

## Stalking the Causes of the Hyatt Tragedy

Debris that lies under lock and key in a Kansas City warehouse holds the clues to determining what caused the July 17 collapse in that city of two Hyatt Regency Hotel interior walkways — a disaster that left 111 persons dead and 188 others injured. The walkway debris, a massive jumble of concrete and steel, now is the focal point of a legal battle and scientific effort to recreate the mysterious prelude to the tragedy.

Shortly after the disaster, the Missouri Circuit Court of Jackson County granted custody of the walkway debris to Crown Center Redevelopment Corp., owner of the hotel. The two collapsed skywalks, along with a third one that had remained intact, were removed and transported to a nearby warehouse. Now, National Bureau of Standards (NBS) researchers are seeking permission to take some of that debris to their laboratories in Gaithersburg, Md., where — at the request of Kansas City Mayor Richard L. Berkeley — they will determine the most probable cause of the hotel tragedy.

The NBS researchers must battle bureaucracy for the debris because lawyers already have filed more than \$2.5 billion in lawsuits alleging negligence by the hotel owner and the Hyatt Hotel Corp., which manages the hotel. And, as one NBS researcher explains, there is concern that the NBS investigation "will destroy the evidence."

On the other hand, although the investigation necessarily would involve a limited

number of destructive analyses, the information generated in those analyses could be used in court, says Edward O. Pfrang of NBS. "While we're not in the business of finding fault," he explains, "in determining the scientific basis for the collapse, you at the same time can support or reject someone else's legal argument as to who is at fault." Moreover, says Pfrang in a Sept. 18 letter to Crown Center Corp. President James C. McClune, "In preparing this request [for debris samples], the need to minimize the alterations or disturbances of the walkway debris has been a primary concern... we have limited our request to items which, if removed, will still allow other interested parties to conduct their own comprehensive test programs." Says Pfrang, NBS researchers have designed a phased-effort test program in which the immediate tasks planned "specifically avoid the removal of unique elements of the walkway debris."

Certain of the phases in this multi-staged test program already are under way. Some NBS researchers are collecting documents concerning the construction of the Hyatt Regency Hotel; others are building walkway "mock-ups." In addition, NBS researchers recently were allowed to weigh selected spans of the Hyatt walkways. The real heart of the investigation, however, awaits the outcome of the NBS request to take sample debris from Kansas City.

NBS researchers have requested, for example, segments of the steel rods that were used to suspend the 30-ton walkways from the lobby ceiling, samples of the welded box beams through which those steel rods were placed and cores of the concrete decks. Reports that surfaced after the hotel disaster indicate that the design for the assembly of these components as originally approved by the city called for the fourth- (upper) and second- (lower) floor decks to be supported independently of one another by steel rods hanging from the atrium ceiling. These plans were scrapped, however, in favor of a design in which the second-floor walkway hung from the fourth-floor one.

A structural engineer hired by the Kansas City Star newspaper shortly after the Hyatt disaster hypothesized that this change in plans could have caused, or at least contributed to, the collapse of the upper and lower walkways by doubling the stress on the fourth-floor walkway box beams. NBS researchers plan to test this hypothesis by first establishing the precise weight of the concrete decks. They then will determine the exact grade and yield strength (the amount of stress needed to deform a material) of the hanger-rod steel. Next, they will determine

the resistance of the box beams to hanger load.

In addition, NBS researchers plan to check the welded seams on the box beams. "One of our interests is to determine the contribution, if any, of weld failure to the gross failure," says Bud Kasen of the NBS Fracture and Deformation Division. Kasen and colleagues will search box beams for flaws such as slag impurities (left from the coating of the welding electrode) and shallow welds — ones that do not penetrate to the same depth as the metal being joined.

Other projects planned include taking an electron microscope's view of the fractured surfaces — which first involves the grueling one-inch-per-hour process of reproducing the three-dimensional surface on specially prepared Scotch tape — and determining whether the walkways' dynamic live load (the weight of the persons in motion) prior to collapse exceeded their resistance capability.

"There are too many possibilities," Kasen says. "It's going to take some careful examination of the debris to get some idea of the sequence of events that occurred when the structure failed." Meanwhile, he and Pfrang await word from Missouri. "We hope that an early approval [of the NBS request to take walkway wreckage] will be granted by the court," Pfrang says, "so that the Bureau's investigation of the Hyatt Regency walkway collapse can be concluded expeditiously." □

*The aftermath of a disaster.*



## Synthetic hormone: Male contraceptive

A powerful variant of an inhibitor of testosterone production shows promise of becoming the first safe, practical, and reversible form of male contraception, according to a Vanderbilt University endocrinologist.

In the past, the search for a male contraceptive focused on agents that inhibit spermatogenesis, sperm motility, sperm maturation, or enzyme activity. This new research, reported by David Rabin in the Sept. 17 *NEW ENGLAND JOURNAL OF MEDICINE*, is the first successful example of reversible hormone inhibition in human males. But one serious side effect — impotency — blocks the path between current research and practical application.

In its endogenous state, the luteinizing hormone-releasing hormone (LHRH) is the master switch over the hormones essential to reproduction. A subtle modification in the amino acid sequence of LHRH produces a compound that, although structurally similar to the original peptide,