

How Exploding Manholes Work

by [Kevin Bonsor](#)

Exploding manholes are one of those weird and interesting side effects of living in a large city. Imagine walking down the street when all of a sudden a manhole covers flies 50 feet in the air!

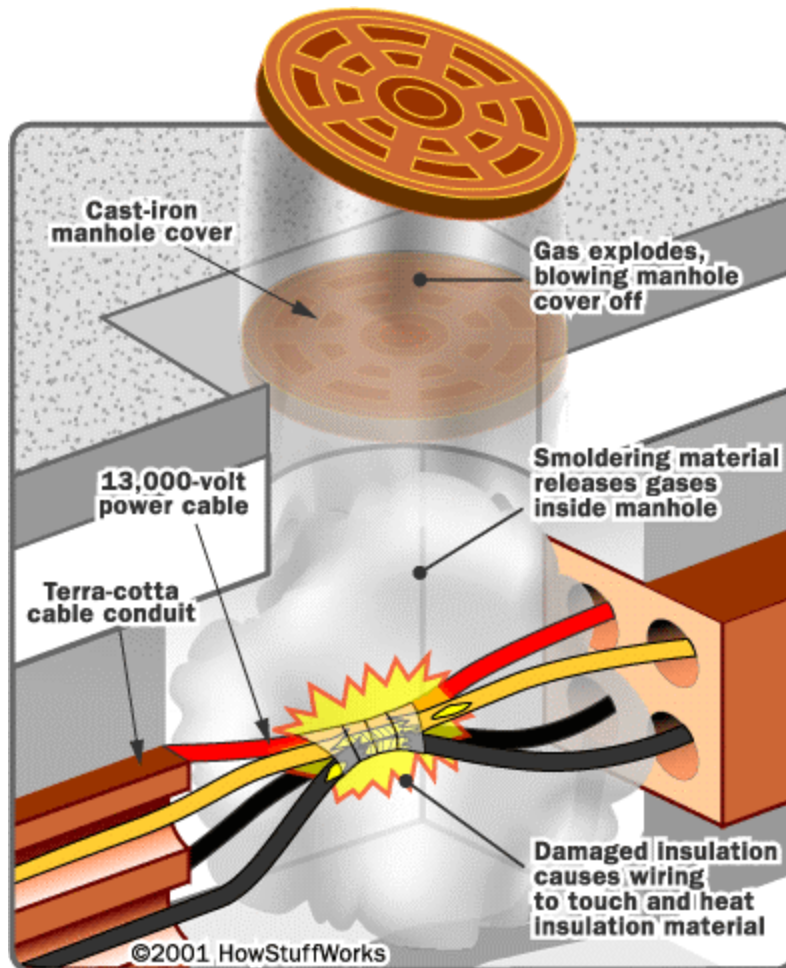


An 85-pound manhole cover can become a missile when blasted out of the ground.

In this edition of [HowStuffWorks](#), you'll learn what causes these blasts and how they compare to the combustion chamber of a [car engine](#).

Shaking the Ground

A cast-iron manhole cover can weigh **between 85 and 300 pounds** (35 to 136 kg), and explosions have propelled these massive discs anywhere from 1 foot to 50 feet (0.3 to 15 m) into the air. The real problem with these explosions (aside from the risk of injury) is the loss of [power](#) in the aftermath.



Explosions are typically caused when a spark from wiring ignites gas inside the manhole.

In most cases, these are the events that lead to an explosion:

1. Underground cables become **frayed** from aging, corrosive chemicals, overload or rats biting them. These cables carry on the order of **13,000 volts** of electricity.
2. These electrical wires **heat up** the paper, lead and rubber insulation.
3. The **insulation** smolders and catches on fire, releasing **gases**.
4. The **pressure** from the gas builds up inside the manhole.
5. The electrical wires arc like a bolt of **lightning** and **ignite** the gases, causing a powerful explosion.

Depending on the amount of gas-pressure built up inside the manhole, the cover may **flip over** or be **launched** several feet in the air. Often, there may not be an explosion, just a lot of smoke or fire.

Some power companies are in the process of replacing solid manhole covers with **slotted manhole covers**. These new covers allow the gas to

be released less violently, and also give an early warning to possible explosions.