

Fact Sheet: Proposal to Improve Carbon Dioxide Pipeline Safety Regulations

Given the Congressional incentives driving carbon capture and sequestration investment, many experts expect a large increase in the mileage of the nation's carbon dioxide pipelines. Once relatively rare and remote, these pipelines will soon be much closer to people and communities. The Denbury CO₂ pipeline failure in Satartia, Miss demonstrated the unique safety risks that these pipelines pose. An asphyxiant that is heavier than air, CO₂ can move as a plume in a dangerous and even lethal concentration close to the ground for long distances after a failure. Current PHMSA safety regulations are inappropriate and insufficient, as described in a Pipeline Safety Trust report.

- The current definition of “carbon dioxide” in the federal pipeline safety regulation does not apply to all CO₂ pipelines that may be developed for CCS projects.
 - Currently, only CO₂ that is moved in a supercritical state is regulated under the current definition, meaning gaseous and liquid CO₂ pipelines are not currently regulated.
- There is currently no defined safe distance or plume dispersion model for developing a potential impact area (PIR) along CO₂ pipelines.
 - CO₂ has unique physical properties which warrant the development of a unique PIR zone to be promulgated into federal pipeline regulation.
- There is currently no requirement to add an odorant to transported CO₂.
 - Carbon dioxide is odorless, colorless, doesn't burn, and is heavier than air meaning that releases are harder to observe and therefore avoid.
- The unique physical properties of CO₂ moved at high pressures through pipelines can cause running ductile fractures upon rupturing.
 - This essentially means that a pipe has a higher likelihood of opening up like a zipper when a rupture occurs, leading to more product being released over a shorter period of time and potentially violent and dangerous pipe shrapnel.
- Contaminants within CO₂ products being transported can jeopardize the integrity of the pipeline.
 - Water, when mixed with carbon dioxide, can form carbonic acid which can rapidly erode carbon steel.
 - Different industries can produce numerous other contaminants, including SO_x and NO_x, which can be toxic to public health, affect the temperature and pressure of the product, and/or cause corrosion, potentially impacting the safe operation of the pipeline.
- The risks associated with the conversion of existing transmission pipelines to CO₂ service have not been fully investigated.
 - Given the unique properties of CO₂ mentioned previously, pipeline conversions have the potential to be at higher risk of failure from CO₂ service than conventional hydrocarbon or even new construction CO₂ pipelines.

For the public to have any confidence in the safety of these pipelines proposed through communities, regulations need to be modernized. However, given the small number of existing mileage of CO₂ pipelines, PHMSA may not have enough information to preemptively justify the cost of such improvements.

Recommendation: Require PHMSA to promulgate rules addressing each of the above-listed regulatory gaps. Given CO₂'s physical properties, unique safety risks, and ability to be transported in multiple phases, PHMSA should allot CO₂ its own section of code, perhaps CFR Part 197. These rules should not be subject to PHMSA's statutory cost-benefit requirement.

Proposed Statutory Language

49 U.S.C. § 60144

- (a) The Secretary shall prescribe minimum safety standards for designing, installing, constructing, initially inspecting, initially testing, and operating and maintenance standards for carbon dioxide pipelines. In prescribing a new standard, the Secretary shall consider –
 - (1) Ensuring all phases of carbon dioxide are included in regulations;
 - (2) Appropriate development of determining a Potential Impact Area (PIA), High Consequence Areas (HCAs), and Could-Affect HCA's;
 - (3) The requirement of an appropriate odorant;
 - (4) Effective fracture propagation protection, including material toughness and fracture arrestors;
 - (5) Maximum contaminant standards to protect public health and pipeline integrity; and
 - (6) Detailed safety standards for the conversion of existing pipelines to CO₂ service.
- (b) The development of minimum safety standards described in section (a) shall not be subject to 49 U.S.C. § 60102 (b)(2)(D) through (E) or (b)(3) through (b)(6).