

# Protecting the Library from Fire

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A PRIMARY CONSIDERATION in planning for fire protection of a library is this unpleasant statistic: More than 70 percent of all library fires are incendiary in origin. Other fires originate in malfunction of heating plants, in problems with mechanical or electrical systems, in the operations of contractors or from lightning. There was a time, 1966-72, when political, antigovernment activism was expressed by setting fire to a library.<sup>1</sup> Then there came a succession of arson fires without any compelling motivation, apparently related to incursions by children and others bent on stealing or mindless destruction.

## 1972-80 Survey of Library Fires

A survey of thirty-two incendiary fires of the period 1972-80 produced some fascinating information.<sup>2</sup> Just half of the thirty-two incidents resulted in identification of the arsonists. There were thirty males and one female linked with the sixteen fires, some acting alone and others in teams of two, three or four. The age range was from eleven to twenty-six years, and the median age was seventeen. Suspects observed but not apprehended in three other fires were called "teenagers," "a youth gang in the neighborhood" and "two young men seen running away." Two employees were responsible for fires: one, a young woman who wanted to call attention to her belief that the stacks were a dangerous place to work; and the other, a young janitor who wanted to be seen as a hero helping others to safety in a time of emergency.

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Burglary was the apparent motive in two or three fires but "casual vandalism" was assigned to almost all the rest. A door or a window was forced, then the vandals went through the building looking for something to steal and set fires before leaving. One fire, at New Rochelle, was set by someone who broke a rear window and threw burning materials inside.

There were six fires out of thirty-two set through book drops. In Pioneer Library at Delta, British Columbia, a fire bomb made with gunpowder and gasoline was placed in the book return in broad daylight, but at a time when the library was not open to patrons. It destroyed the interior, and would have killed or severely injured anyone inside if the library had been open. It does not take much ingenuity to burn out a library using the book return. A boy dropped in a single match at Ceres, California and a \$200,000 loss resulted. Destructive fires originating in book returns have occurred of late in Washington, Oregon, California, Maryland, Tennessee, Indiana, Virginia, and Texas.

The survey showed that arson in libraries occurred not only at night, but in daylight. Eight of the thirty-two fires occurred between 10 A.M. and 7 P.M. In only three fires were the firesetters known to the library as "problem patrons." In all others they were strangers. Responding librarians had some advice on improving protection against fire and against arson:

1. Review insurance policies periodically to make sure coverage is adequate.
2. Insure for the replacement value of books, but remember that many local history items may be unique copies and irreplaceable.
3. Install outside book drops and close off any in-building book returns from the rest of the library.
4. Install intruder detection systems and sprinkler systems.
5. Keep dated, accurate records of all conversations with insurance adjusters to prepare the insurance agent for making a claim once damage has occurred.
6. When preventive measures fail and a severe fire results the consequences can be not being able to use library facilities for up to two years while they undergo repair or reconstruction.

It now seems very possible that library fires ascribed to electrical faults or "careless smoking" in the past were in fact incendiary, since it is hardly likely that the incidence of arson jumped from 0.9 percent in 1963 to 70 percent in 1972.<sup>3</sup> The nomination of smoking as the number

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one cause of fires in libraries, as cited in a 1963 survey, stemmed from the assumption of the survey's authors that causes of fires in libraries would "follow the pattern for all building fires." Since that survey others have blindly followed suit, placing smoking at the top of causes for library fires. There is little evidence of this. The chronology of library fires from 1950 to 1962 which accompanied the survey listed fifty-eight fires out of eighty-eight without any cause or origin indicated (66 percent) and it can logically be inferred that a considerable number of these may have been incendiary, not just the six fires that were so identified.

### **Prevention of Vandalism and Arson**

#### *Reinforced Doors and Windows and Alarm Systems*

The basic physical improvements to a library of whatever size to prevent vandalism and arson start with the strengthening of doors and windows against intrusion, especially at the rear and on any side concealed from the street. Another improvement is the installation of an intrusion detection alarm system which sends a signal to a central watch station when someone tampers with a door or window, or trips any device set to detect an intruder. It is important to have a reliable system and to have it installed by a reputable contractor who will maintain it. Most important is the central-station reporting feature, to get information to the police at the earliest possible moment. If only a local alarm is wanted, this is available, and be aware that it may alert the intruder but seldom results in any information going to the police. Local alarms seldom get much attention and thus may be worthless.

Another alarm system to protect against fire from any source is the automatic detection system covering all parts of the building. An automatic detection system may sense fire through heat or smoke detection or both. Heat detectors operate at a fixed temperature or on a rate-of-rise-of-temperature basis, and frequently both. Smoke detectors use one of several methods to sense smoke or products of combustion and sound an alarm quite early in the development of a fire, assuming a fire is from a source other than incendiary. A local alarm from this system might be useful in the middle of a work day to alert staff people of a fire. In the middle of the night only a central station system would get the signal out to the fire department. Detection systems are valuable when properly installed and well maintained, although their value depends in part on the response they generate from the central station.

*Sprinkler Systems*

Automatic suppression systems, mainly sprinklers, are being used in libraries in increasing numbers. Most very large new libraries are so equipped. Traditionally librarians have resisted having sprinkler systems in libraries clinging to the mistaken notion that water is worse for the books than fire, and that having the sprinkler pipes in the stacks creates a strong possibility of water damage occurring when there is no fire.

They accept automatic detection systems, and are willing to accept whatever delay this may mean in getting water on the fire. Under ideal conditions this may be a delay of a very few minutes. But if there is any malfunction in the communications link to the fire department, or if the fire department is already responding to another emergency, the fire develops rapidly and the firemen may have to resort to the heavy hose streams that cause so much havoc in unburned books.

An example of delayed response was the Klein Law Library fire in Philadelphia in 1972 when 11,000 gallons of water per minute poured into the library and inundated the collections, including rare books on English and American law and papers of Benjamin Franklin.<sup>4</sup> With sprinkler protection this would not have happened.

The basic "wet-pipe" system, so-called because it is always charged with water, is a network of pipe fitted with nozzles or sprinkler heads so arranged at intervals as to provide a wetting down action for the entire area. But the heads open only one at a time, and a very large number of fires under sprinkler protection are put out with one, two or three heads operating. A review of sprinkler operation in fires revealed that 43 percent of all fires were extinguished with a single sprinkler head opening, and 70 percent with no more than three.<sup>5</sup> About twenty gallons of water per minute issue from a sprinkler head in an umbrella-shaped pattern. A second head will open only if the fire is spreading.

A new development in the 1960s and 1970s was the on-off head. It featured the capability of closing itself off when the fire was put down, reducing the possibility of unnecessary damage from water. Even before this the preaction sprinkler system was in use in which a valve in the supply line controls the flow of water. It is designed to open to admit water into the empty pipes when a detector senses the possibility of fire; the system then acts essentially like a standard wet-pipe system. Another refinement of the preaction system was a cycling feature to close the supply valve when the fire was put down. This has had acceptance by some librarians because the pipes over the books are normally empty of water, and are charged only when the detectors sense fire or smoke.

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Gaseous fire extinguishing agents are favored in libraries for the protection of rare books and special collection, since they do not wet the books or leave any residues. The first used was CO<sub>2</sub> (carbon dioxide) which was capable of putting out a fire by creating an atmosphere that would not support combustion. Such an atmosphere also would not support life and this has limited its use to vaults and places where the people can be expected to leave before the agent is discharged.

Halon 1301 has provided the virtues of CO<sub>2</sub> without the concern for safety of life. It also requires less space for storage containers. A 5 percent concentration in the air creates an atmosphere that will not support combustion, yet people can survive in it. They do not have to run for fear of asphyxiation. This is an important point although it must be apparent that in any dire emergency, it would be normal for people to leave the room anyway—at least temporarily. Halon 1301 is being used to protect entire buildings in only a few places, such as Mount Vernon, Winterthur Museum and Pusey Library at Harvard.

Halon 1301 has found a home in a great many rare book rooms, since it acts promptly—putting out fire within a few seconds—and there is no residue. Yet there are possibilities of failure of this product if it is not confined for the duration of time needed to keep a fire under control: doors and windows must be closed and ventilating systems shut down for the brief period needed to insure that the emergency is past. The cost of the agent, at several dollars per pound, places it out of reach for protection of large open areas in big libraries.

### **Rationale for Automatic Sprinkler Systems in Bookstacks**

It is safe to say that nearly all librarians agree on protecting rare book collections with Halon 1301. There is less agreement on the protection with a suppression system of the rest of the library. Yet many new libraries in the recent past have been built fully equipped with automatic sprinklers everywhere except in the rare book room. Examples are the new oversize libraries in Saudi Arabia, the James Madison Memorial Building of the Library of Congress, Metropolitan Toronto Library, University of Minnesota Law Library, and Stanford University Law Library. Existing university libraries have been retrofitted with automatic sprinkler systems at Maryland, Rutgers, Berkeley, and Stanford, for example.

It is no secret in the library field that some librarians remain unconvinced of the need for sprinkler protection over the books. Doubtless there are some who will resist them anywhere in the building, since

the pipes (usually) contain water and water is well known to librarians for its proclivity for finding its way into the wrong places. But consider the experience of libraries with water-damage incidents. In a 1963 survey, 153 libraries reported a total of 257 loss incidents due to water damage.<sup>6</sup> A few of these were from fire department operations. The rest were from leaking water and steam pipes, condensate, seepage, construction operations, storms, leaking roofs, floods, and faulty drains and sewers. In short, there are a great many sources for unwanted water in libraries. The most prolific source, other than floods, may be fire department operations. This is at the center of the argument as to whether an automatic sprinkler system should be placed in the library.

Given an ideal set of circumstances, fire in the library will be detected early by a reliable automatic detection system of the heat, smoke or products-of-combustion type, an alarm will go to the central station, the fire department will roll up to the scene, and the fire will be quickly located and held in check. In several instances involving libraries, there have been failures of detection systems: the layout was faulty, the installation was bad, or the maintenance was not up to date.<sup>7</sup> One scenario in which the early warning might not be soon enough would be that of the fire bomb, even given a prompt response by the fire department. As any fire service officer knows, the first five minutes are the critical time in the fire; and the officer would be happy to find that a sprinkler head had opened to keep a fire bomb in check before firefighters could arrive.

The best solution for a library is probably a belt-and-suspenders arrangement: automatic detection backed up by automatic sprinklers. With this combination it would be possible for the fire department to get early notice of smoke collecting, and fire service officers could walk into the building well in advance of the heat buildup required to open a sprinkler head. Conversely, if a disturbed individual throws a fire bomb into the library's newspaper room and a hot fire ensues immediately, one or two sprinkler heads will open and contain the fire before the firemen can get there. This is particularly gratifying if the fire department is already preoccupied with another fire or with any of the other emergencies a fire department is expected to respond to. Remember also that the automatic sprinkler system, if properly designed, has its own direct waterflow signal to the central station. This summons the fire department which can shut off the flow of water if the fire is under control and take salvage measures to remove smoke and protect the collections. The water flow signal feature is sometimes overlooked in discussing the merits of sprinkler systems.

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Only the circumstances of a fire determine whether a detection system alone or a sprinkler system alone would have been enough to manage the fire emergency. Together they make a formidable defense against even a modest loss. Large public and university libraries in many places have this dual protection.

### **Library Arson is Increasing**

The library fire experience of the years 1978-83 again confirmed the rising incidence of arson. Although information on library fires is not easy to collect, we know about thirty-four fires in this period, only six of which (18 percent) were something other than incendiary. A contractor operation at the National Film Archives in Suitland, Maryland resulted in a disaster in 1978; a lightning strike burned out the library in Scottsville, Virginia in 1980; Perth, Ontario lost their library in 1980 when a fire originated in the caretaker's living quarters; and there were also three electrical fires.

In the same period there were twenty-eight library arson fires (82 percent). Representative disasters were the burning of the San Diego Aerospace Museum and Library in 1978, the Hollywood Regional Library fire of 1982, and the fire that destroyed the College of the Atlantic Library at Bar Harbor, Maine in 1983. A corresponding figure on arson/vandalism for all buildings was mentioned recently in the announcement of a nationwide arson prevention program.<sup>8</sup> The insurance industry names vandalism as the number one motivation for arson, with 53.2 percent of all incendiary fires in buildings, well ahead of the number two motive, insurance fraud, which was credited with 13.6 percent.

Three relatively new developments in the fire risk of libraries should be mentioned. One is the wet book salvage capability now available in various regional centers, and the second is improved vacuum-drying techniques. Both these developments have somewhat reduced the fear librarians have felt about putting water on a fire to save the books, and wetting in the process other books not actually burning.<sup>9</sup> The third is the adoption in large libraries of compact storage systems in which the fire loading of any level so equipped is vastly increased. Fire protection engineers agree that compact storage demands automatic sprinkler protection for adequate safety.<sup>10</sup> This is particularly true for basement installations.

## Conclusions

Libraries are being burned out by vandals. Fires from any other cause are rare. The threat of arson can be modified considerably by simple physical improvements that can be made even on a "depression" budget. It is reassuring to have automatic protection systems and systems that report the presence of intruders, water, fire, or smoke directly to a central watch station. Automatic sprinklers have advantages over other systems in sensing fire—they put water on the fire and alert the fire department at the same time. Some libraries have more than one system and many have Halon 1301 protection over their special collections. A final note: a book drop that is not engineered to defeat arson is an invitation to disaster.

## References

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