

California Sulfate Damage Awards

The construction defect trial went against developer Brighton Homes, concrete subcontractor James Mock Inc, and concrete supplier Owl Rock Products, based on negligence to abide by the provisions of the Uniform Building Code (UBC). The significance of this verdict is that while sulfate attack of concrete from the surrounding soils has been widely known and researched in the United States, previous suits have been settled out of court. Kenneth Kasdan, the attorney who represented the homeowners, said, "This trial now brings the problem out into the open where it belongs."

According to news accounts of the case, failure of the concrete was attributed to use of the wrong mix design with too much water added at the batch plant. This was magnified by the contractors adding water at the construction site to produce a self-leveling concrete mix.

The Uniform Building Code has provisions for dealing with sulfate contained in soil that can seep into concrete and chemically react with the cement paste, forming a new substance that can expand and destroy the concrete. These provisions include maximum water-to-cementitious ratios (W/C), specific types of cement, and in the most severe cases the use of pozzolans in addition to low W/C ratios and Type V cement.



The provisions of the UBC are also in line with the provisions of the American Concrete Institute guidelines in the 318 Building Code for sulfate protection of concrete.

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An Orange County Superior Court jury awarded 24 Yorba Linda homeowners \$1.7 million in November 1999 for damage to the concrete foundations of their homes from sulfate damage.
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Current language by the American Concrete Institute committee 232 on "Fly Ash and Natural Pozzolans" further reinforces and clarifies the beneficial use of fly ash to reduce sulfate expansion and attack. "As a general rule, Class F fly ash can improve the sulfate resistance of concrete mixtures" and, "Generally ... fly ashes with less than 15% CaO content will improve the sulfate resistance of concrete. Fly ashes with more CaO should be tested for sulfate expansion using ASTM C 1012 or USBR Test 4908."

The impact of this award is unknown since, according to the Orange County Register, sulfate damage is thought to affect more than 10,000 homes in Orange County and the surrounding Southern California countryside. This estimate is based in part by observation, and on the fact that the region was once covered by seawater that led to deposits of gypsum in the surrounding soils that contribute to sulfate attack.

Homeowners have been advised to inspect concrete slabs for excessive wear or etching near the front of the garage, and foundations for chipping, flaking and white powder along the foundation side of the house. These could be signs of sulfate damage that can only be confirmed through additional testing.

This retaining wall is suffering from sulfate attack. The soil behind the wall contained soluble sulfates that seeped into the concrete blocks and produced efflorescence (visible calcium hydroxide or free lime). Using Class F fly ash in addition to portland cement can improve the sulfate resistance of concrete.