

When the road salt seeps, sometimes the manhole covers fly

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In this May 8, 2015 file photo, flames rise from a manhole in New York. Utility officials say road salt, melting snow and ice can cause problems when they seep into the underground system. Call it another form of March Madness: Not flying basketballs, but flying manhole covers. A combination of power system design, winter road salt, older electrical cable insulation and basic chemistry trigger underground explosions in older downtowns that launch 350-pound manhole covers tens of feet into the air. One Georgia Tech engineering professor calculated they could happen with the equivalent force of three sticks of dynamite. (AP Photo/Mark Lennihan, File)

Call it another form of March Madness: Not flying basketballs, but flying manhole covers.

Scientific literature traces manhole explosions back nearly a century, but a series of such incidents in Indianapolis, host of the NCAA basketball championships, has authorities looking for a quick solution.

Good luck with that.

A combination of power system design, winter road salt, older electrical cable insulation and basic chemistry have triggered underground explosions in older downtowns, launching 350-pound manhole covers high in the air. One Georgia Tech engineering professor calculated the explosions could have the force of three sticks of dynamite.

"These things have been known to be launched 10 stories; they have found a manhole cover on top of a building in a certain downtown city," said Daniel O'Neill, who advises several utilities on the problem. "They are dangerous things. There are hundreds of these things happening every year."

The nonprofit Electric Power Research Institute's lab in Lenox, Massachusetts, has spent the last 25 years setting off what officials there call "manhole events." It's not for fun. Engineers are trying to find a way to keep manhole covers from flying.

"We're disappointed to say we've not yet solved the problem," said Matt Olearczyk, manager of distribution research for EPRI. He said, his team will keep at the problem "or we're going to die trying to fix it."

The EPRI team has come up with partial solutions, such as latching manhole covers to the ground with a hook-and-piston system. When there's an explosion, those covers lift a few inches to let off some

pressure, but not so much as to let in oxygen to stoke the explosion.

Experts do know how and why these explosions happen amid thousands of miles of tightly bundled electrical cables.

It starts with the way electrical power is distributed in older downtowns underground. Cables are linked so that if one fails, others take over, O'Neill said.

Cable insulation can fray or kink due to age, wear and tear, high power loads during the summer and corrosive road salt. That exposes wiring, which can spark and smolder. Especially when the insulation is older and consists of an oily paper, that releases gases, including hydrogen, methane, acetylene, carbon monoxide and ethylene, O'Neill and Olearczyk said.

Then, salty or dirty water gives the electricity a path to the ground and the spark to set off explosions, O'Neill said.

That's why O'Neill and Olearczyk say they see more blasts events during the winter and in more northerly cities. The salt is a key ingredient. Consolidated Edison once compared manhole [explosions](#) to the streets where [road salt](#) was used and found a good correlation, O'Neill said.

The expensive process of replacing the cables with plastic insulated modern cables works well, Olearczyk said.

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