IV Rulemaking record

EPA has established a record for this rulemaking (docket number OPTS-42094B). This record includes all information considered in the development of the proposed rule and appropriate Federal Register notices. EPA will continue to supplement the record with additional information as it is received.

The record includes all information referenced in support of the May 20, 1987 proposal and the following information:

References

(1) Notice of Proposed Rulemaking, Cyclohexane (52 FR 19096; May 20, 1987).

(2) USEPA. Engineering Assessment: Cyclohexane; Environmental Releases. Prepared by Pankaj Garg, Environmental Protection Agency, Office of Pesticides and Toxic Substances, Washington, DC (December 3, 1988).

(3) USEPA. Toxic Release Inventory System: Chemical Profile Report for Cyclohexane. Environmental Protection Agency, Office of Pesticides and Toxic Substances, Washington, DC (April 20, 1989).

V Other Regulatory Requirements

EPA discussed Executive Order 12291, The Regulatory Flexibility Act, and the Paperwork Reduction Act in detail in the May 20, 1987 proposal; and no changes are indicated for this notice.

List of Subjects in 40 CFR Parts 795 and 799

Testing, Environmental protection, Hazardous substances, Chemicals, Recordkeeping and reporting requirements.

Dated: May 30, 1989.

Dwain Winters,

Acting Director, Office of Toxic Substances.

[FR Doc. 89-13477 Filed 6-6-89; 8:45 am]

BILLING CODE 6560-50-M

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Part 192

[Docket No. 106; Notice 1]

Transportation of Hydrogen Sulfide by Pipeline

AGENCY: Research and Special Programs Administration (RSPA), U.S. Department of Transportation (DOT).

ACTION: Advance notice of proposed rulemaking (ANPRM).

SUMMARY: This notice requests information to determine the need for regulations to control the concentration of hydrogen sulfide (H_2S) in natural gas pipeline systems. There have been several instances in which H_2S has entered pipelines inadvertently. High concentrations may be extremely toxic if released and H_2S is detrimental to steel pipe.

DATES: Interested parties are invited to submit comments by September 5, 1989.

ADDRESSES: Send comments in duplicate to the Dockets Unit, Room 8417 Office of Pipeline Safety, Research and Special Programs Administration, U.S. Department of Transportation, 400 Seventh Street, SW., Washington, DC 20590. Identify the docket and notice numbers stated in the heading of this notice. All comments and docketed material will be available for inspection and copying in Room 8426 between 8:30 a.m. and 5:00 p.m. each business day.

FOR FURTHER INFORMATION CONTACT: Cesar De Leon, (202) 366-4583, regarding the subject matter of this document, or the Dockets Unit, (202) 366-5046, for copies of this document or other material in the docket.

SUPPLEMENTARY INFORMATION:

Background

Natural gas produced from some gas production wells has significant concentrations of toxic H_2S. This gas, commonly called "sour gas" is "sweetened" by removing the H_2S from the natural gas in treatment plants before the natural gas is introduced into the transmission pipelines. The Mary Ann Field in Mobile Bay in Alabama produces natural gas averaging 7½ percent or 75,000 parts per million (PPM) of H_2S.

At present, the federal gas pipeline safety regulations, 49 CFR Part 192, do not specifically address all the safety risks associated with the presence of H_2S in natural gas, such as those involving sulfide stress cracking and toxicity effects.

Hydrogen sulfide is a toxic, colorless, flammable gas which is poisonous, if inhaled, especially at concentrations in excess of 300 PPM (3/10 of 1 percent). Persons will lose consciousness after 5 minutes of breathing H_2S at concentrations of 100 PPM and death results very quickly thereafter.

Considerable research has been conducted to describe the effects of H_2S on the sulfide stress cracking of line pipe and to additionally describe the effects of stress corrosion cracking mechanisms in line pipe [1]. Research has shown a substantial increase in threshold stress (stress below which H_2S has no effect on sulfide stress cracking) with decreasing H_2S concentration [2]. For H_2S concentrations of 5 PPM or less there is no measurable effect on the sulfide stress cracking potential for high strength steel pipe. For high concentration of H_2S (>3,000 PPM) and applied stress levels above 70 percent of the yield stress, the time to failure decreases dramatically [2, 3].

Recent Incidents Reported by NTSB Involving Releases of H_2S Into Gas Pipeline Systems

California. One incident [4] arose on December 28, 1983, when the Pacific Offshore Pipeline Company's (POPCO) Las Flores Canyon Gas Treatment Plant was placed in service. Impurities, including H_2S, were to be removed from producing wells in the Santa Ynez Unit (an offshore field in the Santa Barbara Channel). The cleaned gas would be delivered by pipeline to the Las Flores Canyon Gas Treatment Plant where POPCO would then deliver it to the Southern California Gas Company (SCG) system for distribution to its natural gas customers.

Due to the failure of an automatic gas analyzer, gas was contaminated by 200 PPM of H_2S and entered the SCG distribution system. The analyzer was repaired following the interruption of gas flow. After the gas flow was re-initiated, further analysis indicated 16 PPM H_2S in the gas stream and flow was again stopped. The Occupational Safety and Health Administration (OSHA) regulations limit long term exposure levels of people to H_2S at 10 PPM. This introduction of H_2S into the SCG distribution system resulted in a notification of evacuation for over 20,000 people.

A second incident [4] involving H_2S entering the SCG system occurred on May 12, 1984, at the Wilmington, California, gas delivery point. Following this incident, the California Public Utilities Commission (PUC) requested that all SCG locations that could receive contaminated gas be equipped with automatic H_2S analyzers and shut-off equipment. The shut-off concentration would be set at between 4 PPM and 10 PPM.

As a result of these incidents in California, the California PUC has required that its previously determined upper limit be monitored by automatic equipment on a daily basis at gas supply points.

Texas. On August 11, 1987 automatic H_2S monitoring equipment at the KG Gas Processors, Limited, gas processing plant near Winters, Texas, indicated that an excessive amount of H_2S was entering the gas stream being delivered to Lone Star Gas Company [4]. The supply was shut off and attempts to contact Lone Star personnel were initiated. Although no new contaminated gas was entering the Lone Star system, customer complaints were received triggering actions by Lone Star to analyze the gas. Gas company personnel found H_2S in concentrations of 1,600 PPM and greater and purged the entire system. The excessive concentrations of H_2S were not detected because automatic shut-off equipment at KG had failed to operate in response to the automatic monitor and Lone Star's monitoring equipment had been removed for repair at that time.

Incidents Reported in Canada

During a 25-year period, 22 instances have been reported [5] where workers at the Windfall sour gas field in Alberta, Canada, had been overcome by H_2S vapors emanating from tanks that were being filled by sour crude or gas condensates. Because H_2S is heavier than air, it will flow out of the top opening or vent line from tanks and in still air will accumulate in dangerous concentrations near ground level. Such an occurrence could be extremely hazardous if a pipeline carrying H_2S ruptured in a Class 3 or 4 location.

Recommendations by the National Transportation Safety Board (NTSB)

Current federal regulations in 49 CFR Part 192 do not require gas content and quality monitoring. Additionally, the RSPA gas incident reporting criteria (49 CFR 191.3) do not specifically require that events such as the preceding [4,5] be reported. Therefore, the full extent of the problems associated with H_2S in pipelines is not known. However, from its review of Lone Star's records, NTSB found that since 1977 11 incidents involving the release of excessive quantities of H_2S into its pipeline system had occurred. In consideration of the potential for serious injury or death following the release of H_2S and resultant human exposure, the NTSB recommended that RSPA:

(1) Establish, based on known toxicological data, a maximum allowable concentration of hydrogen sulfide in natural gas pipeline systems, and amend 49 CFR Part 192 to reflect this determination. (Class II, Priority Action) (P–88–1)

(2) Revise 49 CFR Part 191 to require that pipeline operators report all incidents in which concentrations of hydrogen sulfide in excess of the maximum allowable concentration are introduced into pipeline systems that transport natural gas intended for domestic or commercial purposes. (Class III, Longer-Term Action) (P–88–2)

(3) Require gas pipeline operators to install on their systems equipment capable of automatically detecting and shutting off the flow of gas when the maximum allowable concentrations of hydrogen sulfide-contaminated gas are exceeded. (Class III, Longer-Term Action) (P–88–3)

Discussion

Generally speaking, operators of natural gas pipelines do not monitor gas quality at the custody transfer point. The producer is ordinarily contractually obligated to supply gas of a specified quality (moisture content, H_2S, elemental sulfur, BTU content, etc.). Gas quality monitoring is therefore the responsibility of the producer. At present, it is not clear how many operators monitor gas quality. In the case of the Las Flores Canyon Gas Treatment Plant supplying SCG, both producer and operator had gas monitoring and alarm systems.

H_2S poses risks to both health [6] and to the integrity of pipeline structures [1,2,3]. H_2S is a toxic, colorless, flammable gas which is poisonous if inhaled. It is considered to be immediately dangerous to life and health at concentrations of 300 PPM and at concentrations of 1,000 PPM it causes immediate unconsciousness and death. The OSHA has established an upper concentration level of l0 PPM for prolonged (8 hours) workplace exposure to H_2S.

The effects of H_2S on pipe metal depend to a large extent on pressure, steel chemistry, and duration of exposure [2,3]. Spontaneous cracking can be a problem even at low concentrations if the H_2S contamination is not eliminated. Conversely, if a high concentration (>3,000 PPM) of H_2S is accidentally introduced into a transmission or distribution system operating at, for example, 72 percent of specified minimum yield strength, failure could occur in as little as 10 hours.

The ratio of threshold stress (stress at which spontaneous cracking occurs) to yield stress is approximately 1.0 at an H_2S concentration of 100 PPM for API 5LX–65 pipe steel. However, for an H_2S concentration equal to or greater than 3,000 PPM, this ratio is about 0.7

The time to failure for API 5LX–65 pipe steel is a very sensitive function of the applied stress to yield stress ratio from 100 percent of yield to about 70 percent of yield for a concentration of H_2S of 3,000 PPM. Below this level of applied stress, the time to failure increases dramatically from 10 to 20 hours to well beyond a thousand hours.

It has also been shown that high yield strength and high hardness (Rockwell C above 22) steels are more susceptible to sulfide stress cracking than lower strength steels.

Recent studies [7] have shown that the pH level of condensates in the pipeline may be more important than the exact hydrogen sulfide level. Sulfide stress cracking tends to be enhanced at lower pH levels, especially in the presence of CO_2.

In addition to sulfide stress cracking, hydrogen induced cracking or blistering can occur in the presence of H_2S. This type of cracking is sometimes referred to as stepwise cracking. Hydrogen induced cracking can occur in the absence of stress and it occurs in time periods as short as a few days from initial exposure.

Summary of Existing Regulations

1. Federal Regulations

49 CFR 192.125(d), Design of copper pipe

Copper pipe that does not have an internal corrosion resistant lining may not be used to carry gas that has an average hydrogen sulfide content of more than 0.3 grains per 100 standard cubic feet of gas.

49 CFR 192.475, Internal corrosion control: General

(a) Corrosive gas may not be transported by pipeline unless the corrosive effect of the gas on the pipeline has been investigated and steps have been taken to minimize internal corrosion.

(c) Gas containing more than 0.1 grain of hydrogen sulfide per 100 standard cubic feet may not be stored in pipe-type or bottle-type holders.

49 CFR 195.418, Internal corrosion control

(a) No operator may transport any hazardous liquid that would corrode the pipe or other components of its pipeline system, unless it has investigated the corrosive effect of the hazardous liquid on the system and has taken adequate steps to mitigate corrosion.

2. State Regulations

California General Order 58

At present California is seeking to establish a maximum allowable level of hydrogen sulfide in natural gas pipeline systems. The level to be proposed by General Order GO–58–A7 is set forth in Item 7 Purity of Gas, as follows:

(a) Hydrogen Sulfide. No gas supplied by any gas utility for domestic, commercial, or industrial purposes in this state shall contain more than one-fourth (0.25) grain of hydrogen sulfide per one hundred (100) standard cubic feet.

(b) Total Sulfur. No gas supplied by any gas utility for domestic, commercial, or industrial purposes shall contain more than thirty (30) grains of total sulfur per one hundred (100) standard cubic feet.

(c) Test procedures used to determine the amounts of hydrogen sulfide and total sulfur shall be in accordance with accepted gas industry standards and practices.

Michigan Rule 299

The State of Michigan Department of Natural Resources, Geological Survey Division, Oil and Gas Operations, has a comprehensive set of regulations entitled "Hydrogen Sulfide Management. These regulations deal with definitions, set standards for equipment, establish duties of the well operator, define which wells are regulated, and define location of wells and processing equipment. In addition, the regulations establish training requirements of personnel, contingency plans for drilling, drilling operations, and briefing areas.

In addition, Michigan has a detailed H_2S Rules Supplement which further defines which class of well and associated gathering lines is affected by a particular rule or section of the rule.

Michigan Rule 460

The Michigan Department of Commerce, Public Service Commission, has established Rule 460, "Technical Standards for Gas Service. Rule R460.2381 deals with gas purity.

Michigan Rule 81 (R460.2381)

(1) Gas distributed by utilities to customers shall not contain more than 0.3 grains of hydrogen sulfide or more than 20 grains of total sulfur per 100 cubic feet (about 10 PPM), including the sulfur in any hydrogen sulfides.

(2) Gas distributed by utilities to customers shall not contain flammable liquids in quantities that interfere with the normal operation of customer's equipment.

Texas Rule 36

The Railroad Commission of Texas has adopted various versions to Rule 36 entitled "Oil, Gas, or Geothermal Resource Operation in Hydrogen Sulfide Areas," (revised September 15, 1985).

Rule 36 contains general provisions for determining the hydrogen sulfide concentration in the gaseous mixture in an operations or system. It explains how to determine the radius of exposure in terms of concentration as a function of distance from the source. Storage tanks, warning markers, security, materials, and equipment selection requirements are all covered in the general provisions section.

The rule additionally provides guidance and regulations for contingency and emergency preparedness. The rule provides a framework for appropriate field operations, including inspection, drilling, training of personnel, accident notification, reporting requirements, and new well completion reporting of H_2S concentration levels.

3. Canadian Regulations

The Canadian Standard Z184–1975, "Gas Pipeline Systems," contains a number of provisions pertaining to sour gas service. Section 3.4 is entitled "Requirements for Sour Gas Service." This section sets forth special service requirements for piping and all components in contact with sour gas.

Section 4.10, "Inspection and Testing of Production Welds, includes a subsection 4.10.2.1.4 which requires that all welds in a sour gas system shall be radiographically inspected for 100 percent of the circumference.

Section 4.11.3.3 requires that there be *no* area of inadequate penetration or incomplete fusion between the root bead and pipe metal on welds in sour gas systems.

Section 4.11.4.4, "Welds in Sour Gas Systems." This section requires that welds be free of unrepaired burn-through.

Section 4.11.8.4 requires that there be no undercutting adjacent to the root bead on welds in sour gas systems.

Section 6.4.8.1.2 permits testing with sour gas only in remote Class 1 locations when other test media are not available.

Section 6.4.5.1(c)—suitable measures shall be taken to prevent failures due to such mechanisms as metal loss corrosion, hydrogen embrittlement, stress corrosion cracking and hydrogen blistering [in sour gas systems], and provisions shall be made for monitoring stations to assess internal corrosion.

Request for Information

Since RSPA has no regulations regarding maximum H_2S concentration in gas pipeline systems (other than gas holders and copper pipeline), RSPA would like to have additional information to appropriately assess the need for establishing such regulations.

To assist RSPA in evaluating the need for additional regulations, interested parties are invited to answer the following questions and submit relevant information including any accident experience (if applicable) associated with H_2S release(s).

(1) What factors should be considered in determining the need for a maximum allowable concentration of hydrogen sulfide in natural gas pipeline systems? What should this concentration be?

(2) Describe events you know of in which hydrogen sulfide has been released from, or into, a pipeline in dangerous amounts and what were the H_2S concentrations? What were the consequences of such releases? What would be the burden associated with mandatory reporting of such events?

(3) If you are an operator receiving gas from a producer, do you have automatic H_2S detection and shut-off equipment? Do these devices operate reliably? For such operators that do not have this equipment, what costs and other burdens can be associated with requiring use of the equipment?

(4) Which pipelines transporting sour gas should be subject to an H_2S monitoring requirement? Should rural gas gathering lines be subject to H_2S monitoring requirements, even though they are not now subject to any of the Part 192 safety standards?

Commenters are not limited to filing comments only on the questions presented above and may submit any facts and views consistent with the intent of this advance notice. In addition, commenters are encouraged to provide comments on (1) "major rule" considerations under the terms of Executive Order 12291; (2) "significant rule considerations" under the terms of DOT regulatory procedures (44 FR 11634); (3) potential environmental impacts subject to the National Environmental Policy Act; (4) information collection burdens that must be reviewed under the Paperwork Reduction Act; (5) the economic impact on small entities under the Regulatory Flexibility Act; and (6) impacts on Federalism under Executive Order 12612.

Authority: 49 App. U.S.C. 1672 and 1804; 49 CFR 1.53; Appendix A of Part 1, and App. A of Part 106.

Issued in Washington, DC, on June 1, 1989.

Richard L. Beam,

Director, Office of Pipeline Safety.

References

[1] Williams, D.N., "Examination of the BP Test for Measuring the Resistance of Pipe Steels to Blistering and Internal Cracking When Exposed to Sour Gas, Battelle Columbus Labs for the American Gas Association, 1980.

[2] Watkins, M., and Vaughn, G.A., "Effects of H_2S Partial Pressure on the Sulfide Stress

Cracking Resistance of Steel, Materials Performance, Vol. 25, No. 1, 1986.

[3] Mayville, R.A. and Warren, T.J., "The Effect of H_2S Concentration on the Sulfide Stress Cracking Resistance of an X-65 Pipeline Steel, Ref. Paper 55746, Arthur D. Little, Cambridge, Massachusetts, June 1988.

[4] Burnett, James, Safety Recommendations P-88-1, P-88-2, and P-88-3, Transportation of H_2S by Pipeline, May 10, 1988, National Transportation Safety Board.

[5] Wichert, Edward, "Sour Gas Field Reflects Equipment, Operating Improvements, Oil and Gas Journal, Technology, April 25, 1988.

[6] Anon., "Occupational Health Guideline for Hydrogen Sulfide, Occupational Safety and Health Administration, 1978.

[7] Mayville, R.A., and Warren, T.J., "Chevron Point Arguello Pipeline System, Ref. Paper 61786-02, Arthur D. Little, Cambridge, Massachusetts, July 1988.

[FR Doc. 89-13409 Filed 6-6-89; 8:45 am]

BILLING CODE 4910-60-M

INTERSTATE COMMERCE COMMISSION

49 CFR Parts 1003, 1160, 1162, and 1168

[Ex Parte No. 55 (Sub-No. 69)]

Rules Governing Applications for Operating Authority; Revision of Form OP-1

AGENCY: Interstate Commerce Commission.

ACTION: Proposed rule; extension of time to file comments.

SUMMARY: The deadline for filing comments in response to the notice of proposed rulemaking in this proceeding (54 FR 20879, May 15, 1989) concerning applications for operating authority, revision of form OP-1 has been extended.

DATE: Comments are due June 28, 1989.

ADDRESSES: Send comments [an original and 10 copies] referring to Ex Parte No. 55 (Sub-No. 69) to: Interstate Commerce Commission, Office of the Secretary, Case Control Branch, Washington, DC 20423.

FOR FURTHER INFORMATION CONTACT:

Suzanne Higgins O'Malley, (202) 275-7292

Richard B. Felder, (202) 275-7691. (TDD for hearing impaired (202) 275-1721)

SUPPLEMENTARY INFORMATION:

Additional information is contained in the Commission's decision. To purchase a copy of the full decision, write to, call, or pick up in person from: Dynamic Concepts, Inc., Room 2229, Interstate Commerce Commission Building, Washington, DC 20423. Telephone (202) 289-4357/4359. (Assistance for the hearing impaired is available through TDD services (202) 275-1721.)

This action will not significantly affect either the quality of the human environment or conservation of energy resources.

By the Commission, Heather J. Gradison, Chairman.

Noreta R. McGee,

Secretary.

[FR Doc. 89-13506 Filed 6-6-89; 8:45 am]

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