



Pipeline Rupture Test Studied CO₂ Release

These photos (left) show the results of a planned, carefully controlled, pipeline test rupture of an 8.6-inch CO₂ dense phase, high-pressure underground pipeline. It was conducted by the COSHER joint industry project. COSHER stands for CO₂ safety, health, environment and risk.

The test rupture produced a visible CO₂ plume that projected vertically into the air. Soon afterwards, the plume spread horizontally:

- Ten seconds after the rupture, the plume was about 165 feet high and 410 feet wide.
- After 20 seconds, the plume reached a maximum visible height of about 197 feet.
- Then, the plume ejected to the north and south, fell to the ground, and started to form a low-level blanket that spread north, south and east.

Photos depict the visible cloud at 10 seconds (top), 30 seconds (center) and 120 seconds (bottom) after the rupture.

CO₂ is a toxic asphyxiant that displaces oxygen. Exposure to carbon dioxide at concentrations of 4% and higher can cause confusion, unconsciousness, coma, and even death. For comparison, the COSHER experiment was conducted with an 8.6-inch diameter pipeline. The CO₂ pipeline that ruptured near Sartartia, MS, had a diameter of 24 inches.

Photos courtesy of Mohammed Amad

Source:

Ahmad, Mohammad & Lowesmith, Barbara & de Koeijer, Gelein & Nilsen, Sandra & Tonda, Henri & Spinelli, Carlo & Cooper, Russell & Clausen, Sigmund & Mendes, Renato & Florisson, Onno. (2015). COSHER joint industry project: Large scale pipeline rupture tests to study CO₂ release and dispersion. *International Journal of Greenhouse Gas Control* volume 37. June 2015. [DOI:10.1016/j.ijggc.2015.04.001](https://doi.org/10.1016/j.ijggc.2015.04.001)

Why CO₂ Pipelines Are Dangerous

All pipelines leak or rupture. But a leaking or ruptured CO₂ pipeline releases a toxic asphyxiant that can harm or even kill people and animals, including livestock. CO₂ is a colorless and odorless gas that hugs the ground and displaces oxygen. Internal combustion engines won't run, making rescue difficult or impossible.

Carbon dioxide released from a ruptured pipeline can travel two or more miles. At concentrations of 4%, CO₂ is considered to be immediately dangerous to life or health by the Centers for Disease Control and Prevention (CDC). This level can cause severe health effects due to oxygen deprivation and displacement.



Satartia, Mississippi

In February of 2020, a CO₂ pipeline rupture occurred in Yazoo County, MS. The rupture hurled pipe and other debris hundreds of feet into the air and covered the area with ice before it warmed, spread horizontally, and settled in low-lying areas.

The release of carbon dioxide lasted about four hours. The CO₂ plume traveled over one mile to the small, rural town of Satartia, sending 45 to the hospital and requiring the evacuation of 200. Some of the victims continue to experience health issues from CO₂ exposure, years after the incident. This includes respiratory, cognitive, and neurological problems.

Photo: Site of CO₂ pipeline rupture near Satartia, MS. Courtesy of Yazoo Co. Emergency Management Agency



Sulphur, Louisiana

This photograph shows clouds of water vapor and carbon dioxide gas escaping from a CO₂ pipeline near Sulphur, Louisiana on April 3, 2024. The harmful gas prompted a shelter-in-place advisory and concerns about pipeline safety and inadequacy of warning systems.

Photo courtesy of Ward 6 Fire Protection District.

Coalition to Stop CO₂ Pipelines

Protecting people, land, and water

<https://noillinoisco2pipelines.org>

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