

Chelsea Group Key Player in University of Hawaii Flood Cleanup

The Problem:

On Oct. 30, 2004, the University of Hawaii at Manoa campus suffered the worst flood in its 85-year history as a rare and powerful "50-year rain" dropped nearly 10 inches of water in 24 hours on Honolulu.

Storm debris clogged Manoa Stream and forced water over stream banks and into nearby homes and the university campus. As a torrent of storm water strong enough to wash cars away rushed through the campus, tons of mud and debris were deposited in its wake, causing millions of dollars in damage to equipment, infrastructure and priceless research materials. In the aftermath, the university identified some 40 buildings that sustained damage to their structures and contents.

Chelsea Group Ltd., a company of engineers and building science experts that specializes in managing building remediation, was hired by the university under a \$750,000 contract to oversee the cleanup efforts of Texas-based BMS Catastrophe (BMS Cat). The goal was to get the damaged libraries, classrooms and laboratories functioning as quickly as possible so students, including graduating seniors, could finish the school year.



Chelsea Group's Intervention:

Chelsea Group was responsible for ensuring that flood-damaged buildings were restored to their pre-flood condition and ready for occupancy, paying special attention to the moisture and mold damage caused by the flood. Work officially began on Nov. 19, 2004, in buildings that were in the process of drying. Chelsea Group's first tasks included:



- Measuring and assessing BMS Cat's progress
- Evaluating BMS Cat procedures for effectiveness and the quality of results
- Identifying critical challenges that were slowing progress and proposing effective solutions

Immediate results: Buildings quickly began moving from "in progress" to "complete."

As the work pace accelerated, the Chelsea team was expanded to speed recovery efforts. The team encountered complex technical problems in the larger buildings. In these buildings, Chelsea Group accomplished the following tasks:

- Reviewed building design documents, addressing solutions for complex and unusual building components
- Analyzed materials and construction methods of walls to determine whether to demolish or dry damaged areas
- Evaluated mechanical systems and ductwork to determine the effects of increased humidity and extended shutdowns

- Applied national standards to the drying process
- Assisted BMS Cat in selecting efficient approaches

Immediate results: Chelsea Group's analysis of Hamilton Library's complicated design allowed the team to develop a plan to remove saturated duct insulation and devise a procedure for drying that avoided the need to demolish half the basement floor, averting potentially serious structural problems.

The Chelsea team was again expanded to bring in an experienced microbiologist to review samples taken from HVAC systems and other areas suspected of biological contamination. The sampling procedure allowed on-the-spot decision-making to determine whether mold remediation was needed. Chelsea Group performed the following specific tasks:

- Established a start-up procedure for Hamilton Library that would protect occupants and the collections, valued at approximately \$100 million
- Designed a method of filtering the air from systems during startup to protect the collection from any residual mold or dirt after remediation of HVAC units
- Used on-site microscopy to verify air delivered through the HVAC system was acceptable for normal operations

Immediate results: Innovative methods of handling the sampling and laboratory evaluation cut weeks off the schedule for reopening Hamilton Library.

In simpler and less-impacted buildings, Chelsea Group:

- Performed visual inspections and directed workers to remove materials that were at risk for mold contamination or might prove difficult to restore after being wet
- Monitored drying equipment that warmed materials and dehumidified the air to speed the process
- Conducted routine progress checks using hand-held electronic moisture meters

Immediate results: Devices that measured air and surface temperatures and humidity allowed the precise measurement of progress.

Building by building, Chelsea Group assessed the work and completed the quality assurance process. The team's measurements included:

- Making visual assessments
- Performing moisture assessments
- Collecting samples and conducting on-site and laboratory analyses for mold



Immediate results: Chelsea Group issued a verification letter to the university stating the cleanup had met applicable national standards and guidelines as well as the requirements of the BMS Cat contract.

As power was restored to Hamilton Library and the BioMed complex, Chelsea Group assisted in resolving a series of challenges related to emissions from diesel generators. Monitoring particulate matter and several constituent gases from diesel emissions, Chelsea Group mapped airflows into the building and quantified contaminant levels.

Immediate results: Chelsea Group reported to the university its assessment of contaminant measures as compared to national standards, thereby providing clear information to occupants and a scientific basis for decision-making regarding the proper installation of scrubbers and generator placement.

Final Results:

Despite heavy flood damage, the majority of campus buildings were ready for use by the time students returned from the Christmas and New Year's holidays in early January 2005. Chelsea Group's work in Hamilton Library hastened the restarting of the HVAC systems and established procedures to protect occupants and library collections during the startup. After Chelsea Group's extensive testing of the upper floors to document acceptable indoor environmental conditions, the library was reopened during a special ceremony on March 29, 2005.



Testimonials:

I recall days when the Chelsea team worked 36 hours straight to make sure it was safe for faculty, researchers, and students to return to the Biomedical Sciences Building.

Sam Callejo, Vice President, Administration.

Bringing the main library facilities back on line at Hamilton was a team effort, and Chelsea Group was a key player on that team. I worried about mold and their expertise and solutions put my mind at ease. Chelsea Group played a critical role in resolving the immediate flood damage. They also understood what we needed to do to protect our collections, our staff, and the library patrons.

Diane Perushek, Head Librarian