers, mechanics, plumbers, laymen – all good men in their own professions, but are they really capable of selling fire prevention? . . .We have asked them to sell something they themselves don’t really believe in, and they don’t know how to sell it even if they wanted to.”

William B. Phillips, president of the 76 company, Delaware County Firemen’s Association, agrees, and adds this:

“I find that the greatest problem is to find capable leaders who have the time and ability to get up good fire prevention programs. And the second problem is getting the younger firefighter interested in prevention. Most of them want to get into fire suppression, ambulance service, and rescue work; that’s where the action begins not in prevention.”

One witness condemned the fire service of Allegheny County because only 39 companies out of 200 participate actively in Fire Prevention Week. Another man states that, “If the local volunteers don’t go into the schools and teach prevention they’re just not doing their job.”
The Commission feels that the primary job of the firefighter is to fight fires, and that any community that has a thoroughly trained, well-equipped group of firefighters – paid or volunteer – on whom it can rely should consider itself fortunate. If, in addition, members of the service also speak publicly about fire safety, work for Fire Prevention Week, and hold inspections of homes and buildings, then that community can consider itself blessed.

Fortunately, most Pennsylvanians are so blessed. In a state-wide survey of local governments, the Commission found that fire departments in 61% of those municipalities responding provide at least some fire safety education in their schools or engage in other prevention activities. A few municipalities do truly outstanding jobs: Philadelphia, for example, which runs a nationally-acclaimed year-round effort in schools and other public and private buildings, and Harrisburg, which makes a valiant effort to do the same, but is hampered by a shortage of manpower and funds. Lansdowne, a Borough in Delaware County, has prepared a well-accepted slide show, and scores of other fire services (Oil City, for example), through the schools, Scouts and Junior Fire Departments, run solid programs.

Many departments that have been successful in developing fire safety programs have a special prevention committee made up of those who would rather not fight fires – often citizens recruited from the community (frequently teachers, medical people, housewives, and retirees) for just this purpose. They are members of the fire department, but aren’t expected to participate in firematics sessions, attend fire-fighting schools, perform maintenance or raise funds.

Unfortunately, such groups are not only relatively rare, but their overall effectiveness is questionable; the state is simply too big, and their time too short, their numbers too small to spread the word.

What the Commonwealth needs, the Commission feels, is an overall, professionally-run, continuing public education campaign, one that would, on the one hand, work with fire service people in the organization of local campaigns, and on the other, direct wholesale promotion through the media.

**THE COMMISSION RECOMMENDS**

*That under the direction of the proposed Fire Commissioner, a well-funded Office of Public Fire Protection Education be created.*

Because whatever material produced must be of the highest quality, a large fraction of the funding of such an office would be passed on to a high-quality, professional advertising agency with a strong public-relations department. Pennsylvanians today are much too sophisticated to be influenced by second-rate material, though we do remain open for sales messages if they are well conceived and delivered and if the product (and fire prevention is a product) is of quality.

The specifics of the promotion are impossible to see at this point, but the Commission envisages the funding to be divided approximately 1/3 for development of promotion to be implemented on a local level, 1.3 for television spots, and 1/3 for all other media – print, radio, booklets, and so on.

(Most of the broadcasting media money would be spent for the creation of promotional spots, not for airtime. By law, broadcasting stations must supply free time for material of public interest.)

That such a campaign will work has already been demonstrated by the forest-ranging bear, Smokey, who, for 30 years, has been telling us that we alone can prevent forest fires. The campaign has been a huge success: man-caused forest fires have been reduced by nearly one half, while the land involved has doubled and its recreation use has increased nearly tenfold. The annual cost to federal and State agencies averages
somewhat under one-half million dollars, while the radio/TV and print industries donate some $200-million to the Advertising Council in free media time and space.

The reduction of wildfire during these three decades is estimated to have saved $17. Had the campaign been directed against all kinds of destructive fires, perhaps the job of Pennsylvania’s fire service wouldn’t be so difficult today.

Other states have run local fire safety campaigns with marked success. In Missouri, a three-year program directed at a high fire-loss area in the Southeast caused the death rate to drop from 12.9 to 7.4 per 100,000 population or 43%. For every dollar invested in the campaign, an estimated $20 was saved in property that otherwise would be expected to burn. A similar program in a small section of Arkansas resulted in an injury reduction of one-half.

Extrapolating from the Smokey Bear campaign figures and others, one noted statistician calculated that well-planned and supported public education programs in fire safety and prevention should result in an annual decrease in fire loss of a minimum of three percent. In Pennsylvania, that would mean $21 million and ten lives saved in the first year.

Coordinated with any promotional campaign should be a parallel study of the campaign’s results, to make sure there are results. The Commission feels, therefore, that the implementation of a fire-reduction program through education should be on a phased basis. When a manufacturer of a new product decides to introduce it to the public, he usually “test markets” the item, selling it in only one geographic area, after which he evaluates the results of the campaign. So it should be with the selling of fire safety. Initial campaigns should be concentrated in special sections of the Commonwealth, while similar sections are used as control groups. At the end of each test marketing, the results – whether they be measured in fire loss reduction, attitude changed or hazard elimination – are tabulated, and the findings applied to the statewide program.

SECTION II
INSTITUTIONAL EDUCATION

Public Schools

When the Commission surveyed the public school districts in the Commonwealth (about 60% returned the questionnaires), it was disheartened by the results: For the most part, schools continue to hold fire drills, but otherwise do virtually nothing in fire safety education. One questionnaire serves as an ideal example of the apathy we found: The informant answered all questions with “That required by law.” No law covered many of the questions.

Except for Philadelphia, Harrisburg and areas mentioned previously, the only fire safety training in most schools seems to be an occasional lecture or assembly program when local fire chiefs are available; an infrequent orientation before or after fire drills; a few “safety clubs”, which may include fire among the concerns; and a rare film, usually shown during Fire Protection Week – one lonely week a year. It seems that one of two things must happen before a school is stirred into action: (1) an active local fire department forces activity, or (2) a fire. (Even bomb treats don’t work anymore.)

Some schools, we hear, don’t even hold fire drills, and one inspector reports schools whose alarms and extinguishing systems are inoperative.

The Commission suggests that schools be required to notify the local fire company whenever fire drills are to be held.
Such a rule would accomplish two things: It would (1) put a school on fire department record as to frequency of fire drills, and (2) give fire company representatives opportunities to observe, if they desire.

As far as fire information retained by the student is concerned, the Commission finds it is virtually non-existent, and this is wrong. We owe the 2.7-million young people of Pennsylvania the best fire safety instruction possible.

That fire education in schools actually works has been proven in a number of studies; an intensive, effective program of fire-safety instruction usually results in a reduction in children’s burn injuries of from 15 to 20 percent. The Commission is unable to put a dollar value on that.

The study of fire in all its aspects should be a continuing process from kindergarten through 12th grad, in all schools, public, private, parochial – perhaps on a par with New York State, which requires 15 minutes a week of fire education, or Minnesota, which requires an hour a week of fire and health education. In high school, perhaps a home safety course could be included similar to the driver safety courses. The subject of destructive fires should also be included in the curriculum of other courses, such as chemistry, physics, history, ecology, and home economics.

Such education, we believe, would not only have a marked impact on the lessening of death and injury of children, but because the youngsters would bring their attitudes home with them, among their elders was well. The value of thorough training isn’t immediately apparent. Attitudes and habits developed should stretch over a lifetime.

Private Schools

In most cases, these institutions do no better job than the public schools, except that they do seem to be more aware of the fire problem – chiefly, one would suspect, because they are privately owned and thus privately insured.

Most private institutions place their responsibility for fire safety in the hands of the security department, the superintendent of the physical plant, or the safety officer. A very few have full-time fire marshals.

Though all private schools answering our survey hold drills for evacuation from dormitories, only one school reported any measure of fire safety education, and only one other held classroom fire drills.

THE COMMISSION RECOMMENDS

*That a continuing program of fire safety education through grade twelve be made mandatory in all schools in the Commonwealth.*

An important aspect of fire safety programs in schools often overlooked is the qualification of teachers. Most, the Commission reluctantly concludes, are ill equipped to handle the subject. To guard against this, therefore:

THE COMMISSION RECOMMENDS

*That at least one course in fire prevention education be required for inclusion in the curriculum of all teacher-certification programs in the Commonwealth.*

We also suggest that each school set up a liaison with the local fire service so that teachers can periodically refresh their knowledge of theory, procedures, and equipment – not only to gain information, but
also to keep a high degree of fire awareness. And of course, the local fire departments can be of major assistance to the schools, both as a supplier of guest lecturers and as aids in implementing the school fire program.

Hospitals, Nursing Homes and Convalescent Residences

When surveyed by the Commission, only half as many institutions in the northern half of the Commonwealth replied as did in the southern half. The difference may be because of the existence of a strong hospital organization – the Delaware Valley Hospital Fire Marshal’s Association – in the area encompassing Philadelphia and the counties of Bucks, Delaware and Montgomery.

The health institutions appear to be doing a much better job than most other classes of agencies. Almost all have thorough and frequent in-service training programs. Employees are trained in evacuation and patient handling, as well as the use of fire-fighting equipment. Most training is provided by local fire department personnel, though many of the larger hospitals employ full-time fire marshals responsible for training on a regular basis.

Much of the credit can go to the American Hospital Association. It sets accreditation standards, which include one monthly fire drill per shift, plus bi-annual disaster drills.

Prisons

The fire education of prison personnel seems to be ample. All employees are trained in using fire-fighting devices and equipment and some prisons even own their own fire fighting apparatus. In these cases employees are trained by the local fire departments.

It appears that generally the prisons are excellently equipped to cope with fire situations.

Industry

The industry sector of the Commonwealth, the Commission is please to report, is highly sensitive to fire, well informed, and constantly updating itself. All but one of the corporations replying to our questionnaire indicated that emergency organizations are maintained around the clock.

Trained plant fire brigades, administered by fire marshals, provide the basic emergency structure in most organizations, sub-grouped into such teams as evacuation and first aid.

Training frequency ranges from monthly to quarterly. Instruction is by representatives of local fire departments, other industrial facilities, governmental agencies, fire equipment manufacturers or vendors.

The corporations are heavily equipped with protection devices – portable equipment, sprinklers, early warning equipment, and sophisticated control systems. Most companies reported wide-range emergency capability, and the scope is impressive: Planning includes preparation for fire, explosions, riot, civil disobedience, power failure, bombings and bomb threats, spills, accidents, and tank and vehicular entrapment. General employee training ranges from occasional exit drills to frequent review of equipment used by fire personnel.

Obviously, the significant factor at work here is capital. It’s good business to practice fire safety. It might be well to ponder why investments are so much more important than lives.
Unfortunately, the language of the replies to our survey indicates that only minimal instructions are given to employees regarding home fire safety. Our only suggestion, therefore, is that big business reach out from its plant into the community to help promote fire safety. We would hope that industry would enlarge its effort so as to include (1) teaching home fire safety to all employees, (2) a greater involvement in encouraging fire consciousness in the community, and (3) purchasing smoke detectors and other fire protection equipment in bulk for non-profit resale to employees.

Though big industry in Pennsylvania is doing well in fire protection, small business and small industry is not, as revealed by phone surveys by Commission staff members. The lack of activity and interest is most disheartening.

We wonder where the insurance companies are. Why aren’t they pressuring the small businessman and minor industrialist into practicing the same kind of employee-oriented fire protection that the big corporations use? Some witnesses and some Commission members recommended that legislation be enacted that would funnel one or two percent of the business and industry insurance dollar into a fund to be used exclusively for employee education (most heads of households are employees of someone), an education that undoubtedly would lead to a decrease in home fires.

The suggestion has both appeal and merit. However, we feel that it is premature. Perhaps it will be sufficient merely to bring the suggestion to the insurer’s attention that an expansion of their fire safety education would be not only in their self interest, but is a moral responsibility as well.

PART III – FORMAL EDUCATION

In addition to the teacher certification program recommended earlier, the Commission believes that there is a vital need for advanced fire safety education in a number of other areas. (Advanced training for fire service personnel is included in Chapter 13). Among them:

Arson Investigation

A Pennsylvania arson investigator usually learns most of his trade from his fellow officers. If he’s fortunate, he may be sent to Rutgers University or some other training center for a week’s education, or he may spend a day or two at a seminar held from time to time in various schools scattered throughout the Commonwealth. However, no system for formalized training exists, and as a result, the Commonwealth has investigators who do brilliant jobs, and others who don’t.

Arson in Pennsylvania is a huge problem, its growing every year, and the only way to retard it is to let arsonist know that all suspicious fires will be investigated thoroughly, that a high percentage of arsonists get caught, and that odds for conviction are high. Sadly, not one of those points is true today. For one thing, defense attorneys can make an arson investigator look foolish simply by point out his lack of formal training.

After consulting with various Pennsylvania arson investigators and teachers of arson investigation, the Commission concludes that the answer to a higher conviction rate – and presumably fewer fires – is a combination of more investigators (the State Police are sadly understaffed in this area), and additional training of those now on the payroll. The emphasis is on training.

Such training, as we see it, should be three-fold:

First, an annual, basic course – including all subjects from ignition sources to compilation of police reports – taught by the nation’s top arson investigators who would be brought in for the two or three days
needed. All arson investigators in the Commonwealth would be expected to attend the school at least once (and fire fighters would also be welcome).

THE COMMISSION RECOMMENDS

That under the direction of the State Fire Commissioner, and with the cooperation of the State Police Fire Marshal, a seminar in arson investigation be held annually.

The second aspect of the proposed arson investigation training is fieldwork. In the classroom, the arson investigation student gets a background in theory. But that soon dissipates if he doesn’t apply his new knowledge, and apply it under direction. The most active areas of arson investigation, of course, are the cities, and the Commission feels that the intense activities in Pennsylvania’s major urban areas offer ideal training grounds for investigators, whether they eventually probe industrial fires or barn buildings. Although the exact mechanism for such continuing educations is cloudy.

THE COMMISSION RECOMMENDS

That the State Fire Commissioner and the State Police Fire Marshal, in conjunction with the authorities of the Commonwealth’s larger cities, develop a method by which arson investigators can receive advanced training by working alongside recognized urban experts in the field.

A future aspect of arson investigation education focuses itself on the establishment of what might be called “flying squads” of experts traveling about the state investigating suspicious fires. Their prime purpose would not necessarily be the apprehension and conviction of arsonist; that would be a result, of course, but it would secondary. The principal purpose would be to train local investigators in the art – particularly those men who have received formal training from the arson school.

THE COMMISSION RECOMMENDS

That the State Police Fire Marshal, working in conjunction with the State Fire Commissioner, develops traveling arson squads, the primary purpose of which would be the training of local arson investigators.

Questions of funding, we felt, are best left to the legislature. But we do see one area worth exploring, and that is the insurance industry. At one time insurance companies constituted the nucleus of arson investigation, but in recent years the industry has reduced its role virtually to that of an observer. We view this development as a great loss to the fire service. Perhaps a portion of the money no longer spent on investigation and investigative personnel could be used to underwrite the yearly arson seminar.

Architectural Engineering

The Commission looked for an awareness of fire in Pennsylvania’s educational program for architects, architectural engineers, designers and structural engineers – and found little. Architects and engineers design and build structures to meet stability, aesthetic and occupational demands, but are nearly oblivious to fire protection unless it is governmentally mandated. They and their clients seem largely content to let fire safety coast until local building codes force them to meet minimum standards. Then they somehow have the feeling they’re structures are protected, that the codes provide adequate measures rather than minimal ones, and they are satisfied to allow any remaining risk to be balanced by fire insurance. Only when fire hazards are extensively treated in the news media is the architect’s awareness increased. But his substantive knowledge is not.
In its December, 1974 report “Education the Architect: Fire and Life Safety”, The American Institute of Architects states this:

[“The AIA] observes that architects have unique opportunities to bring about long-term reduction in... fire loss. . . The architect can ensure that fire and life safety is considered as a major design element that is held intact through completion of construction. The architect is the one person who must answer the difficult design questions posed by the threat of fire. When is an atrium hazardous? How dangerous are exit stairways, which are only technically separate from one another? If a fire starts in the lobby, will everyone be able to escape? What should have been thought about – but was not. Will ‘fire resistant’ material add to the likelihood of destruction? How much fire protection is necessary for a column or girder? How adequately does a particular code requirement protect life safety?

“Such questions . . . cannot be answered with intuition alone . . Not understanding ‘flashover’, for example, an inexperienced designer might think he has planned for a fire, which spreads much more slowly than an experienced architect would expect . . Before intuition has any value it must have a sound base knowledge.”

That “sound base of knowledge” the Commission finds, is a Pennsylvania rarity in the building-design professions, and the cause, of course, is that fire safety just isn’t taught to architectural or engineering students. Currently, only three schools of architecture in the whole United States offer course specifically devoted to life and fire safety design (even then the courses are elective) – and none of them is in Pennsylvania.

No standard textbook or other learning aid exists for architectural students on fire safety, and the closest thing to a text used in schools are building code booklets. Fortunately, with the passage of the proposed State Fire Prevention Code and State Building Code (detailed in Chapter 4), Pennsylvania students will at least have code texts useful across the Commonwealth.

A State code as a text has certain advantages: The student feels he is studying reality rather than pure theory, the material is updated regularly, the booklets are relatively inexpensive, and the content is reinforced every time he seeks a building permit. However, such codes and standards listing are far from sufficient. They usually are prescriptive and discuss no goals; they specify minimum requirements, not basic principles, and most importantly, they don’t give the rationale for their existence.

If codes are used, they must be supplemented with other learning aids: graphics (plans and details), slides, audio-visuals of fire-rating tests, magazine article off prints, and lectures from experts.

When a student receives his architectural degree, he should not only be familiar with the specified codes, but should have a broad knowledge of the fundamentals of fire and smoke, the factors affecting ignition, combustion, development, spread and suppression. He should also know the effect fire and smoke is likely to have on human beings, and what they might be expected to do when forced to leave a burning building. He must be able to fit this knowledge to diverse designs and to various aspects of any design, from site selection through aesthetics, from alarm systems to structural components.

The Commission feels that (1) the needs of architecture and architectural engineering students in the fire and life-safety area have been generally determined, and that (2) programs should be implemented to satisfy those needs.

The first step is to find out what knowledge exists in the architectural community on fire and life safety, and where the gaps lie. To that end:
THE COMMISSION RECOMMENDS

That the State Fire Commissioner, in consultation with the Department of Education, with the Department of State, and appropriate architectural societies develop tests to determine current knowledge in fire and life safety among architectural and engineering students, registered architects and professional engineers.

Evaluation of the findings will have two main applications: They can be used (1) in the development of educational programs, and (2) as a source of questions to be incorporated in professional registration examinations.

THE COMMISSION RECOMMENDS

That by using the results of the architectural-survey tests, the State Fire Commissioner, in conjunction with the Pennsylvania Department of Education and appropriate architectural societies, develop, implement, and periodically evaluate and improve a model program in fire and life safety education for students of architecture and architectural engineering, as well as registered architects and professional engineers.

The Commission does not feel that at this time architectural schools should be mandated to use the program that will develop. However, we are recommending that fire material be included in architect certification tests, so it is expected that when the model courses are available for use, their worth will be so obvious that adoption of them (or similar programs) will be expeditious.

THE COMMISSION RECOMMENDS

That the Commonwealth Department of State supplements its architectural registration examinations to include substantial material on fire and life safety.
CHAPTER 9

EMERGENCY: 911

The situation is this: You live in Dorseyville, just outside Pittsburgh, let's say, and you awaken at 2:30 a.m. to the smell of smoke. You rush downstairs and find a plastic wastebasket and the curtain above it on fire. You could try to put it out yourself, perhaps, but you decide not to take the chance; you'll let the professionals handle it.

You grab the Pittsburgh telephone directory, shuffle through until page 319, and under “FIRE CALL”; you see a column and a half of listings – 180 entries continuing over to the next page.

The type is less than 1/16th of an inch high, so you run upstairs to get your glasses, rush back down again. The fire, meanwhile, has spread to the other curtain. You look up “FIRE CALL” again, and run your finger down the list of fire stations. What's the name of yours? You have no idea. Then you remember seeing a sign, “Middle Road Volunteer Fire Co.”, so you quickly look up Middle Road. It’s not listed.

Maybe it's under Dorseyville. It is, and you dial, misdial, dial again with one ear listening to the ring as the other hears an ominous cracking sound from the next room. Your start to cough from the smoke, and remembering training from somewhere in the past, drop to the floor, taking the phone with you. On the other end the ringing continues. Nobody answers.

Frantic now, you look the number up again; maybe you misread it. Then you notice in small type under “Middle Road" the words “If no answer...” and another number.

You dial – difficult, because your eyes are watering from the smoke. Someone answers. You report the fire, drop the phone and crawl to the door. The cracking has become a roar.

The above incident never happened, of course, but it's a composite of things that have happened, are happening, and will continue unless the system is changed.

Emergency 911 is the number designated for use throughout the nation for reporting emergencies and for requesting emergency assistance. A call is received by someone trained to (1) handle people who may be distraught, injured or even hysterical, (2) determine the problem, and (3) pass the information on to the right agency immediately.

Though the use of a three-digit, nationwide emergency number has been in effect in Europe for decades, the concept had little official recognition here until 1957 when the International Association of Fire Chiefs advocated a single nationwide telephone number for reporting fires. Nothing happened for a decade. Then in 1967, largely because of increased crime and social disorders, the President's Commission on Law Enforcement and Administrative of Justice proclaimed, “a single number should be established" for reporting emergencies. A year later the number 911 was selected (mainly because it takes less time to dial than the English “999"), and since then some 350 separate systems have been set up across the country. They serve communities of all sizes, representing about 14% of the population; a percentage that will jump considerably if Florida and Illinois proceed with plans to institute statewide systems. California already has it scheduled for implementation by December 31, 1982.

In Pennsylvania, a dozen communities have installed 911 systems, with another four scheduled. Here is the status as of October 1975.
Almost without exception, those who have switched to 911 are pleased with the change. To our knowledge, no community in the whole country dropped 911 once it was adopted. Citizens can remember the number, the digits are easy to dial, travelers and new residents know how to get help, calls received at a central source are more quickly routed, response time quickens, better coordination between agencies and communities is achieved, and public confidence in emergency forces grows.

If the situation is so ideal, then why the holdup? Implementation is retarded primarily because of one big problem: reluctance to integrate services.

The Commonwealth is a colossal patchwork of independent services, often overlapping, often duplicating, usually inefficient. Allegheny County alone, for example, contains nearly 200 separate and independent fire departments, plus multiple ambulance services and overlapping police forces. “The jurisdictions are as jealously guarded as the perimeters of old European duchies,” said one Commission witness. “They’re little power bases, and one hates to dissipate hit power.”

The 911 office must be manned 24 hours a day – by a person hired to do only that or by a professional telephone-answering service, or, more usual, by the local police department, hospital, or fire department, and the system works well only if (1) services are at least partially centralized, and (2) local phone companies are cooperative and technologically in accord.

An example of the kind of problems communities are running into are those discovered when the Centre Region Council of Governments, a five-township combination of political units with State College at its center, looked into the 911 question a few years ago. The Council foresaw that if 911 were established, customers in Boalsburg, a village three miles southeast of State College, would have to pay the phone company for circuits to the State College answering point. In the other direction, people who live three miles north of town in Patton Township and have a Bellefonte number couldn’t use the State College 911 despite the proximity, because, the phone company claims, the system can’t distinguish between those who live five miles from Central and those who live 20 miles from it.
In addition, customers in Stormstown, in Half Moon Township, five miles north of State College, are served not by the Bell System, but by an independent network, the Huntington and Centre County Telephone Company, with equipment not directly compatible with Bell’s gear. And the then police chief of State College insisted that the switchboard handle only major emergencies, and nobody could (or would) determine just what that meant.

Resolving such complications simply seemed like too much work, and in addition would cost more in effort and money (an estimated annual per-capita cost of one dollar) than the communities might be willing to pay.*

Said Arnold Addison, president of the State College Borough Council: “Let’s get other things regionalized first – such as a State College fire company unified with the one from Boalsburg, and police and ambulance on a regional basis – and then we can move on to 911.” Such concerns, dilemmas, and hesitations are reflected throughout the Commonwealth. (Since then, the council has consolidated its fire, police, and ambulance dispatching in all areas but those served by Huntington & Central phones.)

An additional problem statewide is that nobody is pushing the plan. Fire, police, and emergency health groups are behind the concept, but no one is coordinating their efforts. As one witness put it, “You have the question of who will benefit from it, and the answer is ‘only we the people’. But we’re not organized.”

Further, though the telephone companies are required by federal law to make the service available and even to promote understanding of the idea, no guideline can be drawn on how good a sales job they do – and the truth is, 911 doesn’t lead to increased profits, so naturally doesn’t head the list of phone company priorities.

Nevertheless, according to a spokesman from Philadelphia’s Franklin Institute Research Laboratories – which did a massive federal study of 911 in 1973 – universal use of 911 is all but inevitable. Nobody who has 911 is giving it up, and gradually, one by one, new areas are joining the system.

The Commission feels, however, that the benefits from a 911 system are too great to wait for a gradual evolution of service consolidation. State insistence is necessary. Therefore:

THE COMMISSION RECOMMENDS

That the Commonwealth Legislature mandate complete installation of the 911 emergency telephone system throughout the Commonwealth by December 31, 1981.

* (California found a general agreement among local telephone companies that they will make central office modifications to provide 911 capabilities without charge, so equipment cost for the basic system there is minimal. Pennsylvania undoubtedly will receive the same kind of cooperation.)
PART II

FIGHTING FIRES
CHAPTER 10

ARSON!

The statistics are startling – the trend, alarming. The figures aren’t accurate – almost no fire statistics are – but they’re probably close: Pennsylvania fires cause by arson has doubled in the last four years, quadrupled in the past decade. If Pennsylvania parallels the nation, arson is the fastest growing crime.

Arson (the malicious destruction of another’s property or for the purpose of insurance collection) has always been serious, of course, but its inherent drama has often overemphasized its relative importance – at least in the past. But no longer. Today its import is largely underrated, and in the opinion of some Commission witnesses, neglected. The general feeling is that the number of arson-caused fires is much more than the figures suggest, that many fires labeled “electrical”, for example, indicate simply that investigators have taken an easy way out “Cause: Electrical” is a nicely positive statement, not weak, like “origin unknown”.

Actually, it’s surprising that arson isn’t even more extensive, when you look at the diversity of those who practice it:

- **The in-debt merchant** who sets fire to his business or home to collect insurance. It’s a quick way to turn a buck, it’s easy, and if it doesn’t happen too often, few questions are asked.

- **The old-fashion firebug**, who gets his kicks by causing excitement, yet remains anonymous. What an easy way to achieve a feeling of power; and it’s done at random, safe.

- **The mischievous, and probably angry, school kid**. How easy to get back at authority: start a fire at school. Philadelphia children have found a particularly effective technique: stuff a toilet full of paper towels, light, and lower lid. Smoke from the plastic seat will not only drive everyone from the floor, but will cause the halls to smell for a week.

- **The upset neighbor** who discovers that fire is an excellent weapon with which to get even. Is someone a bad influence, a rival suitor, and a troublemaker, the wrong color? Burn him out.

- **The militant activist** who burns down an abandoned building to call attention to what he feels is a need. By a flick of a match, he can summon massive attention in the form of fire engines, police cars and crowds. He does it because he feels nobody will listen otherwise; and a park may be built there if the building is gone.

- **The unconscious businessman** who finds that burning down the other guy’s restaurant is easier than finding a better chef.

- **The frustrated thief**, who finds nothing to steal and vents his anger with a match, burns the scene as a diversion or to remove evidence.

- **Organized Crime**. No proof yet that the underworld is developing a conspiracy to defraud through fire, but some authorities see it as inevitable, if not here already. Says James Dalton, captain of the Newark, N. J. arson squad: “Since the American Insurance Association has terminated its investigation of arson, it will be only a matter of time until the organized criminal element... will turn to arson to make a quick profit.”
In Pennsylvania, arson investigation is handled by the Fire Marshal Division of the State Police. Unfortunately, the job is not being done thoroughly – and the reason is workload: too many fires being investigated by too few officers trained in the field.

At least one Commission witness suggested that we recommend that special “arson squads” be set up, and in the chapter on education we present such a recommendation. These would be units of arson specialist scattered across the state and clustered in the cities, much as the present police units specializing in auto theft, homicide, and burglary.

THE COMMISSION RECOMMENDS

That the area of arson investigation, under the State Police’s Fire Marshal’s office, be expanded with personnel specially trained in arson diagnosis.

How large the unit should be, would best be determined by those supervising the program, but the Commission estimates that the number of men now concentrating on arson should be increased by a factory of at least five.

One area, in which State Police personnel are wasted, it seems to the Commission, is that of the inspection of stored, flammable liquid. The duties largely amount to checking on tanks, pumps, and storage sites. Certainly there are other activities more suited to the background and training of State Police. Therefore:

THE COMMISSION RECOMMENDS

That the legislature amend Section One of Act 291, April 27, 1927, to transfer the enforcement of regulations governing storage of flammable liquids (but not the movement of them to the jurisdiction of the Department of Labor and Industry.

Finally, a little good will come of more thorough arson investigation and prosecution unless the word passes to the citizenry. Therefore, an intense effort must be made to inform the public that every fire is investigated, and the arsonists are being prosecuted.

The press tends to headline fires, but rarely follows up with stories of investigations to determine causes. This lack, we believe, is partly the fault of the fire officials, for they neglect to tell the press about their activities. The arsonist will be deterred only if he falls he’ll be caught. An extensive public education program jointly sponsored by the Police and the proposed State Fire Commissioner would go far toward achieving reduced arson incidence.
CHAPTER 11
THE VOLUNTEERS

The 300,000 Pennsylvanians making up the volunteer service, serving in some 3,000 departments, make up 97 percent of the Commonwealth’s firefighting force. He and his 300,000 brother Pennsylvanian volunteers, serving in some 3,000 companies, make up 99.96 percent force.

All but about 40 Pennsylvania fire companies are composed wholly of volunteers. Of the rest, only 14 have forces made up of only salaried men, while such metropolitan areas as Johnstown-Altoona, Harrisburg-York-Lancaster, and Wilkes Barre-Scranton have paid forces backed by volunteers from the surrounding political subdivisions.

In the early days of the republic, of course, everyone was a volunteer. The bell rang and the bucket brigade formed and that was that.

And then around 1730 the first hand pumper was imported to America. To keep it out of the rain, townsmen built it a shelter; the firehouse was invented – and even today the placement of stations in cities often continues to be determined by the average distance a team of men can tow a pumper.

The spirit, the pride, the rivalry between companies was enormous in those early years, and much of it continues today – and as in the remote past, the fellowship works both for and against the organization. Spirit is viral for the competence of a volunteer company – in fact, for its survival. And yet intense fraternalism often militates against the unit by disallowing cooperation with other organizations. And it may lead to overlapping jurisdictions, inefficiency and needless fire loss.

In its survey of the Commonwealth, the Commission finds innumerable positive attributes of the volunteer service, and a few negative ones. Among them are that the average volunteer is (1) not very well trained, either formally or in the day-to-day experience of this paid brother; (2) often doesn’t have really good equipment, and (3) may not be able to use it very well anyway.

When fighting fires, a volunteer’s problems are complicated by the nature of the area and the insularity of the organization. Insufficient property for a proper tax base often means inadequate, worn-out equipment. Water supplies often are inadequate. Codes are probably absent or not enforced. And distances between fire, firehouse and firefighter’s residence may dramatically lengthen response time. (The population of Forest County is only 11.8 per square mile, compared with Lackawanna’s 516 – both of them 400+ square miles – while Philadelphia has a density of 16 thousand per square mile.)

As a result, for many (some witnesses claim “most”) of the Pennsylvanians living outside of cities – some 71.5% of the population – protection is woefully inadequate.

Good or bad, though, the Commonwealth could hardly afford to substitute paid firefighters. The average volunteer fireman, by one estimate, annually donates to his community $4,580 worth of services. At that rate, if the Commonwealth’s volunteers demanded pay for their work, the year’s bill would come to nearly $1.4 billion, or $224 for each citizen served. (Incidentally, in the larger cities, of each fire protection dollar, 97.5 cents goes directly to personnel.)

The main problem confronting a community is determining just what level of protection it wants – and that figure could vary from none in which case anything that catches fire can be written off – to total, which is impossibility. Each community administrator must ask himself first, what do the people want; then, what do they need; third, can they afford it: and finally (when the answer is no) what are the alternatives?
The truth is, however, what everything usually boils down to is a question that shouldn’t even be raised: How good a sales force can the volunteers muster? Equipment and facilities are financed because someone has done a sales job on administrators (for funding) or the public (for donations).

Communities do have one external yardstick they often use: the numerical score given municipalities by the Insurance Services Office (formerly the American Insurance Association). The grading schedule establishes fire insurance rates for each community, and if the ISO decides that the firefighters need a new pumper to keep the rate down, likely as not they’ll get it; if nothing is said about new turnout coats; the men will probably have to resort to a carnival to get them. And nothing will be said about turnout coats: so far as fire insurance companies are concerned, turnout coats don’t put out fires, they simply protect lives.

Lately, some city administrators are giving the ISO ratings a second look, and they’re realizing that fire insurance companies (1) earn more from upper-income and large properties, so they’re more concerned in protecting structures in which the majority of the fires don’t take place, (2) because most fire insurance policies cover structures, not people, the companies are more interested in saving buildings than lives, and (3) the rating gives only 7% of its weight to fire prevention.

THE COMMISSION RECOMMENDS

That local administrators lean less heavily on the Insurance Grading Schedule as a guide to what is needed, and to reorient priorities to focus more directly on prevention, less on suppression.

(It might be pointed out that the ratings were never designed to be used as yardsticks for determining the level of protection. It’s just that better systems never developed.)

Some communities, in the face of extraordinary equipment-price jumps, have attempted to approach the fire problem in an objective, business-like manner, and applying cost-benefits criteria – essentially, a profit/loss detailing.

With the prospect of high-rise buildings appearing where only two-story structures once prevailed, rural areas must decide whether it is worth it to protect anything over two stories. Instead of buying an aerial truck, a town might invest in a good code enforcement officer for a decade.

And this question, too, was raised in our deliberations: Should the community shoulder the cost of outrageously expensive new equipment for fighting the kind of fires caused by high-rise buildings, or should the builders invest that amount required by local coding in sprinklers, detectors, and fire-conscious design? Many foreign countries – Japan, for instance (with a per-capita fire-death rate only 1/6 that of the U.S.) – regard destructive fire primarily the responsibility of the owner, not the fire department.

Some of our basic concepts of the volunteer fire-fighting system must be brought up to date – and according to many Commission witnesses, so must be the firefighter. What are the ways in which the volunteer service can be further improved? We believe that significant progress will evolve from enactment of the many recommendations presented herein, that the State Fire Commissioner will greatly aid the volunteer service, that new code regulations and public education will make the firefighter’s job easier, that consolidation of reporting systems and multiplied early-warning devices and increased use of sprinklers should make his runs less frequent and less time consuming.

But there are additional ways in which the volunteer service can be improved. The major ones:
Consolidation. In the early days, rivalry grew so strong between competing fire houses that the team spirit often lead to brawls, sometimes to outright sabotage. And that was the straw that lead to consolidation of fire departments in cities. Things never got that bad in the country – so each village retained its own individual company. And so the situation continues. Consolidation, in most areas, remains stoutly resisted.

Some argue that enlarged jurisdictions would put local people under non-local control, would lesson civic interest in the fire service, and would cause morale problems within the companies. Arguments also are given that consolidation may weed out smaller companies, thus increasing travel distances and some response times.

There are serious objections, but those communities that have consolidated find that the advantages outweigh the problems. Some of the benefits cited to the Commission:

1. Money saved through volume buying of standardized gear. More saved because of less duplication, particularly in heavy, rarely used equipment.
2. Better record keeping
3. More reliable communications.
4. Faster response and overall greater effectiveness at the fire site trough direct call-out control of all companies (instead of mutual aid arrangements) and uniform suppression methods.
5. Better training of key men as a result of larger tax bases.
6. More efficient manning through elimination of small companies.

The Commission discussed a number of possibilities for State initiatives toward consolidation, but concluded that at this time the possibilities are best explored on a local basis – with help, of course, from the State Fire Commissioner. The county would be the obvious place to begin, and the Commission suggests that each county government explore in detail the effects of consolidation of fire companies within its jurisdiction.

At the minimum, it seems reasonable to the Commission that regional groups, delineated either by county or topology, could move toward communication and dispatch systems, bulk purchasing, non-duplication of massive equipment, and sharing of such specialize functions as fire safety education.

Data Gathering. Nowhere is our statistical information on shakier ground than in the rural areas of Pennsylvania. Nobody has the faintest idea what type of fire equipment is out there, or how much manpower is available (we estimate that only half of the volunteers are active), or what kind of problems are being faced or how they are being solved. We’re not even sure how many fire companies the state holds (we use 3,000 as a convenience). And the number of registered firemen (300,000, so we say) is only a ballpark figure.

So shaky, in fact, is our grasp of firm statistics that we’re not even sure if some Commonwealth fire companies really pay for themselves, that there would be a rise in overall cost of destructive fire if the typical volunteer department ceased to exist and structures were allowed to burn to ashes. How many lives are actually being saved? We just don’t know.

So one of the early steps to be taken as soon as the State Fire Commissioner gets settled in his office is an inventory of the Commonwealth’s fire service.
Centralized Communication Systems, an idea whose time has come. Consolidation of communications, repeatedly discussed during Commission hearings, makes sense. It allows communities to reduce the cost of maintaining individual emergency communication centers, while increasing efficiency and use of equipment and manpower. It cost less and does a better job, and it isn’t terrible complicated to set up.

Some of the characteristics:

- Better equipment because of shared costs.
- More highly qualified dispatchers because of the reduced number required.
- More efficient mutual aid operations because dispatchers know where all manpower, apparatus and equipment are at all times, and call for only that needed.
- Liaison with other emergency forces throughout the region improves and all communities are better prepared to meet emergencies.
- Other facilities in the region (including such communication systems as O.P. (Civil Defense), Amateur Radio, and so on) are tapped, multiplying everyone’s effectiveness.
- In case of an overall emergency, the system could notify a vast number of people quickly.

The initial cost of conversion is small in comparison with benefits. Ideal, of course, are tie-ins with the 911 Emergency Phone System, discussed in Chapter 9.

With such new programs as the above, with the skyrocketing cost of new equipment, and with an inflation - and unemployment – caused donation-drought looming, volunteers are increasingly in trouble financially. “We just can’t get the money for what we need,” lamented one chief at the hearings. “The men are tired of tag days and raffles and door-to-door begins. They’re tired of throwing carnivals, too; there are too many other things to do nowadays. I don’t know what to suggest, but there must be a better way.”

It’s enough to ask a man to be a volunteer firefighter, the Commission feels, without requiring him to be a fundraiser too. Indeed there must be a better way.

A number of possibilities present themselves:

Municipal funding. Some communities totally support their firefighters. Others give them not a cent. The majority of volunteer fire departments are financed by a combination of direct aid from the municipality and fund-raising by themselves. The Commission feels that asking firefighters to risk their lives is enough. Therefore:

THE COMMISSION RECOMMENDS

That whenever possible, municipalities finance all but strictly social activities of their local fire service.

State Funding. The Commonwealth itself supplies no money directly to fire companies, though at times it does underwrite low-interest loans. Some witnesses spoke strongly for direct financial support from the Commonwealth in the form of equipment, real estate underwriting, or outright grants. The majority of the Commission, however, believes that fire suppression is strictly a local problem (as opposed to protection, which is of broader concern, and the decision as to how much in the way of fire-fighting forces are wanted should be up to the local citizens. If the individual communities decide they can afford only a certain amount of
money for fire fighting – or even if they feel they want no suppression – that, it seems to us, is their right. The State should not seek to coerce them with offers of money.

Insurance companies. Many suggestions have been made that a certain percentage of insurance premiums (usually one or two percent) be returned to local companies for mobile equipment. The law now requires “foreign” or out-of-state fire insurance companies to return two percent of the premiums for the “welfare” or “protection” of the firefighter. A company can buy masks and coats, but not engines. In 1974, record allocations totaling $7,562,303 were made to 2,535 Pennsylvania municipalities. That’s an average of nearly $3,000 each.

Federal Funding. The Rural Development Act of 1972 (Title IV), through the Secretary of Agriculture, offers assistance in the form of matching funds for organizing, raining or equipping fire companies in communities of fewer than 10,000. About $108,000 is appropriated for Pennsylvania for fiscal year 1975, with a similar amount set aside for 1976 (which, if spread equally around the state would come to only about $36 per fire company). Otherwise, at this time, no federal funds are available for direct grants to local companies, though some amounts are likely to be authorized in the future.
THE PAID SERVICE

The major problems of today’s paid firefighter are shared in part both by the volunteers and the other uniformed workers in America’s cities. “A decade ago we felt we were just barely holding our own against urban fire,” one chief told the Commission, “but we actually had it pretty good in comparison with today. Now our equipment is older, buildings are higher, smoke is more lethal, the public is increasingly antagonistic, and arson is endemic. Add to that today’s constant cry to cut back on personnel because there’s no money, and you can see why we yearn for the good old days.”

Urban firemen are attacking a huge and growing set of problems with fewer men, and they’re using yesterday’s means to do it. The result: at best a holding action, a finger in a crumbling dike. Oozing away is much of the old spirit of fraternity and pride; gone is the public adoration of yesteryear. And the on-duty death rate continues to climb; it has reached an awesome 11.5 per 10,000 men, more than three times that of 1960, and about twice the current on-duty death rate of law enforcement officers.

The organizational makeup of fire companies has changed little in the last thirty or forty years, but with the financial pressure of today – along with emerging alternatives to traditional firefighting technique and organization – urban fire departments are soon going to be shaken loose from what one witness called “their atmosphere of self-created isolation.”

The obvious answer to a problem of higher fire loss is more men. And yet, because the annual budgets of municipal fire departments allocated 92 to 97 percent of all funds for salaries, the clamor from city hall is to cut.

Is it possible to use fewer men? Perhaps, concludes the Commission, but probably unwise. Instead, suggested a number of hearing witnesses, the men might be held at the current level but more efficiently used. As discussed in the chapter on the volunteer service, progressive municipal planners are increasingly using long-term master planning approaches to city functions. They’re studying the balance of interrelationship of systems – police, hospital, water, and use, fire – and asking difficult questions about what is wanted, needed, and possible.

In fire, for example, what is the level of protection potential within a given budget? What is the optimum station layout, alarm source, dispatching system to handle the problems of the 1980’s? What must be known to achieve a satisfactory cost-benefit ratio? What proportion of fire prevention and suppression is desirable? How can the effectiveness of a fire-protection system be measured? And how does it all balance with the other systems?

None of these questions has a clear answer, and the whole subject of systems engineering, as applied to cities, is far too complicated to detail here. It seems to the Commission, however, that responsible municipal officers must ask these questions, and must find the best minds around to arrive at answers. Without some sort of framework on which to build the future, the urban fire service, we’re afraid, will begin to degenerate.

THE COMMISISON RECOMMENDS

That to prepare for the future, urban municipalities begin to lay the groundwork for a systems approach to fire by preparing and implementing master plans for the public safety.

Some municipalities – most of them outside Pennsylvania – after taking in-depth looks at their fire services, have decided to deviate from traditional organizations. For example:
Medical Units

Firefighters have long been expert in first aid, resuscitation, and other emergency treatments, particularly those involving rescue and ambulance work. Of the 1,422 ambulances listed in the Pennsylvania Department of Health, about 800 are owned and operated by the Commonwealth fire service. Now, in a few areas, fire service personnel are responding to medical emergencies having nothing to do with fire. They’re administering on-the-spot treatment beyond ordinary first aid through radio communication with physicians. (Some departments, however -- again, outside of Pennsylvania – are assembling poor records in paramedical service because they have assumed the obligation without preparing for it. They’re sending inadequately schooled personnel in fire engines to emergencies in a hit-or-miss manner.)

Combination Paid/Volunteer Departments

Some 14 Pennsylvania fire departments are composed of part volunteer, part paid personnel, and the number is growing. (Of the 3,000 State fire departments, in only 26 are all the men salaried.) Half-and-half companies are particularly useful for juggling fire-frequency times, or for paid firefighters manning when volunteers aren’t available, usually during working hours.

A paid/volunteer setup is especially helpful for the town that’s easing over to paid firefighters from strictly volunteer departments. Communities that are radically changing from rural to suburban complete with high rises and shopping centers and the myriad of problems urbanization brings, might well consider hiring one or two professional firefighters who will manage the department and train the volunteers in the new techniques.

Part-time Firefighters

One argument for keeping a large number of personnel on duty is the need for preparation in case of two simultaneous major fires, or the huge fire, the textbook cases of a department manning for the big fire every four years that burns down the theater. But except for our larger cities, the frequency of large or multiple fires is so low such contingency planning is highly uneconomical.

A few cities outside Pennsylvania have largely satisfied the problem by incorporating part-time firefighters drawn from other city departments. The men are paid for training (typically four hours every other week) and for time fighting fires. When the alarm sounds, the full-time crew answer, and summons the part-time firefighters to cover for them. Often the part-timers have their own engine stationed at the Public Works yard.

Those who have tried it say turning out a part-time man cost less than half that of a regular fireman – and the big advantage is a bank of perhaps a couple dozen men to draw from.

The men aren’t volunteers, with all the variables that entails, they’re true firemen, hired to be both mechanic (or whatever) and firefighter.

Consolidated Police and Fire Departments

Some two dozen cities across the nation – again, none of them in Pennsylvania (present law prohibits consolidation here) – have fully consolidated fire and police departments. A number of other municipalities have partial mergers. Most of the towns are under 10,00 population, usually without the intense crime problems of central cities.
The police/firefighters, called Public Safety Officers, are primarily police, but when the alarm sounds, a high percentage of them turn instantly into firemen. In addition to the obvious advantage of a small number of employees, officials have found that response is often much higher. The officers usually carry with them large fire extinguishers and portable resuscitators, and because they are covering the city in the line of duty, are usually within quick distance of any fire. If they arrive fast enough, for 70% of all fires two men and a fire extinguisher are all that’s needed.

Private Firm

In a few spots around the country – Nashville, Tennessee; Billings, Montana; and Rochester, New York among them – municipalities have contracted with private companies to provide all fire-suppression service. (The idea isn’t new; the first U.S. fire departments were owned and operated by insurance companies.) For the most part the arrangements have worked out rather well. One in Scottsdale, Arizona (populations 70,000) has been operating since 1948, and most of the country of Denmark is privately protected.

But because the idea of public fire protection as a profit making venture runs to counter our tradition, the concept is highly controversial.

THE COMMISSION RECOMMENDS

That Commonwealth fire departments keep open minds concerning organizational setups, that they study alternate systems and explore the economics and practicalities of unorthodox structures.

As needed as such reorganizational changes are, none is going to be fully effective unless major refinements evolve in equipment and its use. The equipment situation in Pennsylvania, concludes the Commission, is a mess. Most firefighting gear in use throughout the Commonwealth, for both volunteer and paid departments, is either worn out, the wrong kind, insufficient, incompatible, wildly expensive, or technologically outdated. (That’s true in other states as well, but that shouldn’t affect our resolve to change things here.)

A fire department works for years to get a new engine, but because the manufacturer feels that the company is as interested in parades as putting out fires, the piece is loaded down with chrome fenders and wheels, striping, bells, doodads and trinkets that jack the price to absurd heights. Said one chief, “Our taxpayers are beginning to figure out that a $30,000 fire truck with $2,000 worth of chrome on it doesn’t fight any more fire than a truck two grand cheaper.”

Helmets remain in the dark ages; breathing apparatus – heavy, awkward, holding insufficient air – seems designed by scuba enthusiasts. We’re still battering through walls with axes, sending men into smoke-filled houses with hand-held flashlights, attaching one hose to another (if we’re lucky enough that the threads are compatible) the same time-consuming way we did in World War II. In an age of technological sophistication, of space-shuttle miniaturization, of electronic control and computerization, something has happened to close the valve on the conduit between laboratory and fire service. (See Chapter 16, “Research”.)

The charge has been made that fire departments are so tradition-bound and riddled with internal politics they are reluctant to accept improved techniques and equipment. The Commission, however, finds this not to be the case. The Pennsylvania firefighter only will accept innovation, but is crying for it.

A good many improvements have been accepted that we’ve forgotten. As R. L. Emrich, Deputy Assistant Chief of the Greensburg Fire Department pointed out to the Commission: “The spring-loaded wooden aerial ladder has been replaced by the hydraulically-operated all-metal aerial and the elevating
platform. Where once straight-tip play pipes were the norm, the variable pattern and gallonage nozzle now is, for the most part, standard on hand lines. Improvements in the materials used in the manufacturing of fire hose have reduced the frequency of burst sections. Dependability as well as pumping capacity of engines has been increased." Twenty years ago a standard 10-pound dry chemical extinguisher was capable of putting out a 50-square-foot flammable liquid fire. Today an extinguisher of similar size, using improved dry chemical agents, can extinguish six times as much fire.

The situation continues to improve on two fronts: gradual progress (which, for the most part, leads to items too expensive for mass use) and the employment of equipment less fancy but more effective

Look at fire trucks, for instance. Basically, an engine is a vehicle for carrying men and equipment to a fire, usually with a built-in water pump, a tank of water, hoses, and a variety of portable gear. A truck ideal for fires in Lock Haven presumably shouldn’t vary much from one suitable for, say, Connellsville (both, population 11.5 thousand), but somewhere in the past, manufacturers and fire chiefs arrived at the practice of customizing engines, adjusting performance characteristics. So today each of the 2,500 fire engines manufactured each year must be individually assembled. Such individual attention, it has been estimated, adds about nine percent to the cost. So a $50,000 basic engine, if available in only, say, four models instead of a plethora, might cost $4,500 less. You can buy a lot of hose for that.

**THE COMMISSION RECOMMENDS**

*That the proposed State Fire Commissioner works with engine manufacturers to develop standardized designs to fill the needs of the Commonwealth.*

Some fire chiefs are finding that huge trucks are not only unnecessary, but in many cases undesirable, and they are using instead “attack trucks” or “mini-engines”. They find they’re less costly to build, operate and repair. They’re faster, lighter, and more maneuverable, and they can handle at least 70% of the fires. Typical is a truck with 300 gallons of water on a heavily-gearied, over-powered 1½ town truck with a booster pump, backed up, if needed, by a conventional 750 gpm pumper.

A few Pennsylvania companies are taking advantage of the Federal Excess Personal Property Program, which authorized State Foresters to loan trucks to communities for conversion to fire trucks (although we hear reports that much of the equipment is so worn that repairs make the economics questionable).

Still another approach to high engine cost is one advocated by Lou Witzeman, president of Rural/Metropolitan Fire Protection Company, a private fire fighting company in Scottsdale, Arizona. His men built their own. “Here’s a challenging, productive, and stimulating way to put a fireman to work in his free hours,” he says. “There’s no mystery to building your own truck . . . and a dozen suppliers will be glad to cross-guarantee their products to give you the truck you want.”
CHAPTER 13

TRAINING

The best in communications, the newest in equipment, even an excess of manpower does no good if firefighters lack the necessary training to do the job – and that’s the charge leveled at the Pennsylvania fire service by more than one witness.

The Commission finds that the quality of training of the average firefighter ranges from superb to absent. Appeals for help in training were voiced again and again during our hearings. Small companies can’t support a fire school, many of them can’t even afford to send their men elsewhere, they’re in dire need of training, and they know it, and they don’t know what to do about it.

Presently there are five kinds of training for Pennsylvania firefighters:

1. **At the station** – or the training ground of the local company. Instructors are older, experienced men who have learned techniques either at fire school or on the job.

2. **At regional schools** – Scattered across the Commonwealth are numerous county or other regional schools manned by some 340 local level instructors from the State Fire School of Lewistown. Fifteen counties have no instructors at all, and as of September 1974, less than half the counties had local-level fire training programs.

3. **At the State Fire School at Lewistown** – Many witnesses spoke of our State Fire School, and the great majority of them summarized it the same way: fine instruction, dilapidated equipment. Not surprising: The State appropriates only $195,000 a year for the facility.

As one retired fire chief and county fire marshal put it: “Most progressive companies are insulted having to use present (equipment) at Lewistown. When a fireman gives up his vacation to a training program, the State should be able to give him the proper caliber of . . . equipment to train with.” Echoed another firefighter: “When a man spends a week of his time, and often his own money, he should expect the best that (Pennsylvania) can provide. This is not the case.” Others spoke of cracked and broken gear, stripped hose couplings, inoperative motor-powered equipment, and hours wasted while equipment was temporarily repaired.

**THE COMMISSION RECOMMENDS**

That if put under the supervision of the State Fire Commission, the budget of the Pennsylvania State Fire School be substantially increased.

Each year about 1,000 firefighters attend at least one class at Lewistown. At the rate all volunteers in the state will have attended in exactly 100 years. (See curriculum suggestions and second recommendations, below.)

1. **Out-of-State Schools** – Unfortunately (with the exception of Philadelphia), the best training seems to be in states other than our own: New Jersey for arson, Maryland for firematics, Illinois and Oklahoma for fire engineering. Every year hundreds of Pennsylvania volunteers spend their own or public money traveling elsewhere to get training the Commission feels they should be getting at home.

2. **Urban training for rural firemen** – Only a few volunteers have had a chance to train with urban departments, but those who have say it’s the experience of a lifetime. On a typical Saturday
night in August in Harrisburg, for example, four volunteers from State College, working alongside regular Harrisburg firefighters, responded to 14 calls, including four suspected arsons, an automobile fire, a flammable liquid blaze, and a probable suicide attempt. "In one six-hour period I learned more about the realities of fire than in all of 1974 at my home station," said one man. "It’s the place you exchange romanticism for reality."

THE COMMISSION RECOMMENDS

That the larger cities of the Commonwealth invite competent firefighters from rural areas to join forces with their own men as Visiting Firefighters.

Such training is particularly good for officers. In the present system, firefighters have nowhere in the state to go for command training. This should not be the case, and the Commission feels that officer-level personnel (both volunteer and salaried) should be able to pursue their careers at the State Fire School.

The Commission also concludes that the Lewistown facility is using its facilities for many elementary courses that easily could be handled in county or regional schools: Fire Fighting I and II, for example, or Hose Practice or Pump I and II (those alone totaling seventeen classes a year).

The State Fire School, the Commission believes, should be for the elite of the fire service; it should be the Commonwealth equivalent of the National Fire Academy or the firefighting equivalent of the Carlisle War College. The Pennsylvania Fire School should hold only highly technical classes in firefighting techniques, tactical direction, and organizational management.

THE COMMISSION RECOMMENDS

That the classes offered at the Pennsylvania State Fire School be reorganized to intensify instruction in advanced firefighting, with the emphasis on tactics, command, and management.

And further,

That those classes in elementary technique that are effectively being taught elsewhere in the Commonwealth be eliminated.

With the dropping of basic training at the State Fire School, a void will be created. The Commission believes that consideration should be given to the establishment of smaller, State-sponsored regional schools, perhaps three to six of them, scattered across the Commonwealth for easy access. Many witnesses spoke to the problem of transportation, pointing out the limited time and money available for individual firefighters. Even though Lewistown is centrally located, a trip there means at least one, perhaps two; overnight stays for most Pennsylvanians attending a class. If a number of schools were available, most students could drive in, attend afternoon classes and be back home the same evening.

THE COMMISSION RECOMMENDS

That the State Fire Commissioner be empowered to design a regional fire training school system to be operated under his direction, with close alliance with the Secretary of Education.

In addition to the regional schools, the Commonwealth has a continuing need for county fire schools. To hold down costs, they could be combined with regional police, fire police, and ambulance facilities.

When first exploring the school concept, counties should not be expected to build elaborate facilities. It would be wise, however, to acquire suitable training grounds for present use and future development, and to
construct such minimal facilities as tower, driver training grounds, oil pits, and possibly buildings for fire drills. Classes could be held in local highway department buildings, town halls, or Vo-Tech or other schools.

For a century now, anyone who wants to call himself a fireman simply sighs up, and he’s so designated. On the day he is voted in, he can don equipment, ride out to fires, and help put them out – and to a stranger, he’s indistinguishable from the man with twenty years of experience. He is a firefighter, so long as he pays his dues, whether or not he ever learns anything about fire.

Training facilities, as poor and sparse as they may be, are available, but only a minute percentage of Commonwealth firefighters have been taking advantage of them. Therefore, the Commission reluctantly concludes that the fire service must be encouraged to educate its members (as have 15 other states) through the establishment of a certification program.

THE COMMISSION RECOMMENDS

*That to become a Certified Firefighter, a candidate must pass basic courses in firefighting (to be developed by the proposed State Fire Commissioner), and that to maintain his status, he must be re-certified every two years.*

Such a certification program will do a number of things: (1) give the firefighter a feeling of “professionalism”, (2) insure that he has had enough basic training to employ safety principles that will help protect himself from accident, (3) assure minimum standards of firefighting effectiveness across the State, (4) bring about a unification and standardization in teaching structure, and (5) provide a generally recognized measure of development, proficiency, and personal achievement. (NFPA recently published a set of certification standards that could be used as a blueprint for the Pennsylvania standards.)

The Commission finds that the lack of knowledge is not limited to the ranks of firefighters, but continues up the scale to include the chiefs. Donald Ben Cypher, Chief of Saxonburg Volunteer Fire Department, reflected the testimony of a number of witnesses when he told the Commission: “It is common knowledge throughout the volunteer fire service that in a great many cases election to an officer’s position is due to a popularity vote rather than one based on a candidate’s education and his knowledge of all facets of the fire service, including technical command and leadership.”

Another witness said: “One of the misfortunes of the volunteer system is that you take your best firefighter and you make him an officer.” An officer, and especially a chief, should be a very special person. He is not necessarily an expert in the technical details of his equipment (though it is likely that he is), nor is he the one who, dissatisfied with the way his orders are being carried out, charges in and does the work himself – like Super chief Steve McQueen in “Towering Inferno.” He does have respect, he must have knowledge, he has the ability to make quick, correct judgments, and above all he must be able to size up the whole situation. He’s got to know which men are doing what, and to direct the others as the situation changes. He must be able to visualize the construction of a building from looking at the outside; he must see the fire through the walls, and even look a little into the future (“This fire will get this big before I get on it, so I’ll need *this* many lines”), know when to send in men and when not to, when to ventilate, and when to give up.

Most of that, one cannot learn on the job.

THE COMMISSION RECOMMENDS

*That before a firefighter is eligible to become a line officer, he must have been certified so by tests developed and administered through the State Fire Commissioner.*
Many officers probably could pass the certification test without attending classes, but the probabilities are that the majority will need some kind of formal education. Most Commonwealth chiefs are strong in leadership but weak in management, and as one fire officer put it to the Commission: “You take a really good firefighter, your best man, and elect him Chief, and then wonder why he fails. He fails because he isn’t a management person, he is nozzle oriented, a fire putter-outer, instead of a man of strategy and tactics.” Few officers in the Commonwealth are good strategist; there are very few in the whole country. And so far as the Commission can determine, there is no satisfactory course of instruction designed to mold a fire officer.

There are courses that can be adapted, however. There are management and supervisory training programs of big business that could be combined with those courses in strategy and tactics used by the military and police.

The Commission doesn’t visualize two distinct classifications of curricula, one for linemen, another for officers, but rather a step system, the basic classes to be held in fire headquarters or county schools, the more advanced (but still basic) courses held in Commonwealth regional schools, and finally – at the State Fire School, the top-level courses for officers and potential officers.

(When the system becomes operational, the ISO rating schedule might take into account the number of certified firefighters and officers active in a given community, rather than the total number of volunteer who simply have paid dues.)

One other area of concern to the Commission is that of the physical fitness of Commonwealth volunteers. “We have many men who are fighting fires who physically aren’t up to it,” one line officer testified. “They just shouldn’t be there. They’re doing it at great physical risk – and the trouble is, they don’t even know it because they haven’t had a physical exam for years. Sending an unfit man into a firefighting situation is not only unfair to him, but to the rest of the men as well.”

The Commission agrees, and has determined that the taking of a physical examination should be required for active firefighters.

**THE COMMISSION RECOMMENDS**

*That in order to achieve or remain at “Certified Firefighter” status, a firefighter must be examined yearly by a physician to determine the examinee’s physical fitness for active firefighting.*

The Commission feels that the cost of such testing should not be borne by the individual firefighter but by the Fire Company or political subdivision. (Such exams fall into the area eligible for payment from Fireman’s Relief Funds.) Physical examinations, the Commission feels, should be considered a firefighting fringe benefit.
CHAPTER 14

WILDFIRE

Pennsylvania’s forest fire and grassland fire situation, the Commission is pleased to report, is in good shape. More has to be done to continue to hold loss down, but in comparison to the rest of the Commonwealth’s fire problem, the control of wildfire by State and local agencies is excellent.

It’s excellent because of long-range planning, of tight organization, and of extraordinary cooperation between volunteers and national, State and local governments.

The woodlands lying across the Commonwealth now represent ¾ of the total forested land extant when Columbus set foot in the New World 483 years ago. It was a vast, virgin forest of majestic white pine, hemlock, and beech, and in the early years of the country attracted huge quantities of settlers. They cut the forests and farmed the land, and by 1900 only about half the state remained forested. Most of the rest burned every few years, even though as far back as 1862 an Act of Assembly established responsibility for damage of woods by fire. Remains from logging operations – dry treetops, limbs and shavings – magnified the normal “dead fuel load” of the forest floor, and when a fire once began, it simply burned until either the fuel was gone or it was suppressed by rain. There was no way man could fight it.

Times changed. In 1911 Congress passed the Weeks Law, authorizing federal funds for, among other things, forest fire fighting. Logging declined as virgin forests disappeared, and debris from the industry gradually rotted away. Meantime, the Commonwealth was developing techniques for fire suppression, and to a lesser extent, prevention.

Gradually, as the years passed, those horrendous fires, almost traditional, occurred less frequently. Still, in 1930 nearly 7,000 wildfires burned 1.2 million acres. Today, an average year sees not many more than 1,000 wildfires burning a little more than 6,000 acres. The average acreage destroyed per fire in 1913 was 500; today it’s about 6 – this despite the fact that since 1930 more than 3-million wooded acres have been added to the total. The reduction has been truly impressive. And fire loss figures continue to shrink.

And yet, during the past 15 years the state has had 20,760 fires that burned close to one-quarter million acres. This represents, in terms of resources lost, approximately $103-million, not counting the cost of fighting them.

That figure really doesn’t tell much. “Measuring forest resource losses in terms of dollars alone,” testified Nelson Folsom of Charmin Paper Products Co., “is extremely conservative at best and often meaningless, for how can one determine a monetary value for poorer air and water quality, or loss of a scenic vista.” Or the sterilization of soil that then blows or washes away? Or the resulting increase in the cost of lumber or paper? Or the elimination of recreation areas?

The causes of fire remain the same as in the old days – at least since the White Man arrived – although the emphasis has somewhat shifted. The three factors that go into the formula for hazard: weather, ground fuel, people.

People (including people-operated machines) cause an astonishing 98% of Pennsylvania fires; nature, through lightning, 2%. (In the Rocky Mountains, about 55% of all wildfires are caused by lightning.) The danger periods here are March through May and October into December, generally until the first snow falls, but drought can extend them through the summer and even winter months.

Pennsylvania wildfires can be traced to three main causes:
• The first is arson. By the simple act of lighting a match and intentionally dropping it, an enormous amount of excitement can be generated – billowing flames, majestic columns of smoke, scores of men and machines battling the fire in action turbulent as a grub-hoed and nest.

• The second cause is careless debris burning. A man trims his trees, and then fires the pile of trash to clean up. The wind gusts and blows the flames into dry grass. Suddenly the fire is out of control.

• The third cause: railroads. On the average, 15% of the Commonwealth’s wildfire results simply from stack discharge from locomotives.

Three potential additional sources loom. One is the combination of deteriorating railroad track beds and increased transportation of flammable liquids and gasses. Another is the increasing use of off-trail vehicles, usually with little or no protection at the exhaust system.

The third potential source is the catalytic converter now being installed on automobiles. According to at least one study, malfunctions can cause converters to self-destruct through excess heat buildup. Not long ago a GM unit blew up because the automobile’s choke stuck. The heat created a 3½-inch rupture in the inner housing and melted some of the converter’s stainless steel components. Stainless steel requires a temperature of from 2,500 to 2,700 degrees F. to melt, about twice that of a lighted cigarette.

Stated the U.S. General Service Administration in its January, 1975, bulletin: “Because converter units are usually mounted at or below the vehicle frame level, thus close to the ground, a converter-equipped vehicle driven over or parked on a surface of easily combustible materials such as dry grass could cause a fire.”

“Parking either in tall or dry grass,” Elliott M. Estes, President of General Motors Corp. told The Oil and Gas Journal in March 1975, “is asking for trouble.”

None of the last three problems has so far emerged as a major threat to our woodlands. The big worry to foresters is simply the exodus from city to woodlands. In most areas it is expected to at least double in the next decade. And the current trend of Pennsylvanians to build homes surrounded by woodland is, in the words of one witness, “positively frightening.” Most of these structures lack the open space and manicured grounds normally associated with farm homes. Organized fire companies are generally distant. And the builders rarely give a thought to protection. “A developer goes into the Pocono’s and puts up a community of $30,000 housed and never gives a thought to fire,” said one witness. “He doesn’t consider layout or building structure or the fact that the homes have an entrance lane with a bridge that can’t carry a fire truck, or the fact that with a fire truck on that road nobody can get out.”

The expansion in forest use is reflected in the fact that although the number of acres burned per fire is decreasing, the number of fires is not.

In light of the increased potential for wildfire, the fact that total destruction continues to drop is an even more remarkable achievement. What are the reasons for such a success? The prime ones boil down to three: organization, planning, and cooperation.

Responsibility for forest and grassland protection lies with the State Division of Forest Fire Protection of the Pennsylvania Department of Environmental Resources (DER). The Forest Service of the U.S. Department
of Agriculture has agreements with each state to help protect watersheds and woodlands, and to fund the cost to a maximum of 50%. Pennsylvania’s reimbursement now runs about 9%.

Pennsylvania has an enormous amount of forested land – some 18 million acres of it, 62% of the total, more than the whole State of West Virginia. A lost of land to protect. Other states have more, but Pennsylvania is second only to California in the risky combination of forests and people.

The Bureau of Forestry is highly organized, tightly structured, and uses a systems approach to the whole problem. A master plan has been created over the years that specifies goals and objectives and weighs relative effectiveness of alternate means of protection. The department has designed what appears to be an optimum mix of preparedness, prevention, and suppression capability.

The secret of successful suppression is a swift attack with sufficient men. According to testimony by the late Ralph H. Freeman, Forest Supervisor of the USDA’s Allegheny National Forest, “Pennsylvania possesses amore highly organized, dedicated, and effective wildfire protection force than any state in our experience.”

The state is divided into 20 districts, each headed by a District Forester and a small staff. Fire is just one of his duties; he also has responsibility for timber and wildlife management, and he works with the private landowner in ecological development of his land.

One of each Forester’s assistants is given the responsibility for fire organization in the district; helping him usually is a number of professional Forest Technicians, one to four full time Forest Inspectors, and a number of Volunteer Fire Wardens (each, by law, required to attend at least one training session a year) – some 3,800 of them across the State.

And then comes a vast number Volunteer Forest Fire Crew Members – nearly 77,000 of them.*

These forest fire fighters may handle small brush fires, but usually they get help from that whole army of firefighting talent, the state’s 300,000 fire company volunteers, and over the years the DER has succeeded in establishing and extraordinary level of cooperation between the groups.

It wasn’t always so. Time was when competition between the various organizations was so keen, as one witness put it, “they’d be fighting each other instead of the fire.” Today, with the realization that everyone in the fire service is working toward a single goal, few rivalries remain.

Most observers credit the overall effectiveness to the organization’s tight structure. It has a firm chain of command and uses tactics borrowed from the military. In a large fire, hundreds of men may be used, and the problems of logistical supply and transport demand a fire structure.

The equipment the DER uses in suppression is some of the most advanced in the nation. In addition to a fleet of four-wheel drive vehicles, ATV’s, tractor-plow units and other specialized equipment, the department leases six to nine helicopters and four B-26’s with a total capacity of 1,000 gallons each to cascade water. Pennsylvania, in fact, was the first state in the East to use aircraft in fire suppression.

*Pennsylvania fire crews also belong to a nationwide mutual aid system that can tap men from one area and move them to another. For example, in 1973, Pennsylvania personnel were flown to the Northwestern States at the request of the Forest Service because of extreme emergency conditions.
Another factor in the success of the wildfire program is the hugely effective campaign of Smokey Bear, detailed in the chapter on education. So successful was it in raising the consciousness of campers that campfires no longer constitute a prime source of ignition.

Even with the vast success of the program, however, much needs to be done, particularly in light of the huge problems coming up. The Commission feels that, as with all destructive fires, the key to success lies in preventing the wildfire in the first place. To that end, a number of areas should be explored:

- Homeowners must be made aware of the gamble they’re taking if they build a house in the woods with little thought to fire protection. In conjunction with public education (to be handled by the State Fire Commissioner’s Education Office), increased thought to land use and zoning must be given by local governments. And because building a home in the forest introduces hazards not found elsewhere, differing code provisions might be appropriate.

THE COMMISSION RECOMMENDS

That when the proposed new fire and building codes are drawn up, sufficient thought be given to structures in forested areas.

- Because unsafe burning practices constitute a major cause of forest fires, a combination of education and law must be implemented. Many municipalities have ordinances prohibiting any kind of debris burning within the city or borough limits, but few rural areas now have such regulations. We feel this to be an oversight.

THE COMMISSION RECOMMENDS

That the local municipalities extend the regulations for burning to areas beyond suburban borders.

- Because of the huge increase in vehicles capable of traveling off regular roadways, and because of the dangers of exhaust in unprotected vehicles.

THE COMMISSION RECOMMENDS

That all off-the-road recreational vehicles be prohibited from Commonwealth woodlands or grasslands unless equipped with a spark arrestor approved by the U.S. Forest Service.
PART III
THE VICTIM
C H A P T E R  15

THE BURN VICTIM

She said it on national television, said it slowly, hesitantly, with her four-year-old child sleeping in the hospital bed next to her: “I wonder if every mother of a severely burned child hasn’t at some time felt that it would have been best if that child had been allowed to die.” She lifted the little girl’s hand, deformed and blotched with colors from ochre to indigo, and gently replaced it. “There’s so much pain, so much agony. I thank God that she’s alive – but still, every so often, I’ve wondered.”

Two months later he child was home – a little stiff, still scarred beneath her blouse, but otherwise normal.

She was one of the lucky ones: When the accident occurred, she was immediately flown by helicopter to a special burn-care unit staffed with highly trained personnel, in a large, nearby hospital. She received complete, round-the-clock treatment by experts, and today her mother is indeed thankful the child hadn’t died.

The fire that burned the little girl left at least two other victims: two parents. Only the child was touched by flames. “A burn victim affects friends and acquaintances something like a suicide,” said on Commission witness. “Everyone who could possibly have done something to avert the pain feels guilty.” The neighbor who might have awakened earlier. The relative who feels he should have talked the family into buying a smoke detector. The fireman who could have arrived just a few seconds earlier. The nurses who during treatment must inflict excruciation pain on the innocent.

And most victims are truly innocent. Of the 3,000 Pennsylvanians who will be severely burned in non industrial accidents this year, perhaps a third will be children, while another third or so will be the very old. They’ll be burned in a variety of ways from a variety of causes. Most – perhaps two-thirds – will be injured by flames (the worst of these involving burning clothing), the rest by scalding, electricity, grease, chemicals, hot pipes, and on and on.

If the victims are children, an experience observer might even tell the season: House fire? Fall or winter. Burns from a flash flame? Summer, the outdoor barbecue season, and the child has poured flammable liquid on the coals. Are the pant=legs burned? It’s spring or fall, then, leaf-raking time. A young girl’s chest burned? Winter, perhaps; wearing a loose, frilly nightgown, she bent over a Christmas candle.

Between November 1973 and June 1975 (the first 20 months in operation), the Burn Foundation of Greater Delaware Valley, which helps support burn centers at two Philadelphia-are hospitals – recorded the following breakdown of the cause of accidents affecting 343 severe burn victims admitted to the two centers:
The table shows that certain types of accidents are characteristic of certain age groups. Infants are most often injured in scald accidents; perhaps a child bumps into an adult carrying a pan of hot water or grease, or pulls it down off the stove. Bathtub accidents involving young children are common, and sometimes carry overtones of child neglect or abuse.

In the pre-school and early school years, match play is a frequent cause. Teenagers often end up in the burn center as a result of contact with high-voltage electric wires.

About half of the severe burns among working-age adults happen in occupational settings, half in a wide range of situations loosely termed "household accidents".

Among the aged, smoking accidents assume greater prominence, along with accidents involving cooking or heating stoves.

Other victims, of course, never make it to the burn center; they die by fire. Most of the fatalities don’t die by flames however. Of the four ways people succumb in a fire, flames are ranked last. The causes stack up like this:

Asphyxiation, lack of oxygen, causes the most fire deaths. Flames, of course, feed on oxygen, which makes up about 21% of ordinary air. If the percentage falls to about 16 or 17, thinking may become befuddled, coordination upset, escape attempts irrational. Physical and mental ability continue to deteriorate as oxygen...
drops, until at 10%, extreme fatigue develops, and the energy needed to move becomes simply too great. A further few percentage-points lower, and unconsciousness results. When oxygen level reaches about 6%, breathing stops.

Heat, a human being can stand temperatures above 300 degrees for only a few minutes. If the humidity rises, the time-span shortens, as deep lung tissues are destroyed – particularly when the heat is accompanied by heavy, wet smoke. Many people die in gasoline fires because the surprise of the explosion causes them to gasp, inhaling the flame. (If an unconscious person is found near a fire, one particularly bad sign is the presence of singed nasal hair.)

Smoke is a combination of suspended particulate matter and toxic gasses. The particulate is mostly incompletely burned carbon particles, similar to soot. This is what you see, and what blocks out exit signs. It can kill, if you breath enough of it, but usually it’s not the smoke that sucks life away, but the accompanying material, either carried on the smoke particles or intermixed with gasses.

Riding on the particulate matter may be such noxious organic irritants as formaldehyde and various acids. Along with the smoke, and sometimes combined with the chemicals in it, are often such other substances as carbon monoxide, nitrous oxide, hydrogen cyanide, sulfur dioxide, ammonia and an enormous number of additional compounds varying not only with materials burned, but the way they were burned. A flaming paintbrush, for example, can produce 150 different chemicals in its smoke. Many of them, in sufficient quantity, are lethal.

And flames. Blind a person with smoke; gas, choke, and strangle him gasses; singe his lungs and destroy his balance with heat – and then apply the flame...

A burn is the most extensive, the most traumatic injury a person can receive and survive. In a severely burned patient, all physiological systems are disturbed; from the cardiac and the kidney systems to his psychological balance, nothing remains normal.

Because of blow to the system is so enormous, before the 1940’s few patients with burns over more than a third of their bodies lived for more than a few days. World War II brought plasma and whole blood for the treatment of shock, and the survival rate rose. By 1964, most victims with 20 percent third-degree burns were surviving, and a few pulled through with 40 percent burns.

Another decade, and a few patients with third-degree burns over 70 percent of their bodies could be saved – and among those with 40 percent burns, more than half lived. Today, the situation is even brighter; a few children have survived burns covering nine-tenths of their bodies.

This dramatic increase in survival rate is due to a number of medical advances. Among them:

- Before World War II, most severe burn victims died in the first two or three days from shock or from massive infection. With the availability of plasma and the discovery of sulpha and antibiotics, the main cause of death in burn accidents shifted to fluid loss. Here, capillaries dilate, become permeable and actually leak fluid, both externally and internally.

- Gradually, through the 1950’s, physicians learned to balance fluid loss with the addition of other liquids. The critical time for burn deaths shifted from about four days to about a week. Meantime, they were learning the importance of keeping the kidneys and various other systems functioning.
With fluid loss understood and largely controllable, burn patients who continued to live became susceptible to low-grade organisms, always present in the human intestine. They often proved fatal some ten days to three weeks after hospitalization.

- But by the mid 60’s, doctors had learned to combat these organisms with such topical medications as sulfamylon and aqueous silver nitrate applied directly to the wounds.

- Poor nutrition was the next thing overcome – this when physicians began fully to realize a burn patient’s huge increase in the need for calories and protein. Additional venous feeding controlled that problem.

- Finally, in the mid-1970’s, concentration has shifted to experimentation with immediate skin grafting, which allows for quicker coverage and wound healing. The use of allografts, skin donated by another person, was made possible by new immunosuppression techniques developed in conjunction with organ transplants. In this procedure, sheets of skin from a donor are used as biological dressings. Treatment continues for six or seven weeks, while physicians repeatedly “harvest” enough of the patient’s new skin to cover the wounds.

Burn treatment has come a long way in the last quarter century. At least, when you look at the figures, it seems to have. But not when you talk to the specialists. They actually know very little, they say, about how massive burns affect patients’ immunity, for example, or why fluid-balance shift occurs, or how best to ward off infection.

The reason for the ignorance, they say, is simple: not enough research going on, not enough funding. Burn treatment is not a popular medical problem. In 1972, for example, the National Institute of Health spent some $1.25 million on research into burns and burn treatment. In contrast, it spent $5.5 million on hepatitis, a disease which causes few fatalities. That’s about $101.00 for each hepatitis sufferer – and for each seriously burned victim: $4.17.*

Some witnesses felt that the State, through its medical schools and research institutions, should liberally fund research activities in burns treatment. The Commission concludes, however, that such funding more properly belongs at the national level as part of a coordinated research policy. To that end, the Commission urges State leaders to work with the Pennsylvania Congressional Delegation to introduce and support legislation that would provide for greatly expanded research efforts.

The lack of research funds is a major problem, but it isn’t the largest. The thing that’s hurting most is a lack of facilities and personnel. Pennsylvania has hospitals within its borders, but according to burn specialist appearing before the Commission a severely burned patient can be well treated at only four burn centers – those hospitals providing advanced burn treatment in isolation units:

Crozer-Chester Medical Center, Chester

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*Recent efforts of the federal level promise better support, though actual funding may still be a year or two away. The Federal Fire Prevention and Control Act of 1974 (P.L. 93-498) included a section on the “Victims of Burns”, which provides for expanded research and additional burn treatment centers, but no funds were requested in the 1975 HEW budget for this section. Again in 1975 legislation was introduced in the House (HR 8438) seeking $90 million in three years for the support of new and existing burn centers and research programs.
When a patient arrives at a burn center – often by helicopter (and generally referred from a local hospital) – he is delivered through the equivalent of an air lock to isolate him as much as possible from bacteria. All hospital personnel and visitors wear disposable gowns, hats, shoes and face masks. Once they leave the unit – if only for a few moments – they discard their garments; to re-enter, they wash until surgically clean, then put on fresh apparel.

Special burn treatment equipment for the new patient is on hand: kidney dialysis machines, for example (renal failure often is a serious problem at burn centers) and huge, blood-temperature hydrotherapy tanks (used mainly for removing burned skin and for forcing movement in reluctant joints – excruciating and interminable procedures, but essential.) One major new advance in treatment is the use of relatively inexpensive pressure garments, special tight fitting clothing that reduces the size of scars and helps fight atrophy. The garment must be worn 24 hours a day for an average of a year.

Care during the first few days is known as “intensive, intensive”. Nurses continually monitor the patient, watching for signs of renewed shock. Intravenous lines pour fluid in; a catheter in the bladder drains urine out. And every so often the patient is shunted to the hydrotherapy area for more debridgement, more stripping away of burned skin.

After a month or so, the first of a series of grafting operations begins. Meanwhile, intensive physical therapy continues, needed particularly now because grafted skin tends to shrink, to distort a limb and to limit joint movements. A head may pull sideways, a foot in, a mouth open, and the patient may have to return again for treatment.

First-degree burns usually heal in a week or less, second degree in double that, with only slight scarring. But a third-degree burn of more than two inches in diameter usually heals only after months of treatment, almost always leaving scars, even with the most meticulous grafting. The treatment, the interminable surgery, can go on for months, years.

Nobody but the very rich can afford to pay for it themselves. The average cost for treating a patient with burns over 50% of his body is somewhere around $60,000. At the time of the hearings, one boy at Crozer-Chester Burn Center had accumulated bills approaching $200,00. Occasionally a community pitches in to raise funds. (When 16-year old Todd Wheeler of State College was burned in 1975 while helping to put out a grass fire, the community raised some $70,000 for his treatment.) But most don’t and usually, neither the hospital nor the surgeon is paid much more than a stipend.

And that’s a major reason for the scarcity of personnel and specialized facility. Often the judgment of whether or not a patient is referred to a burn center depends on the extent of his insurance protection. If it looks like a victim is going to need more treatment that his insurance can cover, he’s shipped out to a burn center; if he is heavily insured, he’s often kept no matter how extensive his injuries, how poorly equipped the hospital.

*No authoritative guide exists to determine burn care, but according to various knowledgeable sources, of the 6,000 hospitals with acute care facilities in the U.S., only about 25 offer complete specialized burn care in isolation units. Another 75 to 100 hospitals report having burn units, but many of these are not truly isolated, and don’t have a broad range of full-time personnel focusing solely on burn treatment.
One burn specialist suggested, and the Commission agrees, that all patients with burns covering more than five percent of their bodies be classified as having a “reportable disease”, as has been done in Massachusetts. If hospitals are required to report serious burns to the State, there will be fewer “hidden” severe burn cases at local hospitals, and, hopefully, better care.

Another factor: In many of those smaller hospitals that attempt to treat severe burns, competent personnel are largely unavailable, the Commission learned. “Physicians will specialize in almost anything other than burn treatment,” one expert said. “First of all, it’s extraordinarily difficult work emotionally, and the mortality rate is most depressing. Second, there may be insufficient cases to maintain skills. And then there’s the economics: A surgeon can’t afford it. Look at the number of man-hours a burn patient can require, and figure how many hysterectomies you could do in that time.” Further, a surgeon can’t adequately care for a burn victim without a burn care team (in a staff-patient ratio of about five to one) consisting of nurses, physical therapist, dieticians, occupational therapists, and later, social workers – all difficult to keep. The psychological pressure on nurses is so great that burn facility administrators estimate a 100% turnover every year or so.”

So the burn victim is ultimately faced with a double-edged problem: First, hospitals don’t want him because such patients are economic drains. On the other hand, for the sake of fund raising, hospitals wish to appear “full facility” and able to handle any kind of health problem. So if only for public relations, they may attempt to handle cases they’re unprepared for. And fail. Statistics are difficult to compile, but the survival rate of severely burned patients fortunate enough to be sent to a burn center is estimated to be more than twice as high as those treated in the local hospital.

All severe burn patients should be treated in burn centers. But there’s not enough room.

Adequate burn treatment can never become reality unless it is heavily subsidized. How should hospital burn units and centers be funded? The Commission considered a number of possibilities: special insurance, public relations campaigns for increased donations, service club sponsorship, increased taxes, federal government subsidy, general or special State funding. Rather,

THE COMMISSION RECOMMENDS

That a one-percent (1%) surcharge be levied against all fire insurance premiums collected on property in the Commonwealth.

This would seem to be the most equitable, controllable and appropriate source. At present, the system would net approximately $3.8 million per year – an amount judged low, but not unreasonably so.

We also feel that part of the problem will be solved if lifetime limits in major medical insurance plans be raised. The cost of premiums expanding limits from $10,000 to $200,000 is surprisingly small, since so few people are affected. In addition, we suggest that State officials press Congress and HEW to move more quickly on catastrophic health insurance coverage.

One other point: Since it is expected that other Commission recommendations, if enacted, will reduce the total incidence of fire with time, so should total cost for facilities and care diminish over the years.

In the meantime, local hospitals should be upgrading their present service, the Commission feels. Because of the appalling lack of trained personnel in the area of burn treatment, and because time is crucial in the initial treatment of patients, we suggest that local hospitals, in conjunction with burn centers, launch programs for information and coordination that would include:
1. Workshops and seminars for physicians, nurses, and other hospital personnel likely to be involved in the initial treatment of severe burns, and the ongoing management of victims with moderate burns, education and orientation, with special training courses that would include:

   a. A well-developed emergency transport system for getting trained EMT personnel quickly to the scene of every traumatic accident, and for getting victims to the appropriate hospital.

   b. Regular two-way communication between each regional burn center and the hospitals in its service area, including periodic dissemination of information about the centers and burn treatment.

The Commission feels that every citizen in the Commonwealth should have at least adequate burn care available to him within a reasonable distance. For a huge percentage, this is not the case. The situation is not worthy of one of the nation’s most progressive states.
PART IV

RESEARCH
Throughout this report we say, “we don’t know” in dozens of different ways: nobody really knows very much about destructive fire. Much of our ignorance of Pennsylvania’s fire situation is due simply to the lack of statistics – a problem that should begin to be rectified when the State Fire Commissioner sets up his data bank. But other answers will be revealed only through meticulous, long-term research. Man has been using fire for a million years, has been studying it scientifically for a century or two, and yet he still barely knows what happens in a match flame; and virtually nothing of the chemical process-taking place in a flaming room.

Study the fire problem and question fly about like dandelion seed: Why do people die from smoke inhalation? Why do firefighters wear flammable turnout coats? Is there some cheap chemical that could be added to water to make it more effective? Could a childproof match be developed? Should automobile gas tanks be located farther forward? How far apart should firehouses be placed? When should you ventilate? Why isn’t a firefighters hat available with built-in flashlight and radio? Why are there no standards for flammability, fire proofing, flame proofing? And on and on.

A good deal of research is going on across the state – but nobody knows exactly what. Some projects are being financed by the federal government, others by philanthropic organizations, still others by private industry, and still more simply by individuals with curiosity.

Because nobody is keeping track of who is doing what, an exceeding amount of effort is being wasted through duplication. On the other hand, many potentially fertile ideas are lying fallow. Every other fire chief in the state probably has at least one powerful idea. But he doesn’t know how to give it to someone who can develop it.

To really come to grips with the fire problem, we need massive, continuing research to find out where we can go. But first, we must know what we’re doing. The State Fire Commissioner should be able to answer that by establishing a Fire Clearing House to monitor and coordinate various Commonwealth research projects related to fire.

Such a clearinghouse would have a number of functions. It would (1) correlate research to restrict duplication, (2) study methods of measurement and evaluation to establish standard yardsticks, (3) evolve a common terminology and symbol system so that everyone can speak the same language, (4) act a go-between to bring together ideas, sponsors and researchers, (5) develop a continuing inventory of needs – equipment, programs, basic data – and (6) for the fires time establish whether or not existing regulations make sense.

In the Commission’s opinion, the need is not so much for new technologies, but for applications of existing ones. We feel that much of the wherewithal is available, but that the technology must be tapped and adapted to our needs.

Funding, of course, is particularly important. The Commission visualized the Clearing House as a conduit, finding sources of money, publicizing them, and, with professional advise on procedures, helping Pennsylvania secure grants an other forms of aid. Money is available; the biggest problem is getting it to the right researchers.

Possible sources include producers of fibers and chemicals, fire suppression and detection manufacturing groups, charitable foundations, federal offices such as the Departments of Agriculture and
Defense, the National Science Foundation, the National Institutes of Health, the Bureau of Standards, the National Fire Prevention and Control Administration, and many more.

What kind of research is needed? In its year of study, the Commission asked scores of questions that so far have no answers. Research could fine them. Here is a listing of a small sample of areas that need exploration:

Basic Research

- Establish a firm understanding of ignition. (Chemists are convinced they can develop better flame inhibitors as soon as they understand flame chemistry.)
- Develop methods of predicting and measuring fire growth and spread, and the basic reasons behind it.
- Detail the processes that take place when combustion occurs in an enclosure.
- Nail down a firm explanation of the relationship between radiation, conduction and convention. (What would happen, asked on Commissioner, to a match flame in a zero gravity space lab? Would it extinguish itself because convection is inoperative?)

Materials

- Compile an encyclopedia of products of combustion from given substances.
- Establish standards for fireproofing and flame proofing, and develop a meaningful distinction between them.
- Ascertain combustion facts concerning floors and floor coverings – an area until now neglected. Establish similar facts on interior furnishings. (Neither area is sufficiently addressed by today’s codes.)
- Detail the relationship between materials made to be fire-retardant and products of combustion. (Some studies indicate that increased life hazarded may result.)
- Culture natural woods with lower flame-spread rates.
- Find ways easily to treat polyester, nylon, flocked velvet and other such materials for flame resistance.

Design

- Develop basic structure design to minimize fire hazards.

Biological Man

- Determine the physiologic effects of smoke on the exterior and interior of human beings, and investigate not only individual toxic substances, but also combinations of products.
- Explore more fully the effect of heat on the human organism.
- Continue and expand research into burn treatment.
Psychological Man

- Study the psychological processes of human beings under treat of fire; determine the relative influences of stress and toxic gasses.

- Explore the psychology of the arsonist and the possibilities of dissuading him.

Suppression

- Research cost-benefits of combinations of early detection and automatic sprinkler systems in homes, and develop new construction techniques to lower cost. (Such systems are found to be 95% successful; the 5% fail rate is almost always due to incorrect installation or maintenance.)

- Establish guidelines for cost-effectiveness and systems management for the fire service.

- Continue work on flame-retardant vegetation for forest and grassland protection.

Firefighting Equipment

- Develop hats, gloves, coats and pants to be well fitting, easily donned, heat- and flame-resistant, electrical-resistant, and protective.

- Reduce the size and weight of breathing apparatus while at the same time increasing the air supply.

- Devise tools to guard against over-exertion: Lighten gear and design it to allow freer body movement; generate power tools or explosives for easy access through walls and doors.

- Develop portable radios that are light, inexpensive, rugged, temperature-insensitive, and easily carried (possibly built into hat or breathing apparatus) for used by personnel both inside and outside a burning structure.

The Clearing House would conduct a continuing study of equipment inventory and needs of the Pennsylvania fire service, and publish progress reports on equipment development, availability, and performance—a “consumer’s report” of the field.

As of now, there are few criteria concerning equipment performance standards; no group exists for defining them. Because we feel that the establishment of such standards for tools and equipment – their design, construction, fabrication, and effectiveness – is vital, we recommend that under the direction of the proposed State Fire Commission, a Fire Technology Center be established.

Its main function would be to monitor and coordinate existing program of product and material testing, both to establish standards and to determine whether or not new products achieve those standards. Individual fire departments have neither the means nor the expertise to experiment with equipment, and therefore are open to manufacturer pressure and the whim or prejudice of the company-purchasing officer. The Fire Technology Center would serve to collect data to establish standardization of apparatus (with sufficient options to fulfill peculiar local tasks), a move that would have the double benefit of lowering costs and pressuring for better products.
GOVERNOR’S COMMISSION
ON
FIRE PREVENTION AND CONTROL

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