



Credible.
Independent.
In the public interest.

CO₂ Pipeline Safety

Bill Caram
Executive Director

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Pipeline Safety Trust History



Guys -
I'm fishing. Will
be back before dark.
Homework is done.

Liam



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CO₂ Safety History – Lake Nyos, Cameroon

- Natural release of CO₂ in 1986
- 1,746 people killed, everyone within 16 miles



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CO₂ Safety History – Satartia, MS



- CO₂ pipeline failure in 2020
- 45 people sought treatment at hospital
- CO₂ plume affected residents more than a mile away from pipeline
- Vehicles couldn't operate
- Emergency responders needed Self-Contained Breathing Apparatus

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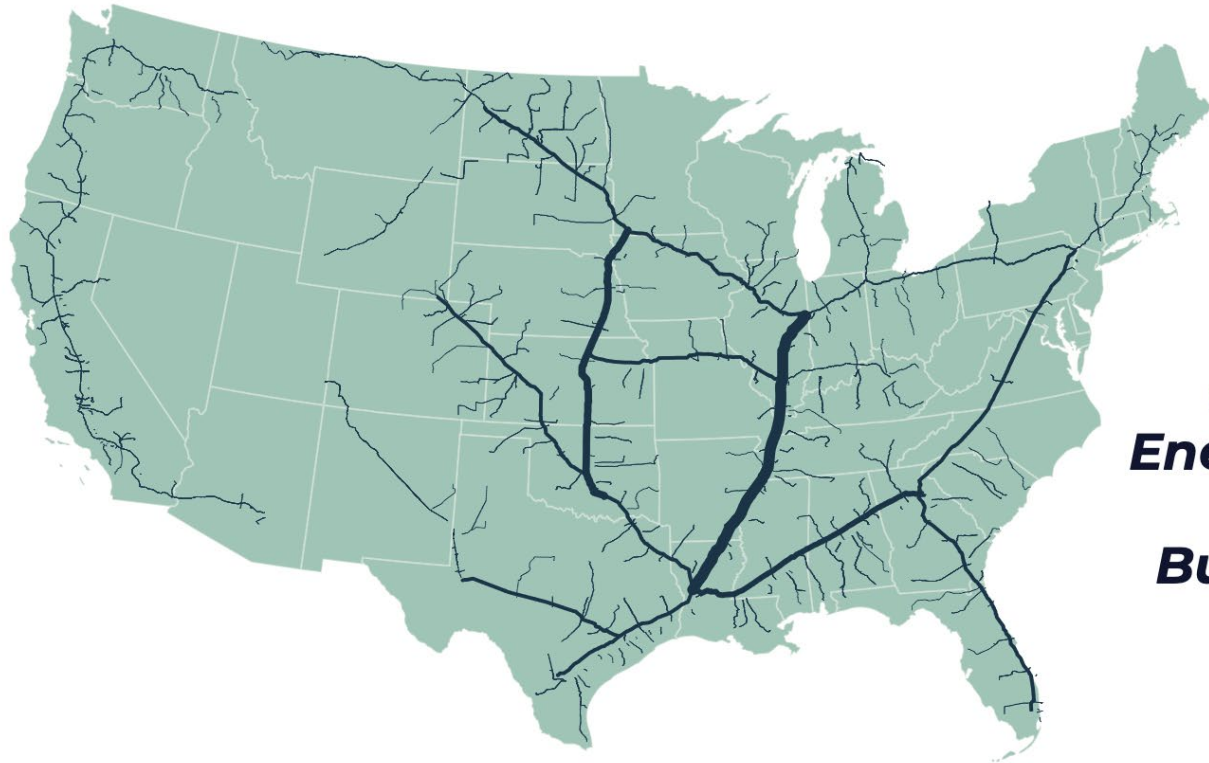
CO₂ Pipelines - History

- 1986 – Lake Nyos, Cameroon tragedy
- 1988 – PHMSA final rule
- 2020 – Satartia, MS disaster
- 2021 – 45Q Tax credit expansion
- 2022 – Inflation Reduction Act
- 2022 – PST paper published on CO₂ pipelines
- 2022 – Inflation Reduction Act



Photo Credit: Yazoo County Emergency Management Agency

Potential CO₂ Pipeline Buildout



***Department of
Energy Estimated
CO₂ Pipeline
Buildout by 2050***

6, 7, 8

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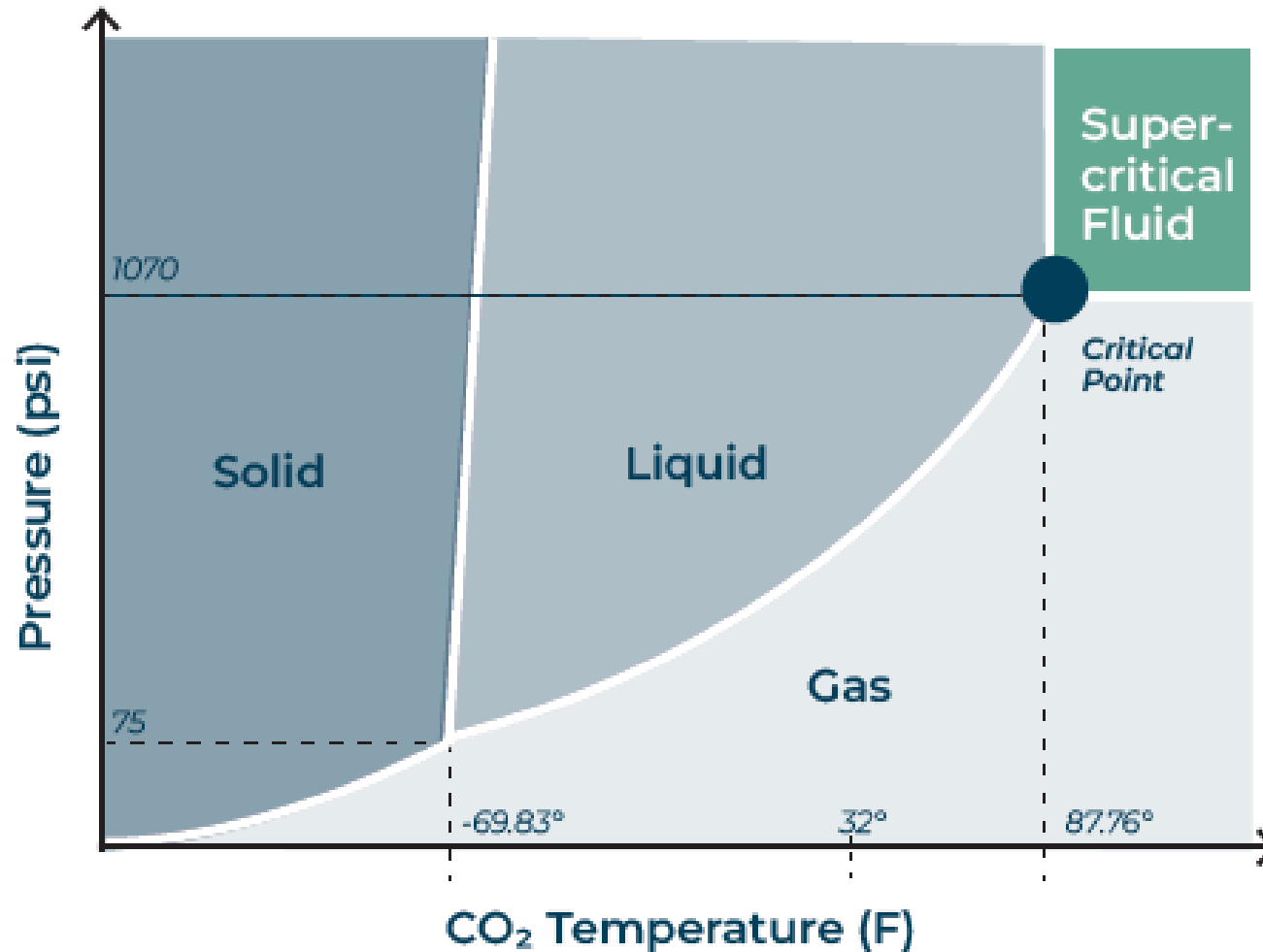
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CO₂ White Paper Findings

- Regulatory shortfalls
- Public safety concerns
- Dispersion modeling limitations
- Pipeline integrity
- Existing pipeline conversion



CO₂ Phase Chart



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CARBON DIOXIDE: AN INVISIBLE THREAT

Carbon dioxide has unique physical properties which can make transporting it via pipeline extremely dangerous in the event of a rupture. The physical characteristics of carbon dioxide which augment risks include:



Carbon dioxide is odorless and colorless, making detection by first responders and the public difficult.

Unlike other hydrocarbon pipelines, **carbon dioxide does not ignite or dissipate quickly** in the event of a release. Depending on topography and weather, CO₂ can migrate far away from the rupture site and settle in low lying areas before detection or dispersion.



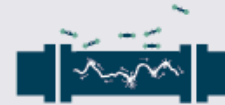
Carbon dioxide is an asphyxiant. The displacement of oxygen in the air by CO₂ has the potential to cause long-term health effects and casualties for both humans and animals.



Carbon dioxide is heavier than air, allowing the contents of a rupture to move along the ground and settle in low-lying areas.



Supercritical CO₂ undergoes rapid phase changes upon a pipeline rupture. These phase changes can exacerbate ruptures due to fracture propagation and cause large amounts of product to rapidly release into the environment.



Carbon dioxide's interaction with impurities, such as water and hydrogen sulfide, can compromise pipe integrity and increase the risk of corrosion and failure.



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WATER IN CO₂ PIPELINES: POTENTIAL FOR CORROSION



No Corrosion



Corrosion



Severe Corrosion

Historically, CO₂ pipelines have transported relatively dry and pure CO₂. However, the expansion in different sources of CO₂ has the potential to lead to higher water content and more impurities introduced into pipelines. In addition, carbon dioxide mixed with water can form carbonic acid which is extremely corrosive to the internal surface of the pipe.

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CO₂ Regulatory Shortfalls

- Only supercritical fluid CO₂ is regulated, other phases are unregulated
- No federal oversight for siting and routing
- No maximum impurity levels established by PHMSA despite public safety and pipeline integrity risks
- No odorant requirement
- Inappropriate regulations to establish Potential Impact Areas (PIA)
- Insufficient regulations to mitigate fracture propagation
- Insufficient regulations on pipeline conversion

Thank you!

CO₂ Pipeline Report and other materials:

<https://pstrust.org/carbon-dioxide-pipelines-dangerous-and-under-regulated/>

Contact:

bill@pstrust.org

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