Date of Hearing: April 6, 2022

ASSEMBLY COMMITTEE ON UTILITIES AND ENERGY
Eduardo Garcia, Chair
AB 1676 (Grayson) – As Amended March 31, 2022

SUBJECT: Pipeline safety: carbon dioxide

SUMMARY: Expands the regulatory oversight of the Office of the State Fire Marshall (OSFM) to include intrastate pipelines transporting supercritical carbon dioxide (CO_2). Specifically, **this bill**:

1) Includes "carbon dioxide" into the statutory definition of "pipeline" for the purposes of OSFM regulations.

2) Defines "carbon dioxide" as a fluid consisting of more than 90% carbon dioxide molecules compressed to a supercritical state. This definition mirrors the federal definition of "carbon dioxide."

3) Establishes findings related to carbon capture and storage (CCS), which among other declarations, claim CCS could be a "ready-to-go solution" of California's emission reduction goals and that CCS may abate nearly 60 metric tons of CO_2 per year.

4) Makes minor and technical changes to code, including striking an outdated code section related to 1990 requirements that OSFM establish lists of higher risks pipelines until regulations are adopted by January 1, 1992.

EXISTING LAW:

1) Pursuant to the Elder California Pipeline Safety Act (the Elder Act) of 1981:

    a. Grants the OSFM exclusive safety, regulatory, and enforcement authority over intrastate hazardous liquid pipelines. (Government Code § 51010)

    b. Defines "pipeline" for the purposes of the Elder Act as every intrastate pipeline used for the transportation of hazardous liquid substances or highly volatile liquid substances; and does not include an interstate pipeline subject to federal regulations, a pipeline that transports hazardous substances in a gaseous state, and other specified exclusions. (Government Code § 51010.5)

    c. Requires OSFM to adopt hazardous liquid pipeline safety regulations in compliance with the federal law relating to hazardous liquid pipeline safety, including, but not limited to, compliance orders, penalties, and inspection and maintenance provisions. (Government Code § 51011)

    d. Requires every newly constructed pipeline, existing pipeline, or part of a pipeline system that has been relocated or replaced, and every pipeline that transports a hazardous liquid substance or highly volatile liquid substance, to be tested in accordance with federal regulations and every pipeline more than 10 years of age and not provided with effective cathodic protection to be hydrostatically tested

every three years, except for those on the OSFM's list of higher risk pipelines, which shall be hydrostatically tested annually. (Government Code § 51013.5)

e. Requires every operator of an intrastate pipeline to maintain each valve and check valve necessary for safe pipeline operations, and requires OSFM to promulgate regulations for maintaining, testing, and inspecting these valves. (Government Code § 51015.4)

f. Authorizes OSFM to assess and collect from every pipeline operator an annual administrative fee. (Government Code § 51019)

2) Authorizes the United States Secretary of Transportation the regulatory and enforcement authority over gas and hazardous liquid pipelines, including carbon dioxide pipelines. (49 United States Code § 60102)

3) Prohibits the Secretary of Transportation from prescribing or enforcing safety standards and practices for an intrastate pipeline or intrastate pipeline facility to the extent that the safety standards and practices are regulated by a state authority, except as provided. (49 United States Code § 60105)

4) Defines "carbon dioxide," for the purposes of the United States Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) regulations, as a fluid consisting of more than 90% carbon dioxide molecules compressed to a supercritical state. (49 Code of Federal Regulations § 195.2)

5) Defines "hazardous liquid," for the purposes of PHMSA regulations, as petroleum, petroleum products, anhydrous ammonia, and ethanol or other non-petroleum fuel, including biofuel, which is flammable, toxic, or would be harmful to the environment if released in significant quantities. (49 Code of Federal Regulations § 195.2)

FISCAL EFFECT: This bill is keyed fiscal and will be referred to the Committee on Appropriations for its review.

BACKGROUND:

What is supercritical CO_2? – There are a number of CO_2 sources. An abundant source is from underground reservoirs where CO_2 under pressure occurs naturally. It can also be produced commercially in natural gas plants, ammonia plants, and recovered from power plant stack gas through CCS.[1]

At normal temperatures and atmospheric pressure, CO_2 is an odorless and colorless gas, not flammable, and denser than air. It will not combust, but it can be fatal to humans if enclosed due to the potential for suffocation. CO_2 may exist either as a solid or gas depending on temperature and pressure. Dry ice for refrigeration is a common use of CO_2 in solid form. When pressurized

[1] Department of Energy factsheet; "Carbon Capture, Utilization & Storage;" accessed on April 15, 2021; https://www.energy.gov/carbon-capture-utilization-storage#:~:text=Carbon%20capture%2C%20utilization%20and%20storage,will%20not%20enter%20the%20atmosphere.

to extremely high pressures (1,200 pounds per square inch gauge (psig)), CO_2 enters what is called the supercritical state.[2]

PHMSA regulations define CO_2 as a fluid consisting of more than 90% CO_2 molecules compressed to a supercritical state.[3] The remaining 10% may be comprised of gases such as water, nitrogen, oxygen, methane, or other impurities. Federal standards set CO_2 impurity limits for transportation pipelines.[4]

Pipeline transportation of CO_2 in the supercritical state is more desirable than transportation in the gaseous state. As a dense vapor in the supercritical state, CO_2 can be transported more economically and efficiently using smaller pipelines and pumps because greater volumes of fluid may be transported. Most CO_2 is transported in the supercritical state in steel pipelines kept at 2,200 psig.[5]

What are the commercial applications of CO_2? – Unsurprisingly, the beverage market is the largest segment of CO_2 use; however, the beverage market requires food grade CO_2 with a much higher purity rating than required in industrial or pipeline applications. CO_2 has been used for many years to aid in the production of crude oil. Because of its high degree of solubility in crude oil and abundance, CO_2 is a popular extraction tool in enhanced oil recovery projects. In enhanced oil recovery, the CO_2 mixes with crude oil making the oil more mobile and easier to extract.[6] Supercritical CO_2 has also grown in popularity as a solvent in the chemical industry, where it can replace more toxic, volatile organic compounds.[7]

Interstate vs. Intrastate Jurisdictions – PHMSA has exclusive federal authority over interstate pipeline facilities.[8] An interstate pipeline is defined as a pipeline that is used in the transportation of hazardous liquid or carbon dioxide in interstate or foreign commerce. Typically, these lines cross state borders or begin in federal waters. As of 2015, there were 1,188 miles of interstate pipeline in California.[9]

OSFM regulates intrastate hazardous *liquid* pipelines pursuant to the Elder California Pipeline Safety Act of 1981.[10] Whereas the California Public Utilities Commission (CPUC) regulates intrastate *gas* pipelines (both natural gas and liquid petroleum gas). An intrastate pipeline is defined as a pipeline that is located entirely within state borders, including offshore state waters. OSFM may regulate portions of interstate hazardous liquid pipelines located within the state, if

---

[2] Department of Energy "Supercritical CO2 Tech Team" information page; https://www.energy.gov/supercritical-co2-tech-team
[3] 49 C.F.R. § 195.2
[4] Steve Herron and Paul Myles, "CO2 Impurity Design Parameters;" National Energy Technology Laboratory, August 2013.
[5] Steve Herron and Paul Myles, "CO2 Impurity Design Parameters;" National Energy Technology Laboratory, August 2013.
[6] Federal Register, Vol. 56, No. 113; June 12, 1991; 49 C.F.R. Part 195 "Transportation of Carbon Dioxide by Pipeline."
[7] Chemical Engineering; "Supercritical CO2: A Green Solvent;" February 1, 2010; https://www.chemengonline.com/supercritical-co2-a-green-solvent/?printmode=1
[8] 49 USC § 60101, et seq.
[9] Cal FIRE-OSFM Pipeline Safety Division "Information Sheet"; October 21, 2015; https://antr.assembly.ca.gov/sites/antr.assembly.ca.gov/files/Pipeline%20Hearing%20%2810%2021%2015%29_CALFIRE%20FactSheet%20.pdf
[10] Gov. Code, § 51010, et seq.

there is an agreement between PHMSA and OSFM. OSFM is only allowed to enter into an agreement with PHMSA if it is given all regulatory and enforcement authority of the pipelines subject to the agreement. As of 2015, there were 4,500 miles of intrastate pipeline in California, although that number was predicted to grow.[11] The vast majority of pipelines in California carry petroleum based hazardous liquids.[12] According to OSFM, there are no pending nor proposed plans for new CO_2 pipelines in the state. California statute currently does not specify OSFM authority over carbon dioxide pipelines.

Safety Considerations of CO_2 – CO_2 is not currently defined as a hazardous substance under PHMSA regulations. As noted above, the most dangerous hazard of CO_2 is asphyxiation. Because CO_2 is denser than air, it may pool in enclosed spaces or fail to disburse when released in areas without strong air circulation. The most deadly incident involving CO_2 occurred in 1986 in Lake Nyos, Cameroon which is one of only three lakes in the world known to be naturally saturated with CO_2. An eruption of dissolved CO_2 in the lake suddenly released an estimated 1.6 million tons of CO_2 into the air, killing 1,700 people and 3,500 livestock. However, industrial CO_2 accidents may also occur, such as a 2008 leak at a fire extinguishing installation in Germany, which led to the hospitalization of 19 people.[13]

COMMENTS:

1) *Author's Statement.* According to the author, "To tackle the impending climate crisis and drastically reduce greenhouse gas emissions, it is essential that the state create a regulatory framework to facilitate the capture, storage, and transportation of carbon. Without decisive and swift action, California will be unable to meet its ambitious greenhouse gas emission reduction goals. AB 1676 authorizes the State Fire Marshall to oversee and regulate pipelines that carry captured carbon. This simple clarification will support the effective deployment of Carbon Capture, Utilization, and Sequestration (CCUS) technology, drastically reducing the state's carbon emissions to help California meet its climate goals."

2) *Who Is Watching the Pipes?* OSFM regulates hazardous liquid pipelines as authorized by the Elder Act of 1981. However, unlike federal standards, the Elder Act does not mention CO_2 pipelines specifically and instead only refers to hazardous liquid pipelines. Federal statute was amended by Congress in 1988 to require regulation of CO_2 pipelines, but no Elder Act amendments have mirrored this change.

   According to a February 2021 report from Lawrence Livermore National Labs,[14] "This asymmetry [of state and federal regulations] could be interpreted to mean that California law does not authorize the State Fire Marshal to regulate intrastate CO_2 pipelines and that

---

[11] Cal FIRE-OSFM Pipeline Safety Division "Information Sheet"; October 21, 2015; https://antr.assembly.ca.gov/sites/antr.assembly.ca.gov/files/Pipeline%20Hearing%20%2810%2021%2015%29_CALFIRE%20FactSheet%20.pdf

[12] According to a 2015 background paper prepared by the Assembly Committee on Natural Resources for "Joint Informational Hearing: Oil Pipeline Safety: Testing Methods and Frequency;" Santa Barbara, CA; October 21, 2015.

[13] P. 4; Harper, P., et al.; "Assessment of the Major Hazard Potential of Carbon Dioxide;" *Health and Safety Executive*; June 2011.

[14] George Peridas, *Permitting Carbon Capture & Storage Projects in Californi*a, February, 2021, Lawrence Livermore National Laboratory, LLNL-TR-817425.

the relevant authority lies with PHMSA. However …the Elder Act authorized OSFM to 'act as agent for the United States Secretary of Transportation to implement the federal Hazardous Liquid Pipeline Safety Act (49 U.S.C. Sec. 2001 *et seq*.) and federal pipeline safety regulations as to those portions of interstate pipelines located within [California].'"

The CPUC's jurisdiction encompasses *gas* pipelines, whereas OSFM oversees *liquid* pipelines. As the CO_2 pipelines under consideration in this bill carry a supercritical fluid, which is between the states of gas and liquid, it seems reasonable to follow the federal example and place supercritical CO_2 under the same authority that manages liquid pipelines. By that reasoning, OSFM should have jurisdiction over intrastate CO_2 pipelines in California. This bill, in explicitly including "carbon dioxide pipelines" throughout the Elder Act, clarifies OSFM's jurisdiction of intrastate CO_2 pipelines.

3) *Findings and Declarations.* This bill makes various findings related to CCS, which include claiming CCS could be a "ready-to-go solution" for California's emission reduction goals and that CCS may abate nearly 60 metric tons of CO_2 per year. Although this bill does not impact CCS directly, clarifying the oversight and regulation of CO_2 pipelines is a necessary precursor to operational CCS plants and associated infrastructure. *The committee may wish to consider striking the findings and declarations in the bill to allow the bill's focus to remain on CO_2 pipeline oversight.*

4) *Related Legislation.*

AB 2931 (Bloom, 2022) seeks to authorize OSFM to require the owner or operator of a pipeline to establish and maintain records, make reports, and provide information specified by OSFM.

SB 1030 (Limón, 2022) seeks to authorize OSFM to require the owner or operator of a pipeline to establish and maintain records, make reports, and provide information specified by OSFM, among other provisions.

5) *Prior Legislation.*

SB 1531 (O'Donnell, 2021) in a version of the bill that passed through this committee, sought to expand the regulatory oversight of OSFM to include intrastate pipelines transporting supercritical carbon dioxide (CO_2), defined "carbon dioxide" as a fluid consisting of more than 90% carbon dioxide molecules compressed to a supercritical state, mirroring the federal definition, and made various findings related to CCS including claiming that CCS may abate 60 metric tons of CO_2 per year. Status: Senate – Died – Appropriations.

SB 34 (Calderon, 2013), among its many provisions, sought to clarify OSFM authority to regulate carbon dioxide intrastate pipelines. Status: Senate – Died – Appropriations.

SB 1139 (Rubio, 2012), among its many provisions, sought to clarify OSFM authority to regulate carbon dioxide intrastate pipelines. Status: Assembly – Died – Appropriations.

6) *Double Referral.* This bill is double-referred; upon passage in this Committee, this bill will be referred to the Assembly Committee on Natural Resources.

REGISTERED SUPPORT / OPPOSITION:

Support

AERA Energy LLC
California Business Roundtable
California Carbon Capture Coalition
California Manufacturers and Technology Association
Calpine Corporation
Chevron
Clean Energy Systems
Independent Energy Producers Association
Southern California Gas Company
State Building and Construction Trades Council of California
Western States Petroleum Association

Opposition

None on file.

Analysis Prepared by: Natalie Seitzman / U. & E. / (916) 319-2083