CHEMISTRY KEY TO ROTTING BASEMENTS

'Property Values Drop, So Do Town Grand Lists.' This was the subhead on a story this month by Kathleen McWilliams in The Courant. Normally such stories are about rising crime, neighborhood blight or corporate closings. But in this case it's about disintegrating home basements in northeastern Connecticut that can cost up to $200,000 each to fix. And more generally, it's about public ignorance about how the Earth works.

Let's start with fool's gold. Technically, it's the beautiful golden metallic mineral called pyrite, whose chemical formula is FeS2. One part iron and two parts sulfur. It has a cousin called pyrrhotite, with a formula just below one part iron and one part sulfur. It's named after pyrrhos, which is Greek for "flame colored."

Add water and oxygen, and this mineral falls apart. The iron rusts to a stable oxide with the mottled orange-yellow color of fire. The sulfur becomes a chalky residue resembling disintegrated plaster. One byproduct of this reaction is sulfuric acid.

Eleven years ago, I featured this reaction on the front cover of my book "Exploring Stone Walls." It showed my candidate for New England's saddest wall, located in Storrs. Its stones were becoming yellowish dust streaked with rust, leaving angular rubble and granular sand. This wasn't a typical historic fieldstone wall, but one probably built in the 1960s when the neighborhood was being suburbanized. Its stones likely came from a quarry in a geological formation known as the Brimfield Schist, which locally has a high concentration of pyrrhotite. Within half a century, this collapsing wall was rotten through and through.

When such a wall disintegrates, its stones just fall apart and tumble down. No big deal. In a building foundation, however, that same material will cause the foundation beneath the house to fall to pieces. I've seen this in several Colonial-era fieldstone foundations, where expensive repairs had to be made.

The same reaction takes place when pyrrhotite-laced rock is crushed for aggregate and mixed with concrete to be poured for a house foundation. As with the Brimfield Schist, the iron goes to rust and the sulfur goes to dust. And because concrete is made with lime, the acid released makes even more dust. Gradually, the foundation changes color, cracks and begins to be crushed under the weight of the house.

This is what's happening in at least 19 towns in northeastern Connecticut. Employees of Becker's Quarry in Willington mined their rock and crushed it to sell as concrete aggregate. This aggregate was used by the J.J. Mottes Co. to make concrete, which they poured to make house foundations during a 20-year period between 1983 and 2003. This was a time of great residential sprawl in eastern Connecticut. Now, the chemical time bomb contained within those houses whose foundations are tainted with pyrrhotite is becoming a serious problem.

A group called the Connecticut Coalition Against Crumbling Basements has become a political force. Hundreds of homeowners have filed complaints with the Connecticut Department of Consumer Protection. State Attorney General George Jepsen's office is investigating and has said no laws were violated. Insurance companies are denying claims by arguing that this problem doesn't qualify as collapse, placing the full burden on homeowners. With their basements falling apart, family homes are being devalued. The owners are demanding that their assessments be lowered. This burdens town governments because their grand list gets smaller. To make up the difference, this raises the taxes for those with intact homes. This burdens the schools, which are funded mainly by
property tax revenues. In short, this is a lose-lose-lose-lose situation, all because those involved apparently didn't know how a common mineral reacts in concrete.

In Willington, there were 615 homes built in the problematic time window, constituting 37 percent of the town's tax list of residential properties. One example is a house assessed at $229,240 that was reassessed to $79,240 due to foundation failure. In nearby Coventry, 1,500 homes were built in the time window. What will their foundations look like in a few years?

We ignore earthly matters at our own peril.