
DISASTER CONTROL IN LIBRARIES

A Lesson From the Los Angeles Central Library Fire

On April 29, 1986, a deliberately set fire raged for nearly eight hours through America's third-largest public library. It was the worst library fire in the country's history; nearly 400,000 volumes of the 2.1 million in the library were completely destroyed in the flames. Water-

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soaked or dampened books totaled approximately 700,000 volumes, and virtually all remaining books suffered smoke damage. Damage to the uninsured building and contents totaled more than \$22 million; \$2 million for the building and \$20 million for the books, artwork, and other materials. With the exception of the basement, the building lacked a sprinkler system.

The majority of the library's books were recovered and saved from irreparable damage, but certain collections were either badly damaged or totally

destroyed. Large portions of science and technology, U.S. Government and California State Government documents, and natural history were destroyed by the fire. It completely consumed the largest and oldest collection of patents and inventions in the West.

Flames and water severely damaged the periodical collection, particularly the art, business, literature, history, and social science sections. The fiction and nonfiction literature sections were also damaged. The lost research value to general patrons and researchers

BY RANDALL BUTLER

alike is immeasurable.

Fortunately, most of the rare books and photographs were spared. The Rare Book Vault suffered minimal damage along one wall from water seeping through the porous concrete ceiling. Portions of Special Collections elsewhere in the basement, however, were seriously soaked.

Thanks to quick action on the part of the Los Angeles Fire Department, heavy plastic sheeting was placed over the library's card catalog and stacks not in the immediate path of the fire. The card catalog was thus saved, and even more important, the library's shelf lists were also rescued. However, tens of thousands of books were so wet that they could be squeezed like sponges.

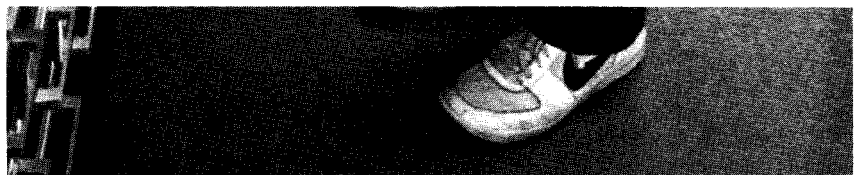
Water is usually the most destructive element in library disasters. Imme-

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diately and effectively action must be taken to recover water-dampened or soaked materials. When damp, books can swell to a third or more of their original size, mold and mildew grow, coated/glossy paper commonly used in art periodicals and books and general periodicals commonly fuse together, and bindings break down. Photographs and many other media forms are similarly affected.

Removing water and ventilating the building with large fans are crucial and must be done immediately. Mildew and mold spores are activated by stagnant, moist air within 48 to 72 hours, depending on climatic conditions. These spores grow rapidly when the temperature is above 70 degrees Fahrenheit and the relative humidity is more than 70 percent.

All of these problems common to water damage, including a rising humidity level in the poorly ventilated stacks, faced Central Library personnel when the fire department allowed them to enter the damp and soot-filled building nearly 24 hours after the fire was



be sealed, loaded 24-30 on wooden pallets, shrink-wrapped, numbered, and taken immediately to a cold-storage facility.

Slightly damp books can be successfully air-dried by standing them up with the pages fanned open at a 60-degree angle. This procedure should be attempted only in an air-conditioned, well-ventilated building. Heat must not be applied to the books because it can activate mold and mildew spores.

Wet black-and-white or color photographs should be taken immediately to a qualified photo lab for proper cleaning and drying. Under certain circumstances, they can also be frozen for stabilization.¹

The Central Library recovery effort was not without its flaws. Due to inexperience and inadequate supervision, many boxes were not properly packed or marked and pallets were improperly numbered. Perhaps the most serious mistake was the decision not to individually wrap each book. This made sorting the books based on their value and condition prior to vacuum freeze-drying virtually impossible. With the books now thoroughly frozen together, they must be dried together at an average cost of \$3.50 per volume, whether they warrant the expense or not.

The vacuum freeze-drying process involves vaporizing the ice crystals at low chamber pressures combined with pumping in hot, dry nitrogen gas to draw the moisture from the books. The vapor can then be pumped out of the chamber.

Another variation of this process uses cryogenic panels cooled by liquid nitrogen within the chamber to draw the water molecules to the panels. Upon contact with the panels the molecules are instantly condensed into ice. Increases in the chamber temperature melt the ice, and water flows to the floor for removal. Each method requires a cycle of 8 to 10 hours.

On April 30 the McDonnell-Douglas Astronautics Company offered to dry a representative sample of the books in the vacuum chamber of its Huntington

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extinguished. Realizing the task was more than they could handle alone before mold, mildew, and other problems became an even more serious threat, the library administration and the City of Los Angeles issued an urgent call for volunteers. Sufficient time was the key to any hope for a successful recovery effort.

Volunteers Sought to Assist in Recovery Effort

Over the next three days, more than 1,500 volunteers from all walks of life labored to evacuate the wet books. Working in six-hour shifts around the clock for three days, they packed more than 600,000 books in about 44,000 corrugated boxes. Over the next week, library personnel packed an additional 100,000 volumes. Approximately 400,000 dry but smoke-damaged books remain in the building. These volumes are presently being cleaned and deo-

dorized with chemically treated sponges by the library staff.

Many postsalvage problems can be avoided by the proper packing of books. Very damp and wet books should be packed spine down in a single row, inside either standard one-cubic-foot-size corrugated boxes or plastic milk crates. Books should be packed snugly but not too tightly because they will continue to expand even in the early stages of freezing. The books should be wrapped in freezer wrap, waxed paper, or clean (unprinted) paper, in order to prevent them from sticking together.

The boxes/crates should then be coded "W" for wet or "D" for dry and some form of their classification numbers marked on at least three sides. Even if only one book is damp or wet in a row being packed, the whole group should be placed in a box marked "W." If corrugated boxes are used, as in the case of the Central Library, they should

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Beach plant. The company donated its chamber and all associated costs of drying the books. Beginning with the first method of drying the books by vaporizing the ice crystals only, the company soon had to add cryogenic panels because the chamber's pumps alone could not handle the large volume of water.

Under normal operating conditions books are placed on open shelving and require 7 to 17 hours to dry to a moisture content of zero. But the frozen condition of the Central Library's boxed books required 16 working days or 37 cycles of 8 to 10 hours each (later cycles were progressively shorter as the books dried). Altogether, more than three tons of water was pumped out of the space chamber.

The condition of the dried books in general is very good, according to Robert Baird, senior manager of mar-

volumes. According to Betty Gay, Central Library director, the library is currently seeking a temporary public building until the original building can be renovated and new construction is completed in 1991. In the meantime, the city is paying approximately \$32,000 a month in cold-storage fees.

Once space is available, the library will follow the recommendations of Document Reprocessors, the San Francisco firm contracted by the city to advise and oversee the recovery effort; Peter Waters, head of the conservation department of the Library of Congress; and other conservators, to vacuum freeze-dry the frozen books.

Disaster Control

The recovery methods described above form one of three elements of disaster control. In their book, *Preservation Planning Program: An Assisted Self-Study Manual for Libraries*,² Pamela W. Darling and Duane E. Webster define disaster control as

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keting, engineering, and operations at McDonnell-Douglas. Some books were damaged due to improper packing, but the majority will require only rehumidification (a book's normal moisture content ranges from 5-7 percent by weight) at room temperature before being returned to service. No mold or mildew has been detected in the books. Nevertheless, all dried books must be placed on open shelving and monitored for mold and mildew growth for at least a six-month period before being returned to service.

Only traces of mildew were discovered after May 2 in the unevacuated stacks, with the exception of the art periodical collection. Lower temperatures and relative humidity levels in the morning hours, ventilation, and the removal of water as quickly as possible appear to have been the saving influences.

The Central Library's options are presently very limited. It does not have the shelf space necessary for monitoring and rehabilitating the frozen

encompassing three distinct activities: prevention, preparedness, and response. The first two should be ongoing programs. All three factors should be included in a written disaster plan. No matter how large—or small—each library should be prepared for any contingency.

The disaster plan should be a committee or team effort. The number of members on the committee will depend on the size of the facility and its parent organization. But at the very least, it should have representatives from the library and parent institution administrations (including the finance office), campus maintenance, fire, and safety departments.

Representatives from the police and fire departments of the community should also be invited to participate in the planning stage and should receive copies of the final plan. The plan should outline the necessary actions, in their proper order. It should include the names and telephone numbers of key individuals and suppliers as well as

available resources.

Another very important part of a disaster plan is the choice of a disaster action team or disaster recovery team, along with designated substitutes. Usually the same group that drafts the plan to manage the salvage effort would fill these roles. Each member of the team has clearly designed functions described in the plan. The plan must be distributed to each team member.

The structure and purpose of a disaster plan are more thoroughly described in *Disaster Plan Workbook*,³ *Disaster Prevention and Disaster Preparedness*,⁴ *Salvage of Water Damaged Books, Documents, Micrographic and Magnetic Media*,⁵ and the Darling and Webster book listed previously. Disaster plan committee and recovery team members should have access to these materials, along with Peter Water's booklet on salvage procedures (See Footnote 1).

Prevention

Prevention, perhaps the most important of the three elements in a disaster plan, involves measures to, as far as possible, eliminate disasters. The most common catastrophes to befall libraries are fires, broken water pipes, and floods. Disaster prevention should include periodic inspections of the building's plumbing and electrical circuits, preventive maintenance and installation of smoke detectors, fire alarms, and water detectors. One of the best preventive measures is a sprinkler system (preferably with individual heat-activated heads). However, this may not always be feasible.

Fire extinguishers should be installed and properly maintained. Halon 1211 extinguishers are the best defense in paper fires. They should be conveniently located in the stack and office areas. Standard B (liquid-chemical) C (electrical) extinguishers should be stationed near janitor closets, elevators, equipment rooms, major appliances, copy machines, and electrical panels. While Halon extinguishers can also be used effectively against chemical or electrical fires, they are more expensive to purchase and refill than standard B C extinguishers. If possible, water-filled extinguishers should be avoided because of their potential damage to paper and possible misuse in chemical or electrical fires. Staff

training sessions on the use of fire extinguishers should be conducted periodically.

Most of these preventive measures are routine and the product of common sense, but unfortunately they are often neglected or ignored. For example, most of the damage in the Central Library fire could have been avoided if the library had had a sprinkler system.

Disaster Plan

The lack of a disaster plan hindered the Central Library's response to the fire. While most resources were managed well, this was not always true of people or their actions. Lack of preparation was a consistent problem during the recovery effort. Disaster preparation and response are closely associated in a cause-effect relationship. The ability to respond quickly and effectively is largely determined by the degree of preparation.

Preparedness includes some of the same inspection and training elements as prevention. In addition, it requires

making a detailed outline of the resources and supplies that will be needed in an emergency. Some of these supplies can and should be stockpiled and stored in a building other than the library. Among the most important are garbage bags, rolls of heavy plastic to cover shelves and equipment, and freezer wrap, waxed paper, or clean newsprint-quality paper in which to wrap wet books. Cold storage space in a campus or commercial facility should also be provided for in a disaster plan. It is especially important to make prior arrangements with a cold-storage facility, since some by choice or state law do not allow anything but food in their freezer units.

A great deal has been learned from the Los Angeles Central Library fire, but perhaps most important, it serves as a poignant reminder that the subject of disaster control should be a priority of librarians. It may be too much to expect that any library could cope with or be fully prepared for the scale of destruction that this fire presented.

Nevertheless, it is now more timely than ever for librarians and related professionals to focus their attention on the potential disaster that exists within their own stacks and develop a plan for appropriate response. □

A free copy of the full-length report and analysis of the Central Library experience may be obtained from Randall Butler, Department of Archives and Special Collections, Heritage Room, Loma Linda University, Loma Linda, CA 92350.

FOOTNOTES

¹ For this procedure and an excellent review of all recovery methods, see Peter Waters' booklet, *Procedures for Salvage of Water-Damaged Library Materials* (Washington, D.C.: U.S. Government Printing Office, 1979).

² (Washington, D.C.: Association of Research Libraries, 1982).

³ Prepared by the Preservation Committee of New York University (New York, 1984).

⁴ By Hilda Bohem (Berkeley: University of California, 1978).

⁵ By Eric Lundquist (San Francisco: Document Reprocessors, 1986).

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