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The Gas Field Next Door: Living Amid Old Storage Wells at Risk of Leaks

By Susan Abram on August 8, 2019

More Americans than previously estimated live within a city block of aged, underground natural gas storage wells, some more than a century old and most of them lacking modern designs to prevent major leaks, according to researchers from Harvard University.

Using satellite imaging, researchers estimate that 20,000 homes and about 53,000 people across six states live within 650 feet of natural gas wells.

Most of the homes are in suburban residential areas, researchers found. And many of the nearby wells lack the structural integrity to safely store highly pressurized natural gas.

"The question then becomes: is it acceptable that thousands of likely unsuspecting people should have to bear the risks of living on top of these aging, under-regulated systems that are doing a job they weren't designed to do?" said Drew Michanowicz, lead author and research associate at the Center for Climate, Health and Global Environment at the Harvard T.H. Chan School of Public Health.

Michanowicz and his research team, whose study was funded in part by the nonprofit Environmental Defense Fund, wanted to understand how many people were at risk of exposure to harmful air pollutants or explosions because of their proximity to underground storage wells. They focused on six states with large numbers of aging wells. Their method allows residents in these states – Pennsylvania, Ohio, West Virginia, Michigan, New York and California – to see if their own homes are located near any of these wells.

About 80 percent of the wells in U.S. gas storage fields were completed in the 1970s or earlier. Built for oil production, they later were modified to store natural gas, according to a federal government report released in 2016.

But repurposing the old has created new safety concerns, the researchers say.

Wells lack modern safety features

Many older wells, for instance, have only one pipe for injections and withdrawals and lack a secondary blow-out prevention system needed for gas storage wells, which are subject to high-pressure injections, said the federal report by a Department of Energy task force.

Such high-pressure storage can create explosion hazards and, in a leak, the release of toxic compounds like benzene and formaldehyde, according to the Harvard research.

Failures can be catastrophic. In 2015, one of 115 wells in the Aliso Canyon storage field in suburban Los Angeles ruptured, sending nearly 100,000 metric tons of methane into the air and over nearby neighborhoods. Methane is a potent greenhouse gas and, at high levels, can react with other compounds to form a toxic mix that can cause respiratory problems and headaches.

More than 8,000 nearby residents were forced to relocate, leaving their homes for months. Schools in the area were closed and children were sent to classrooms far from their neighborhood.

The ruptured well, originally constructed in the 1950s, had only one pipe and lacked safety valves. The scale of the leak is considered unprecedented.

The American Gas Association, which represents more than 200 local energy companies, did not comment specifically on the safety of older wells. But the association stated that the natural gas industry already goes above and beyond state and federal regulations and has collaborated with outside companies to design, operate and "ensure the integrity of underground storage for natural gas."

The Aliso Canyon incident led Michanowicz and his team to examine the safety of gas storage fields. They estimate that two thirds of the nation's storage wells lack needed safety features.

Old wells concentrated in four states

A majority of those repurposed wells are in Ohio, Pennsylvania, New York and West Virginia, states where the Harvard researchers found that regulations on setback requirements between homes and underground storage fields are seldom enforced.

Long-term exposure to natural gas operations also has been associated with many illnesses. A University of Colorado study released last month found there may be a connection between mothers living near more intense oil and gas development and having children with congenital heart defects.

The massive leak from the Aliso Canyon storage field in northern Los Angeles continued for more than three months. During that time, Los Angeles County health authorities logged more than 700 reports from residents of health problems ranging from headaches and nosebleeds to other illnesses.

The federal task force created in response to the Aliso Canyon accident recommended taking older wells offline and further studying the cost and effectiveness of updating them with safety valves.

During his research, Michanowicz and his team found that while the industry is starting to provide information on wells that are plugged, leaking, repaired or tested for

durability, little data exists on which old wells remain active. “There is currently no effective means to ensure compliance with safety standards,” according to Michanowicz’s study.

In California, regulations finalized in 2018 called for natural gas operators to prove that older wells are safe by modifying them with both primary and secondary barriers, according to the state’s Division of Oil, Gas, and Geothermal Resources.

“Operators have to submit a work plan for bringing existing wells into compliance with the new standards,” said agency spokesman Don Drysdale. “The work plan must provide for all wells to be in compliance within seven years with minimum annual benchmarks.”

Environmentalists want swifter action

That’s not soon enough, say environmental activists. “California’s underground gas storage wells are old and not properly maintained or monitored, making them ticking time bombs that endanger nearby residents,” said Maya Golden-Krasner, deputy director of the Center for Biological Diversity’s Climate Law Institute.

Meanwhile, setback rules between homes and storage fields are seldom enforced nationwide.

In Ohio, more than 12,000 homes and over 30,000 residents are within 650 feet of an underground well. Michigan requires a 300-foot setback, one of the most stringent laws on the books, but there were more violations of the rule there than in all six states that Harvard researchers examined. In Pennsylvania, setbacks can be as far as 500 feet.

But all an operator has to do is get a written consent from a homeowner and “they can put the wells where they want,” Michanowicz said.

“A lot of these homeowners don’t know what they are signing.”