**RESTORATION SERVICES**
**Case Study: Structural Drying**

# Saturated roof structure restored after wind storm.

Eighteen thousand buildings were damaged when 115 mile per hour winds blasted down out of the Vulture Mountains and crashed into northern Phoenix and its western valley suburbs.

Thousands of trees were uprooted, steel radio towers bent like sticks, and power lost in 250,000 homes in what Red Cross relief workers called the worst windstorm in the history of Phoenix. However, wind was only part of the problem, as heavy rains poured as much as two inches of water down on wind damaged roofs.

Among the hardest hit institutions in the community were the schools. Perhaps the hardest hit school of all was Sahuaro Ranch Elementary School.

There, a 100-foot long section of the school's 13,000 square foot metal roof loosened at the windward end. The roof rolled up like the top of a sardine can, as section after section pulled free landing 75 feet away.

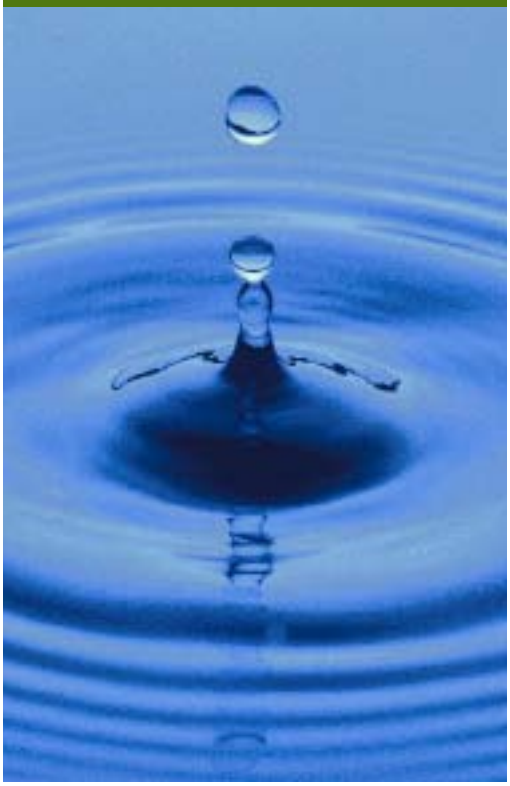
## The problem

With the roof's destruction, the entire building became extremely vulnerable to the heavy rains that followed. Water ran through the cracks between the plywood sheets, or down the plywood until it met a wall.

All of the building interior was wet, but the unusual roof design created a unique challenge. A girder at the peak supported joist running downward every 16 feet along the roof. In the spaces between the joist were six inches of insulation. Screwed to the joist, beneath the insulation, was a layer of sheet rock from which a grid system had been suspended to hang a flat ceiling. Above the joist was a layer of plywood covered with 30# building felt. The standing seam metal roof was attached to the plywood.

This complex, multi-layered structure had become soaked throughout. However, it was still intact, except where a section of the metal roof had blown off. Since the school was a relatively new building, removal and replacement of the roof structure was judged to be both costly and inconvenient.

*Above left:* Jim Sherman, safety and loss coordinator for the Peoria School District, said the entire roof was in jeopardy. "If drying didn't workout, reconstruction would have cost the school $750,000. To leave it wet would have subjected the school to serious mold and mildew problems." *Above right:* Two HC-4500 dehumidifiers were used to generate the dry air needed to complete the project.



**THE MUNTERS ADVANTAGE**

Call Munters first for disaster recovery and get the most experienced and best equipped company to meet all of your restoration needs. After wind and water damage, the Peoria School District benefitted from these Munters advantages:

- REDUCED RECOVERY COST
  Munters saved more than $700,000 by eliminating reconstruction.
- MOLD PREVENTION
  After drying, repairs could be done with confidence that mold growth would not occur.
- ADVANCED ENGINEERING
  Munters built a unique dry air delivery system to meet the project's special needs.
- FAST RESULTS
  Munters has the manpower and the equipment to address any disaster quickly.

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## The solution

Munters first had to determine how wet the roof was. To do this, eight test openings were cut in the roof along the area that had been damaged. This allowed inspection of the condition of the insulation, gypsum board, and joists.

After the test sites were opened, widespread water damage was revealed. To address the major problem, a drying system combining two Munters 4500 cfm desiccant dehumidifiers and a distribution plenum was constructed. It delivered dry air up to the roof's peak and then forced it down through the wet sections toward the eaves. Munters measured the moisture content of the air escaping at the eaves to monitor the pace of the drying and to determine that the air was circulating properly.

Even though Arizona is famous for high temperatures and dry air, the tight, multi-teared construction of the school roof created circumstances that required desiccant drying. A vapor barrier caused by the construction paper would have sealed in moisture. Heated by the hot Arizona sun, the roof was a perfect environment for mold and mildew growth. Microbiological problems that could have threatened the health and well-being of Suhuaro Ranch school children were an ultimate concern. However, once the roof was dry, the possibility of mold related problems from the water damage was eliminated.

Likewise, drying the structure saved the gypsum board and allowed the grid system for the ceiling to remain in place. With the integrity of the roof structure in tact, it was safe to simply replace the metal surface with complete confidence.

Munters bill for the dry out, including all the rental equipment and consulting to engineer the unique drying system, was $65,000.

"Munters saved our roof and for far less than the cost of replacing it," said Jim Sherman. "Successfully drying our interior walls saved the school another major expense, as well as the time to gut, re-insulate and rebuild. I was pleasantly surprised by the results and very impressed with the Munters team."

A plenum running along the peak of the roof conducted dry air from the dehumidifiers into the roof structure. The air flowed down to the eves, where Munters measured its humidity level to monitor the drying process.

## The benefits

When you call on Munters for restoration services, you have North America's largest, most experienced recovery team at your disposal. Using Munters lets you benefit in many ways:

**Economic Advantages**
Drying after water damage will reduce your recovery costs by 30% to 70%. Drying saves structural elements, greatly reducing the need to rip out and replace building materials, sheetrock, and utilities. As the Suhuaro School case study exemplifies, Munters has an unique expertise that allows us to engineer drying solutions to complex structural designs. School officials conservatively estimated that Munters saved more than $300,000.

**Shorter Disruption**
In many cases, drying can occur without vacating the property. While thorough drying of a water-damaged building may take one week or longer, many interiors are dry enough to resume use within 48-hours. The drying process can generally be managed to allow use of the facility with only minor disruption. This eliminates the major inconvenience and significant cost of a temporary relocation.

**Avoid Microbiological Problems**
A water-damaged building must be thoroughly dried to suppress the growth of mold and mildew. Fungi spores are found everywhere and require only the presence of moisture and warm temperatures to grow. This growth will rapidly lead to odors, unsightly stains and in many cases a health hazard. Micro-biological studies, conducted at sites dried by Munters, have repeatedly shown that desiccant drying controls fungi growth, eliminating problems.

**Experienced Professionals**
Munters founded the water damage recovery business in 1984. Since then, Munters has grown to have more than 30 company-owned offices in the US and Canada. We've successfully completed more than 30,000 water damage recovery projects! In doing so, Munters has encountered virtually every water damage problem imaginable. When you call on Munters, you call on the most knowledgeable people in the business today!

**Technical Services**
Munters works with experts in the field of electronic restoration. We've protected large computer centers, state-of-the-art medical equipment and complex electrical and communications installations.

**Wood floor Restoration**
Munters is the leading company in gymnasium and other hardwood floor restoration. We have encountered more than 100 structural configurations and have developed proprietary drying methodologies which maximize the opportunity for restoration. Consulting Munters after wood floor damage can produce vast savings.

**Document Restoration**
Munters saves over one million documents every year. Munters can restore documents at your site, allowing access throughout the drying process, or remove documents to a regional drying center. Books, files, drawings, x-rays, microfiche, video and audio tapes and computer media can all be restored by Munters.

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