

rently blending their traditional commitment to space exploration with biotechnology research. Activities of "Spaceweek '89," commemorating the twentieth anniversary of man's first walk on the moon, included a medical symposium focusing on past medical spin-offs from NASA research and the future commercialization of space biomedical technology.

Current research at JSC includes the use of bioreactors in outer space to accomplish tasks that would be much more difficult or costly on earth. In this environment of microgravity, clot-dissolving enzymes and anticancer drugs can be processed more readily. Fragile human tissues can be grown without the sedimentation of cells that occurs in the earth's gravity.

Within the TMC campus, construction progresses for Texas A&M University's Institute for Biosciences and Technology. This \$21.5 million, eleven-story research tower is scheduled for completion in the spring of 1991 [4]. This is to be followed by an additional research tower equal in size and facilities to the first. Current Texas A&M biotechnology research is diverse, but much of it is related to human health. Because cattle are susceptible to a number of diseases that resemble those found in humans, researchers are working hard to help map the bovine genome. Additional research uses genetic material from the blowfly to clone a family of proto-oncogenes. These genes have many similarities to those suspected of causing neoplasms in humans and other mammals.

## CONCLUSIONS

It is difficult to predict the actual impact biotechnology will have on our future health, but considering that approximately 2,000 human disorders are caused by a defect within a single gene, the possibilities are almost limitless [5]. Recognizing biotechnology's enormous potential, NLM is taking steps to meet its unique information challenges. The HAM-TMC Library is targeting biotechnology for special development and support; at the same time, the library furthers Houston's endeavors to diversify its economy and become a recognized center for the biotechnology industry.

## REFERENCES

1. NATIONAL LIBRARY OF MEDICINE. Long range plan. Bethesda, MD: National Institutes of Health, 1987.
2. Houston courts biotech firms. *Houston Chronicle* 1989 Jan 19:1B.
3. Biotech seeds here beginning to blossom. *Houston Chronicle* 1989 Mar 19:1G.
4. A&M science tower set for Shamrock site. *Houston Chronicle* 1988 Nov 22:10A.

5. OUELLETTE RP, CHERMISINOFF PN. Applications of biotechnology. Lancaster, PA: Technomic Publishing, 1985.

*Received August 1989; accepted September 1989*

## After the flood: disaster response and recovery planning\*

*By Deidre Green, M.L.S.  
Director, Hospital Library*

*The Hospital for Sick Children  
555 University Avenue  
Toronto, Ontario M5G 1X8*

Hospital libraries occupy space in patient care centers where clinical staff are faced with biological hazards during the course of daily patient care. While an increasing emphasis has been placed on practice of universal blood and bodily fluid precautions for those with direct patient contact, little discussion has been concerned with hospital support personnel who are subject to risk but remain unfamiliar with sound infection control practices. All health care center employees, including the hospital library staff, should learn infection control procedures to prevent biological contamination resulting from disasters within their work environment. Many libraries with irreplaceable collections are situated in aging institutions where plumbing, wiring, or insulation do not meet today's stringent building standards. A carefully maintained library collection can be compromised by the frailty of the building that houses it. Only with well-planned disaster control policies and procedures, subject to regular review and revision, can a library staff prevent a devastating loss when a damaging event takes place.

The library of The Hospital for Sick Children, Toronto, is a large, well-equipped facility. The collection contains 7,000 monographs, 600 journal subscriptions, and 26,000 bound journal volumes. The library occupies 7,000 square feet on the first floor of the center wing in a forty-year-old hospital building. Directly above the library are ten floors of pediatric patient rooms, operating theaters, and laboratories.

## THE FLOOD

In August 1987, staff arrived to discover that a plumbing leak had occurred sometime during the previous

\* Based on a paper presented May 22, 1989, at the Eighty-Ninth Annual Meeting of the Medical Library Association, Boston, Massachusetts.

day or night while the library was closed for a statutory holiday. A section of the acoustic tile ceiling, approximately 200 square feet in area, had been soaked through and had disintegrated, allowing a great quantity of water to splash and soak 2,000 bound journal volumes. Drenched carpeting was still wet underfoot, and shelving in the area was covered with pieces of ceiling tile, insulation material, and pools of water. Many of the journals were so sodden that they had swollen up and were "glued" together.

A primary concern was the possibility that asbestos insulation might present a health hazard to the library staff. The hospital safety officer responded immediately to a call for assistance and determined that asbestos was not present in the exposed insulating material. The plant and engineering supervisor and the infection control officer were paged and arrived immediately; they indicated that the flood was composed of sewage from a ruptured plumbing stack just above the library: the library was closed to patrons immediately. Since a biological hazard was present, all library staff were given gamma globulin injections in the Employee Health Unit. Staff were issued operating room suits, masks, boots, and rubber gloves and were told to dress in this protective gear before entering the contaminated area.

Once the plumbing repair had been completed successfully, the library staff returned to assess the damage. The immediate goals were to salvage journals that had been splashed or stained and to remove and discard those that were irreparably damaged. Before proceeding, a number of companies that freeze-dry water-logged books were contacted. When they learned the materials were contaminated with human waste, they refused to take the volumes because contamination of their facilities would jeopardize the sterility of drying chambers used for food handling.

## THE CLEANUP

A slow and awkward process then began; while a hospital photographer documented damage and recovery, the staff began to create a precise record of which journals needed to be discarded. Supplies of yellow "infectious material" vinyl bags were obtained; discarded volumes were bagged and placed on flat-bed trucks acquired from the hospital's receiving department. Only a few volumes could be placed in each bag since each wet volume was heavy and the bags tore easily. While one group bagged volumes for discard, another bagged those that could be disinfected later. It was important to accomplish this quickly since mold would soon develop on the splashed volumes. Volumes saved for decontamination were moved from the library to a room in a nearby building.

The hospital's insurance adjustor was contacted and

soon arrived to take more photographs to document the insurance claim. By early evening of the first day, all damaged volumes had been bagged and removed. The ceiling tiles were replaced, the carpet shampooed, and the shelves disinfected with chlorine bleach. Over the next several days, staff worked in shifts at the building where disinfection of the salvaged volumes took place. Again gloved and gowned, the staff thoroughly washed the covers and page edges with an ammonium chloride germicide. After being cleaned, dried in room air, and returned by cart to the library, the volumes were reshelved by weekend staff. One week after discovery of the flood, the library was back to full operation.

The librarian then compiled a report of the event for the hospital administrator and for the insurance claims adjustor. The library's journal agent was consulted to determine current replacement costs of long runs of journals. Included were costs for binding, replacement of the security system transmitter labels, spine labels, book pockets, and book cards. It was estimated that it would take no less than one year to acquire replacement journals; one employee would need to spend five hours per week during that year to follow up claims, process acquired journals, and update missing lists. Some costs were difficult to calculate in advance, such as those for interlibrary loan requests for journals formerly held in the library. Damage costs amounted to over \$150,000 Canadian.

In an attempt to restore the complete collection, an appeal was directed to local, provincial, and national health sciences libraries. Many generous donations resulted, but these barely reduced the great loss. A year after the event, a list of thirty still-missing titles was mailed to 150 pediatric hospital libraries in the United States. This brought many individual issues of pediatric titles that were crucial to the collection but again, did little to ameliorate the situation. Since many of the titles lost are now out of print, microfiche/microfilm replacement had to be considered. This, however, would be an unwelcome change in the nature of the collection.

## THE LESSON

Valuable lessons were learned from this unpleasant event. Through review of actions and reactions, a flood protocol has been prepared for use as a guideline should another flood occur. This protocol includes two major elements—supplies essential to safe disaster control and actions that ensure a calm, responsible approach.

Table 1 lists the contents of the library's new disaster kit. Stored with the supplies are disaster record sheets (Appendix 1), designed after consulting all library staff. With this form as a guide, any staff member discovering a flood or any other disaster can fol-

**Table 1**  
Disaster kit

---

Gowns
Operating room suits
Rubber gloves
Disposable masks
Safety glasses
Roll of twine
Scissors
Flashlight and extra batteries
Yellow "biological hazard" bags
Ten rolls heavy plastic sheeting

---

low through and document essential actions. This documentation is crucial to eventual compilation of insurance claims and will assist staff later in the composition of narrative reports.

Protocol regarding staff protection from biological risk is especially important in the health care setting. While adaptation may be made in individual institutions after consultation with infection control staff, the following precautions are universally applicable.

- Move any undamaged materials from the disaster area before touching anything in the contaminated area. If there is a large amount of material to move, get help. Conserve the staff's energy; they will need it later.
- Determine if the flood is sewage-contaminated and what health hazards are involved; contact the safety officer or infection control nurse immediately.
- Protect all staff entering the area damaged by leaking fluid. Don gowns or operating room suits, masks, and gloves.
- Cover book trucks or carts with plastic sheeting before loading with wet books or journals. Do not

open or examine wet materials; wet paper is very fragile.

- Instruct plumbers to cover nearby shelving with plastic sheeting before repair work begins.
- Any staff leaving the contaminated area must remove their gloves and leave them in the area. Remind staff not to touch telephones, pens, or desks in the uncontaminated area while wearing soiled gloves.
- If library materials are contaminated by sewage, accurately record their bibliographic information. Place volumes in yellow "biological hazard" bags for discard.
- Wear protective clothing, including gloves and safety glasses, when decontaminating library materials with germicidal agents. These chemicals are irritants; accidental splashes can harm eyes or skin.
- Journals or books soaked with uncontaminated water may be salvageable by freeze-drying. Place these items on plastic sheeting on a counter top or table. Do not open the volumes or separate sheets of newsletters or pamphlets. Provide good air circulation, using portable fans if available. Contact freeze-drying companies for direction as soon as possible.

Careful documentation throughout the sewage flood experience at The Hospital for Sick Children was crucial to a favorable settlement from the hospital's insurers. Despite the collection loss and the unsettling activities that followed, the experience caused an assessment of environmental safety and a greater awareness of risk in the workplace. Rapid action kept the collection loss to a minimum.

*Received July 1989; accepted November 1989*

**APPENDIX**

**Disaster record**

<p>_____</p> <p>Date</p> <p>OCCURRENCE: (summarize briefly)</p> <p>CHECKLIST [check (✓) when done]:</p>				
ACTION	✓	TIME	DATE	COMMENTS
FIRE involvement: called—1234† called EMERGENCY—7111	<input type="checkbox"/>			
called DIRECTOR (Home): 377-4182 or Assistant Librarian (Home): 774-1723	<input type="checkbox"/>			
NEED HELP MOVING BOOKS? called MOVE TEAM—7072	<input type="checkbox"/>			
CONTAMINATION SUSPECTED? called SAFETY—7583 called INFECTION CONTROL—4386	<input type="checkbox"/>			
CLEAN-UP? called HOUSEKEEPING—7081	<input type="checkbox"/>			
USED DISASTER SUPPLIES? inform DIRECTOR	<input type="checkbox"/>			
<p>COMMENTS:</p> <p>_____</p> <p>signature</p>				

† All phone numbers are fictitious and given for illustration purposes only.