Van Ness Feldman LLP
vnf.com

PHMSA Suggests Tighter CO_2 Pipeline Safety Regulations Amid Growing Infrastructure for Carbon Capture

JANUARY 15, 2025

By Joseph Hainline, Michael Diamond, Susan Olenchuk, Jordan Manley, and Mekkah Husamadeen

On January 15, 2025, the Pipeline and Hazardous Materials Safety Administration (PHMSA) of the U.S. Department of Transportation released a pre-publication version of a notice of proposed rulemaking (NPRM) that would propose new safety regulations for pipelines that transport carbon dioxide (CO_2). The NPRM would extend PHMSA's regulatory oversight to pipelines transporting CO_2 in all phases, to include the first-ever safety requirements for pipelines transporting CO_2 in gas and liquid-phase, while also reinforcing existing standards for transporting CO_2 in its supercritical phase. This much-anticipated NPRM introduces several significant and targeted proposals that would create a uniform nationwide set of safety regulations for CO_2 transportation by pipeline. Comments on the proposal will be due 60 days after the NPRM is published in the Federal Register.

Background on CO_2 Pipelines

The U.S. Department of Energy (DOE) has projected a major expansion of the nation's CO_2 pipeline network, driven by global efforts to capture and store excess CO_2. According to a December 2023 Congressional Budget Office report, the number of carbon capture and storage (CCS) projects is expected to increase nearly tenfold by 2050. A substantial increase in commercial development of CO_2 pipelines has occurred in the past several years and is expected to continue.

Although CO_2 pipelines historically have a clean safety record, a major incident, coupled with the expanding CO_2 pipeline infrastructure, prompted PHMSA to revisit the need for targeted safety regulations for pipelines transporting all phases of CO_2.

PHMSA's Proposed Rule

While PHSMA has long regulated pipelines transporting CO_2 in a supercritical phase (at a 90% or more concentration of CO_2 in the product stream), PHMSA's proposed rule expands its authority over CO_2 pipelines significantly, in part to address the growing need for expanded carbon capture and storage (CCS) infrastructure, driven by significant new incentives from the President's Bipartisan Infrastructure Law and the Inflation Reduction Act. If adopted, the rule will introduce several key changes, including:

- The first-of-its-kind requirements for the design, installation, operation, maintenance, and reporting of CO_2 gas and liquid-phase pipelines.
- New guidelines for operators converting existing pipelines to transport CO_2 in different phases.

- Mandates for CO_2 pipeline operators to train emergency responders and ensure access to CO_2 detection equipment for effective emergency management.
- Enhanced public communication protocols during emergencies.
- Detailed vapor dispersion analysis requirements to safeguard public health and the environment in the event of a pipeline failure.

First-of-its-kind Requirements

The proposed rule will enhance safety standards for newly constructed, replaced, relocated, or converted CO_2 pipelines through the introduction of updated fracture control requirements. Among the key provisions, operators would be required to evaluate and adjust pipeline toughness based on operating conditions, ensuring fracture arrest within specific pipe lengths (320 feet for 99% probability and 200 feet for 90%), conduct toughness tests per industry, and meet toughness requirements outlined in API Specification 5L, which could lead to mandated crack arrestors.

The proposed rule also seeks to add several new sections; §§ 195.263 (Fixed vapor detection and alarm systems), 195.309 (Spike hydrostatic pressure test), 195.429 (Maintenance and testing of fixed vapor detection and alarm systems), and 195.456 (Vapor dispersion analysis). Each of these proposed new regulatory sections introduce new concepts that are prescriptive in nature and may raise practical considerations that are ripe for comment and discussion with PHMSA as the rulemaking process progresses.

Operational Guidelines

PHMSA proposes enhanced requirements for pipelines converted to CO_2 and hazardous liquid service under part 195. Operators seeking to convert a pipeline to CO_2 transportation would need to meet design and construction standards from subparts C and D. Specifically, pipelines converted to CO_2 service must undergo a spike hydrostatic pressure test before being placed into service. Additionally, operators would be required to conduct in-line inspections within 12 months and close-interval and coating surveys within 15 months of the service initiation. These measures are designed to ensure the integrity and safety of converted pipelines by identifying and addressing any defects or issues early on.

Training Key Individuals

PHMSA's proposed rule includes three key safety improvements for CO_2 and hazardous liquid pipelines. First, it calls for enhanced training for emergency responders, ensuring they have the necessary equipment and expertise to handle pipeline emergencies, particularly asphyxiation risks. Second, the proposal mandates additional safety equipment for operators, including tools to detect hazardous vapor and gas concentrations in excavated areas. Lastly, it requires pipeline operators to communicate with affected entities and the public during emergencies, ensuring clear and consistent messaging and coordination with emergency response organizations.

Van Ness Feldman LLP
vnf.com

Enhanced Public Communication Protocols

PHMSA's NPRM proposes enhanced emergency response plans for CO_2 pipelines, building on the Valve Rule to address safety risks. The proposal includes additional training for emergency responders, requiring operators to provide equipment and training on CO_2-related emergencies, including asphyxiation risks. It also mandates the provision of safety equipment in excavated trenches and tools for detecting hazardous vapor and gas concentrations. Lastly, operators would be required to communicate with affected entities, including the public, using population density data to ensure clear, coordinated messages during emergencies. These changes aim to improve emergency response effectiveness and public safety, but details surrounding the level of training and type of equipment provided to first responders remains unclear and will need to be flushed out in comments the public meetings as the rulemaking matures.

Detailed Vapor Dispersion Analysis

PHMSA is proposing new requirements for vapor dispersion analyses for hazardous liquid and CO_2 pipelines. Operators would be required to update their models every 15 months, or at least once a year, to reflect updates to software and changes in relevant factors. These updates aim to ensure that operators' assessments of pipeline segments potentially affecting High Consequence Areas (HCAs) are accurate and based on the latest science. However, recognizing potential resource challenges, PHMSA proposed to allow operators the option to use a default 2-mile radius on either side of the pipeline as a basis for determining impacts on high consequence areas. This proposal aims to improve pipeline safety by ensuring up-to-date risk assessments and enhancing regulatory oversight.

The Big Picture

About 5,000 miles of CO_2 pipelines exist in the United States, and their main purpose is to improve oil drilling operations. However, according to a 2020 Princeton research study, 65,000 miles of CO_2 pipes will be required by 2050 to achieve net-zero emissions targets. As a result of worldwide CO_2 collection and storage initiatives, the DOE has also predicted a large growth of the CO_2 pipeline network. According to a Congressional Budget Office assessment released in December 2023, the number of CCS projects might nearly double, and by 2050, the length of CO_2 pipelines could increase by 10 times their current size.

For More Information

Van Ness Feldman counsels clients on pipeline safety compliance, enforcement, and litigation under the Pipeline Safety Laws and Regulations and related statutes. Van Ness Feldman's pipeline safety practice group is well-positioned to assist operators with navigating the comment and rulemaking process for this proposed rule. If you are interested in additional information regarding pipeline safety matters or any PHMSA or pipeline-related matter, please contact Joseph Hainline at (202) 298-1949 or jhainline@vnf.com, or any member of the firm's Pipeline & LNG practice group.