REMOTELY CONTROLLED VALVES ON INTERSTATE NATURAL GAS PIPELINES

(Feasibility Determination Mandated by the Accountable Pipeline Safety and Partnership Act of 1996)

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Research and Special Programs Administration
400 Seventh Street, S. W.
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REPORT

Remotely Controlled Valves on Interstate Natural Gas Pipelines
(Feasibility Determination Mandated by The Accountable Pipeline Safety and Partnership Act of 1996)

1.0 SCOPE AND PURPOSE

This report is in response to a Congressional mandate in the Accountable Pipeline Safety and Partnership Act of 1996 to survey and assess the effectiveness of remotely controlled valves (RCVs) on interstate natural gas pipelines and to determine their technical and economical feasibility to shut off gas after a rupture.

This report contains a discussion of the results of a public meeting held in Houston, Texas on October 30, 1997 for the purpose of gathering information and discussing issues relevant to the survey and assessment. The report also contains the results of an RCV field evaluation conducted by Texas Eastern Transmission Corporation (TETCO) as part of a Consent Order issued by the Office of Pipeline Safety (OPS) (CPF 15102) to provide information on TETCO's experience with RCVs. There is also a discussion of status briefings before the Technical Pipeline Safety Standards Committee (TPSSC) and a cost versus benefit study.

The report addresses the four main issues raised by the Congressional mandate to study RCVs, i.e., effectiveness, technical feasibility, economic feasibility, and risk reduction. The report concludes with a proposal for further action, which is a public meeting to seek input on information for specifying the time-to-isolate a ruptured pipeline section.

2.0 BACKGROUND

2.1 Congressional Mandate

The Accountable Pipeline Safety and Partnership Act of 1996 (codified at 49 U.S.C. 60102 (j)) mandated that:

- **"Not later than June 1, 1998, the Secretary [of Transportation] shall survey and assess the effectiveness of remotely controlled valves to shut off the flow of natural gas in the event of a rupture of an interstate natural gas pipeline facility and shall make a determination about whether the use of remotely controlled valves is technically and economically feasible and would reduce risks associated with a rupture of an interstate natural gas pipeline facility."**

- **"Not later than one year after the survey and assessment are completed, if the Secretary has determined that the use of remotely controlled valves is technically and economically feasible and would reduce risks associated with a rupture of an interstate natural gas pipeline facility, the Secretary shall prescribe standards under which an operator of an interstate natural gas pipeline facility must use a remotely controlled valve. These standards shall include, but not be limited to, requirements for high-density population areas."**

This action by Congress was in response to a high pressure gas transmission pipeline failure in Edison, New Jersey on March 23, 1994. The failure of the 36-inch pipeline operated by TETCO resulted in ignition of the escaping gas and creation of a fireball 500 feet high. The incident report filed with the Research and Special Programs Administration (RSPA) reported no fatalities and two people requiring inpatient hospitalization. Radiant heat from the fireball ignited the roofs of buildings located more than 100 yards from the failure, destroyed 128 apartments and resulted in the evacuation of 1,500 people. The casualties were limited because the few minutes between the time of the failure, the fire, and the radiant heat from the fire igniting the apartments, allowed residents to vacate the area. The gas transmission company took 2½ hours to isolate the ruptured section of pipeline by operating manually operated valves, which contributed to the severity of the damages[1]. (1)[2]

2.2 Public Meeting

[1]The main contributor to the length of time to isolate the failed section was that the upstream valve closest to the rupture (about 2000 feet away) relied on pipeline gas pressure to power the valve actuator to close the valve and the pipeline pressure was insufficient for the task due to the rupture. The valve lacked redundant power, such as bottles of compressed gas, to operate the valve actuator to close the valve. This valve could not be closed manually because of differential pressure across the valve made hand wheel turning difficult and the number of revolutions to close (700-750) was excessive. When this valve could not be manually closed, the next closest valve was closed. It took considerably time to reach the next closest valve because of traffic.

[2]Numbers refer to references in Section 7.0 of this report.

By public notice in the Federal Register (62 FR 51624; Oct.2, 1997), we invited representatives from industry, state and local government, and the public to a public meeting on the use of RCVs on interstate natural gas pipeline facilities. The purpose of the meeting was to gather information and discuss issues relevant to the survey and assessment. Consistent with the President's Regulatory Reinvention Initiative (E.O. 12866), RSPA wanted to explore the Congressional mandate with maximum stakeholder involvement. Toward this end, RSPA sought early participation in the survey and assessment process by holding the public meeting at which participants, including RSPA staff, exchanged views on relevant issues concerning RCVs. The public meeting was used in partial satisfaction of the "survey and assess" portion of the Congressional mandate.

The public meeting was attended by approximately 31 people representing the gas pipeline industry, consultants to the gas pipeline industry, the Gas Research Institute, and RSPA staff. Ten people presented oral comments at the meeting. A sampling of comments made at the meeting is included as Appendix A to this report. There were seven written comments in response to an invitation in the public notice. A summary of each written comment is included as Appendix B to this report. The comments,

transcript, and notices in Docket No. RSPA-97-2879 can be accessed at the DOT Dockets Management System's Internet web site.[3]

The notice announcing the public meeting contained eight questions to encourage participants to focus on the issues we believe are the most important. The eight questions and general responses are as follows:

A. What is the potential value of early detection and isolation of a section of pipeline after a failure in terms of enhanced safety and reduced property damage?

> **One commenter indicated that the potential value of early detection and isolation is the public perception of enhanced safety, whereas another indicated it would reduce the volume of flammable gas being vented. However, most commenters agreed that any consequences from a failure, i.e., casualties or property damage, would occur very soon after the failure and long before RCVs would be effective. In a large diameter pipeline, even if the valves closed instantaneously, it would take some time to blow down the**

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[3] http://dms.dot.gov

pipeline section involved. An example of this is an approximate blowdown time of 10 minutes for a 5-mile section of a 24-inch pipeline if the failure is near one end (2).

B. What are the technical and economic <u>advantages</u> of installing RCVs?

One commenter indicated a technical advantage is greater reliability if old valves need to be replaced with new ones because of a requirement for the valves to be remotely controlled[4]. The only economic advantage is the value of the gas not lost because RCVs can isolate the ruptured pipeline section faster than manually operated valves.

C. What are the technical and economic <u>disadvantages</u> of installing RCVs?

Comments on technical disadvantages focused on reliability of the technically complex RCV installations, both the hardware and the communications link. The technical difficulties in retrofitting existing valves to provide

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[4]An unknown number of old valves may not be full opening. Replacing them with full opening valves would allow the passage of in-line inspection tools which would be an additional advantage.

remote control, such as matching new valve operators to old valves, was also cited. Commenters stressed past studies which indicate RCVs are not cost beneficial because of the high installation costs of valve actuators and communication links, and the high maintenance costs with no corresponding benefits. One commenter noted that a ten year review of Department of Transportation (DOT) pipeline leak and failure statistics for his company revealed no casualties that could have been prevented by RCVs. This operator estimated the cost of remotely controlling all DOT-required valves in Class 3 and 4 locations would be $40 million with no benefits from reduced casualties over a 10 year period.

D. What states in addition to New Jersey have adopted regulations concerning RCVs on intrastate natural gas pipeline facilities?

Commenters were not aware of any states adopting regulations[5].

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[5]As a result of the pipeline failure in Edison, NJ on March 23, 1994 **(2)** , the New Jersey Board of Public Utilities (BPU) adopted a new set of rules covering the installation, operation, and maintenance of intrastate natural gas pipelines in the state of New Jersey. These rules became effective March 17, 1997.

One of the new BPU rules requires each operator to submit a Sectionalizing Valve Assessment and Emergency Closing Plan for sectionalizing valves in class 3 and class 4 locations. All valves in class 3 and class 4 locations are to be evaluated and prioritized as to the need for installation or retrofitting of a RCV or automatically controlled valve (ACV). Each plan is to include training of appropriate personnel on emergency plans and

E. If RCVs were required in only high risk areas, what would constitute high risk areas and what would be criteria for prioritizing from highest to lowest risk?

Commenters believed operators should determine high risk areas through a risk assessment of their pipelines. The potential magnitude of damage from a pipeline failure because of such factors as population density, pressure, and pipe diameter, and the probability of a pipeline failure due to such factors as subsidence, and proposed contiguous construction activity, should be used as criteria.

F. Document cases where RCVs have malfunctioned causing them to close unexpectedly or to not close when commanded by the dispatcher.

No documented cases of RCV malfunctioning were submitted by commenters.

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procedures. An emergency closing drill that simulates shutting down a selected section of the pipeline is required once each year. Reports of the closing drills are to be submitted to the BPU.

We later surveyed the states to determine if any other states had adopted rules governing sectionalizing valves. None were found as a result of our survey.

G. Document cases where RCVs operated after an accident to reduce the consequences of the accident.

There were no cases documented by commenters. However, one commenter referred to a Gas Research Institute report (2) which indicated, in Appendix B to the report, that an analysis of 80 past failures reported to DOT showed the quick closure of a valve could have prevented an injury in only one incident[6].

H. Provide documentation to support or refute the impression that when the escaping gas from a failed gas pipeline ignites, it normally occurs shortly after the accident, usually less than 10 minutes after the accident.

No concrete documentation was supplied by commenters. There were a number of comments that there are a number on ignition sources at any failure site so that ignition almost always occurs immediately after a failure, or not at all.

3.0 TETCO'S FIELD EVALUATION OF RCV INSTALLATIONS

[6] Appendix B in the report **(2)** tabulated a total of 28 fatalities and 116 injuries in the 80 incidents.

As part of the settlement in the compliance case with TETCO involving the failure in Edison, NJ (CPF No. 15102), TETCO offered to fund and perform a number of pipeline safety activities mutually acceptable to OPS and TETCO. TETCO worked with Battelle to develop an RCV project as one of the activities, part of which included a one year field evaluation of the RCVs installed on its pipeline system in New Jersey and other states. The field evaluation included design considerations and commissioning experience as well as actual field experience accumulated over a one year period. TETCO offered this project because it believed it would be useful in responding to the Congressional mandate to study RCVs.

The TETCO experience with installing 90 RCVs on its system is not typical of the gas industry, nor is it to be considered the norm for the industry. It is not meant to be a model for the industry, but was in response to the potential for casualties resulting from catastrophic pipeline failures such as the failure that occurred in Edison, NJ.

The project was monitored by RSPA and a representative from the New Jersey Board of Public Utilities. We attended a briefing in Houston TX on the project on March 25, 1998, which included a

tour of TETCO’s Gas Control Center. We also toured the Millstone River RCV site in New Jersey on April 14, 1998, and witnessed an activation of a RCV from TETCO’s Gas Control center in Houston.

TETCO submitted a field evaluation report (3) received by us on November 4, 1998. The result of the one year field evaluation was that the RCVs were operated approximately 200 times with no valve closure problems when first commanded to close. In addition, there were no actual incidents or false indications to remotely close an RCV-equipped valve. Following are excerpts from the report which we believe are significant enough to be included in this report:

“The total installed costs of the RCV sites installed on the TETCO system ranged from $150,000 for a single mainline valve with an existing valve operator, existing ROW, no permitting problems or road requirements to $500,000 for an eight valve site with significant permitting costs. The average site on the TETCO system with three mainline valves, which have existing valve operators, cost $250,000. These costs represent the range of costs incurred for converting 90 existing valves at 40 sites from local actuation to remote control.”

“The average cost of converting a valve to remote control was $125,000 to $150,000 (which included the efficiencies realized at multiple valve sites where site costs could be spread over several valves).”

“There has been no significant impact on direct operating costs as a result of installing remote activation equipment on valves because the maintenance activities for the additional equipment have been absorbed in the function of the technicians that work these sites for other activities. Additional maintenance costs due to RCV equipment are approximately one man-day/year/valve or $20,000 system wide for labor and $15,000 for additional spare parts for 90 RCV equipped valves installed to date via this project. This additional labor is incurred during semi-annual and annual maintenance checks that require cycling the valve and performing sensor and [remote terminal unit] checkouts.”

“The design of the RCV upgrade was based on using existing valves and, where practical, systems and hardware currently used by TETCO on other applications. For example, TETCO’s prior experience with the Benchmark RTU (remote terminal unit) on gas metering applications was leveraged to apply that system as the controller for the RCVs. Also, sensors and related hardware in

use on other TETCO equipment were directly applicable for use on the RCVs."

"Since installation of the RCVs there have been no unplanned valve closures. Unplanned valve closures are considered to be the result of a false valve actuation or a commanded closure in an emergency situation."

"Upgrading valves to RCV status does not impact the time to get people to an incident site. However, the additional capability now available to Gas Control enables more rapid response in evaluating a situation, facilitates more accurate dispatching of personnel, and facilitates isolating an effective section by allowing valves at both ends or multiple sites to be closed quickly and without requiring personnel at each site. Also, in situations that Gas Control can resolve with overwhelming evidence, valve closure can be accomplished before operations personnel access the site.

"Of the approximately 200 valve cycles, the valves closed 100 percent of the time as commanded on the first attempt but failed to reopen upon command in three instances. In one additional instance, a valve failed to close a second time after closing and

reopening properly during the first attempt.”

“As noted above, there were three cases where valves did not reopen upon command from Gas Control, and one case where a valve failed to close in a second attempt after closing in the first attempt. In all four cases, the problem was the result of a solenoid valve failing to open and provide power gas supply pressure to the operator.”

4.0 COST BENEFIT STUDY

A study by Southwest Research Institute (SwRI) (4) for GRI assessed the potential role of RCVs in controlling the blowdown time after a gas pipeline rupture and to evaluate the effects of early isolation on fatalities and injuries. We have used this study as the basis for our determination of the economic feasibility of installing RCVs on interstate natural gas transmission pipelines.

The objective of the study is stated in the report:

> "To evaluate the potential benefit of remotely controlled main line valves in reducing the personal injuries and fatalities associated with pipeline ruptures, and to assess the projected cost of retrofitting existing valves for remote operation."

The SwRI study provides data on which to base a rudimentary analysis of costs versus benefits[7]. For instance, the study concludes that almost no casualties would be prevented by the installation of RCVs. Of a total of 81 incidents studied from 1972 to 1997, virtually all fatalities and injuries occurred at, or very near (within three minutes), of the time of initial rupture, long before the ruptured pipe section would be isolated,

[7] This degree of analysis is sufficient since a positive benefit to cost ratio based on quantifiable benefits can not be achieved.

even with RCVs installed. The SwRI study concludes that an average of 10 minutes is the time between rupture and initiation of RCV closure (if no on-the-ground confirmation of the rupture by operator personnel is required).

This leaves property damage prevention and the value of gas saved from early valve closure as the only measurable benefits of RCVs. Unfortunately, there are no analyses that compare property damage that occurred before valve closure versus property damage that occurred after valve closure, either with RCVs or manually operated valves installed. Therefore, the value of gas saved because of RCV closure is the only measurable benefit that can be derived from the SwRI study[8].

The SwRI study contains computer simulations of a single and looped pipeline to define the pipeline flow characteristics under rupture condition and arrive at estimated gas loss when RCVs are activated versus when valves are manually closed. On a single pipeline modeled as a 30-inch diameter line, 48 miles long with valves placed every eight (8) miles[9] (a total of seven valves),

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[8]RSPA Edison failure investigators theorize property damage could have been reduced if the ruptured section had been isolated in 10 minutes and blown down in another 10-15 minutes. There is no data to substantiate this theory, however.

[9]Required for a Class Location 3 per 49 CFR 192.179 (a).

operated at a pressure of 1000 psig, the loss of gas after a guillotine line rupture would be 31 MMSCF[10] for RCV closure at 10 minutes and 58 MMSCF for manual valve closure at 40 minutes. The difference would be the gas saved if RCVs were installed or 27 MMSCF (58-31=27). At a gas price of $2.50/MSCF (used in the SwRI study), the savings, and therefore the benefit, would be $67,500. The cost to retrofit the seven valves in this single line to make them RCVs using the cost of $32,332 from the SwRI study, would be $226,324. This is 3.3 times the benefit from the value of gas saved if there was a rupture in the valve section.

Each pipe in the looped pipeline study model (two pipelines in parallel) is the same length, diameter, operating pressure, and valve spacing as the single pipeline model. The only difference is that the line is looped for the 84 miles. At each of the five main line valves between compressor stations[11], there are 10-inch diameter lines connecting the two 30-inch lines and crossover valves to isolate each 30-inch line. The most gas is saved by assuming the crossover valves are operated in the open position, thus both 30-inch diameter lines operate together. The report states the gas loss would be 40 MMSCF for RCV closure at 10

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[10] Million Standard Cubic Feet

[11] There is a valve at each of the two compressor stations.

minutes and 93 MMSCF for manual valve closure at 40 minutes. The difference would be the gas saved if RCVs were installed or 53 MMSCF (93-40=53). At a gas price of $2.50/MSCF (used in the SwRI study), the savings, and therefore the benefit, would be $132,500. The cost to retrofit the fourteen (14) 30-inch diameter valves in this looped line (7 per line) to make them RCVs using the cost of $32,332 from the SwRI study would be $452,648. In addition, there are ten (10) 10-inch crossover valves with a cost to retrofit of $29,395/valve which would be an additional cost of $293,950. The total cost of retrofitting the valves on this model would be $746,598. This is 5.6 times the value of gas saved.

The considerable spread between benefits and costs in just these two models presented in the SwRI study make additional analyses unnecessary.

5.0 ISSUES RAISED BY TECHNICAL PIPELINE SAFETY STANDARDS COMMITTEE

There have been two detailed briefings to the Technical Pipeline

Safety Standards Committee (TPSSC)[12] on the status of work done under this Congressional mandate. There were no issues raised during the first briefing on May 5, 1998. However, there were a number of issues raised during the second briefing on November 5, 1998.

One issue was the public perception that the installation of RCVs increase safety over manually operated valves. The GRI report (4) stated that it takes at least 30 to 40 minutes to close a manually operated valve after a pipeline release whereas a RCV can begin closing in 10 minutes. The same GRI report indicated that a review of pipeline incidents between 1972 and 1997 showed virtually all fatalities and injuries occurred within three minutes of the incident, with most of them occurring at the time of the incident. Therefore, the installation of RCVs would have little or no safety benefit. One committee member remarked that the highest perceived benefit is the public perception about RCVs. This committee recommended that we determine if the public's safety comfort level would be greater if the valves closed in 10 minutes rather than 40 minutes before requiring the spending of a lot of money on RCVs.

[12]The Technical Pipeline Safety Standards Committee is established by statute (49 U.S.C. 60115) to advise the Secretary of Transportation on the technical feasibility, reasonableness, and practicability of all proposed gas pipeline safety standards and all amendments to existing standards.

The issue of delays in closing manually operated valves in populated areas due to traffic congestion was raised in the context of reducing gas loss as it is one of the only measurable advantages of installing RCVs.

The advisory committee discussed other benefits from installing RCVs, other than reducing casualties. Property damage may be reduced, disruption to the public's normal activities may be reduced, and other utilities may be affected. These benefits should be considered if the time to shut in a failed pipeline is reduced. This, of course, reverts to the public perception issue. A member of the public at the TPSSC meeting noted that the public impression of control is an over-riding issue.

There were no solutions advanced at the second TPSSC meeting to deal with the issues raised.

6.0 FINDINGS AND PROPOSAL

6.1 Findings

In this section, we will evaluate findings on the four issues raised in the Congressional mandate, i.e., effectiveness of RCVs,

technical feasibility of RCVs, economic feasibility, and reduction of risk with RCVs.

Effectiveness of RCVs

The results from the TETCO one year field evaluation of 90 installed RCVs reported in section 3.0 confirm that RCVs are effective. The valves were operated approximately 200 times with no valve closure problems. They closed the first time when commanded to close 100 percent of the time.

Technical feasibility

The TETCO experience demonstrates that RCVs are technically feasible. TETCO has installed 90 RCVs and has proven that they operate reliably when remotely commanded. There is considerable anecdotal evidence from other operators of successful installations of RCVs, mostly at compressor stations, that confirms their technical feasibility. It is unquestionably feasible to install equipment on manually operated valves to convert them to RCVs because the necessary equipment exists and has been used for years.

Economic feasibility

We can not find that RCVs are economically feasible. The quantifiable costs far outweigh the quantifiable benefits from installing RCVs.

Section 4.0 of this report contains a discussion of the costs versus the benefits. There is a small benefit from reduced casualties because virtually all casualties from a rupture occur before an RVC could be activated. Comparing property damage from ruptures where RCVs are installed versus where manually operated valves are installed is not possible because we are not aware of any studies that have been conducted that compared these damages. Many of the commenters at the public meeting and in writing, reported in section 2.2, indicated the only economic benefit to installing RCVs is the value of gas saved because of quicker isolation of the ruptured section. However, the models used in the SwRI study indicated the cost of installing RCVs to realize the gas saving was 3 to 5 times the value of the gas saved.

The TPSSC commented on issues that impact benefits. These issues included public perception of the benefits from RCVs, disruption to the public's normal activity and the effect on other

utilities. Unfortunately, there is no data known to us to quantify these benefits.

Reduction of risk

Installation of RCVs would reduce risk, but the degree of reduction is unknown. The reduction is primarily due to less gas escaping to the atmosphere after a rupture because RCV closure can be in 10 minutes versus 40 minutes (4) if the valves require manual closing, resulting in possible reduced effects, such as property damage. There is some evidence from the NTSB report on the Edison failure (1), that faster valve closure might have allowed firemen to enter the area sooner to extinguish the blazes and might have controlled the spread of the fires to adjacent buildings. However, a quantifiable value can not be placed on this savings to property damage.

6.2 Proposal

We have found that RCVs are effective and technically feasible, and can reduce risk, but are not economically feasible. We have also found that there may be a public perception that RCVs will improve safety and reduce the risk from a ruptured gas pipeline.

We believe there is a role for RCVs in reducing the risk from certain ruptured pipelines and thereby minimizing the consequences of certain gas pipeline ruptures. We are aware of excessive delays operators have experienced manually closing valves following a pipeline rupture. RCVs ensure that a section of pipe can be isolated within a specified time period after the rupture. Once the ruptured section is isolated and no longer receiving additional gas from upstream in the line, any fire would subside as residual gas in the isolated section is burned.

At many locations, there is significant risk as long as gas is being supplied to a rupture site, and operators lack the ability to quickly close existing manual valves. Any fire would be of greater intensity and would have greater potential for damaging surrounding infrastructure if it is constantly replenished with gas. The degree of disruption in heavily populated and commercial areas would be in direct proportion to the duration of the fire. Although we lack data enabling us to quantify these potential consequences, we believe them to be significant nonetheless, and we believe RCVs may provide the best means for addressing them.

Also, by providing a definitive time when the line would be

isolated following a rupture, it is possible to determine how and when any fire would die out. This knowledge provides a basis for risk assessment and response planning, important considerations in certain heavily populated or commercial areas, and an important factor in maintaining public confidence.

There are some locations where RCVs may need to be installed to reduce the risk from escaping gas at a failure when a reasonable time to close a manually operated valve can not be established, even though installation of the RCV would not be cost effective. Although we believe a standard requiring time-to-isolate a ruptured pipeline section may be appropriate, we lack sufficient data to consider one. We are therefore hosting a public meeting on Thursday, November 4, at 1:00 p.m., Room 8236, 400 7th Street SW, Washington, DC. We will seek input on information for specifying the time-to-isolate a ruptured pipeline section. Some of the parameters to consider would be -

- **Population density**
- **Vulnerability of the infrastructure**
- **Environmental consequences**
- **Accessibility of existing valves based on changing conditions such as weather and traffic**
- **Valve spacing**

- **Operational parameters (such as pipe diameter and operating pressure)**

7.0 REFERENCES

(1) National Transportation Safety Board, "Texas Eastern Transmission Corporation Natural Gas Pipeline Explosion and Fire, Edison, New Jersey, March 23, 1994," PB95-916501, NTSB/PAR-95/01, January 18, 1995.

(2) C. R. Sparks, <u>et al.</u>, (Southwest Research Institute), "Remote and Automatic Main Line Valve Technology Assessment," Final Report to Gas Research Institute, Report No. GRI-95/0101, July 1995.

(3) David W. Detty, P.E., (Battelle Memorial Institute), " Texas Eastern Transmission Corporation, Remote Control Valves Field Evaluation Report, October, 1998."

(4) C. R. Sparks, <u>et al.</u>, (Southwest Research Institute), "Cost Benefit Study of Remote controlled Main Line Valves," Final Report to Gas Research Institute, Report No. GRI-98/0076, May 1998.

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Public Meeting on 10/30/97

Adams Mark Hotel, Houston

Summary of Remarks from Transcript

- Tetco has had good experience with ACVs using “threshold pressure change,” don’t disallow ACVs (Drake, p.9)

- In NTSB reports where RCVs recommended, they wouldn’t have significantly mitigated property damage or injuries (Richardson, p.13)

- Question of RCVs deals with economics and operating aspects, has little to do with safety or property damage (Richardson, p.15)

- Closing valves faster with average spacing of 20 miles would not significantly reduce damage because average vent time is an hour or so (Steinbauer, p.17)

- Hope any rule issued would be a design rule, couldn’t justify new RCVs much less refitting existing valves (Richardson, p.20)

- Only savings is reducing time that gas blows and that can be calculated (Richardson, p.22)

- Command or communication system is the most unreliable part of RCVs (Richardson, p.23)

- The issue of closing multi-line systems must be addressed (Drake, p.25)

- The real issue on the consequence side is public perception (Drake, p.27)

- On the cost side: failures, ignition, majority of damage, and protecting lots of people will not be stopped by RCVs (Drake, p.28)

- Must consider what the industry is doing now, since it’s successful (Deleon, p.31)

- For CGS, back of envelope calculation, retrofitting valves in Class 3 & 4 locations, $40 million cost & $2 million benefit (Burney, p.32)

- For SoCal, retrofitting valves on 4,000 miles in Class 3 & 4 location, cost would be $70 million (Mosinskis, p.33)

- Placement of RCVs should be based on RM rather than across-the-board in a certain class location (Drake, p.39)

- For PSE&G of NJ, no feedback from the commission on the adequacy of our valve assessment required by state regulations (McClenahan, p.47)

- Dispatcher’s decision to close valve must be on a case-by-case basis, not a detailed procedure (Mosinskis, p.51)

- The industry, industry associations, or GRI could develop guidelines for dispatchers to use (Burnley, p.58)

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Summary of Seven Written Comments to

Docket No. RSPA-97-2879; Notice 1

Questar Regulated Services Company

- Parent company of Mountain Fuel Supply & Questar Pipeline Company. Mountain Fuel has 625,000 customers in UT, ID, and WY. Questar Pipeline operates in CO, UT, and WY. Together operate 2950 miles of transmission, 10,000 miles of mains, 8285 miles of services.

- The decision to install RCVs (or ACVs) should be left up to the operator using risk assessment providing a more flexible approach.

- An operator may decide ACVs (or "line-break" valves) are a better fit for it's system.

- Criteria could include densely populated areas (CL 3 &4), response time due to remote locations, ESAs, or other high risk area identified by the operator.

- Mandating RCVs would require Questar to replace existing ACVs at substantial expense without incremental benefits.

Columbia Gas Transmission

- Columbia gas system has 16,300 miles of transmission lines.

- Installing RCVs won't significantly lower the potential consequences associated with ruptures, prevent ruptures, eliminate blowing gas, or eliminate fires.

- The industry currently has no criteria for the placement of RCVs; In all Cl 3 & 4 locations is too broad.

- The only potential value is the public perception of enhanced safety even though the majority of damage would occur before the valve was closed.

- The only advantage is limiting gas loss if and when a rupture occurs.

- Many disadvantages including: More complex, requires SCADA and human intervention, power or communication failure could render a RCV inoperable, and retrofitting many different valve designs could be technically difficult.

- Economic disadvantages: From a review of Columbia's accident data over 10 years, no deaths or injuries would have been prevented by RCVs. To require RCVs on sectionalizing block valves in Cl 3 & 4 locations on Columbia is estimated to cost $40 million, with $0 benefits.

- High risk areas determined by population density, proximity to the pipeline, operating conditions, calculated radiant heat, terrain, predominate building construction and materials.

- One documented case: An incident over Mississippi River on Aug. 24, 1993, an ACV closed on one side of the river, but the ACV on the other side did not.

Pacific Gas and Electric Company

- Has over 3 million gas customers in CA.

- Have no objection to installing RCVs, have found them reliable, install them when upgrading existing major control stations or installing new stations.

- Objects to GRI finding of reliability of ACVs. PG&E has found that the sensitivity of the detection system must be set so low as to miss some line breaks, in their experience.

- Safety would be enhanced by reducing the volume of flammable gas released.

- Major technical advantage by isolating section quickly without dispatching personnel and knowledge of valve status using SCADA.

- Major economic advantages are minimizing company liability, and potential for minimizing gas customer outage by quickly isolating section and providing alternate gas supply.

- Main disadvantages is high cost and potential for inadvertent shutdown.

- No documented cases, but PG&E dispatchers have experienced both malfunctions and cases where the valves closed on demand.

- One can assume that if ignition occurs, it will occur a few seconds after rupture.

<u>Dayton Power and Light Company</u>

- Has 300,000 gas customers, both intrastate transmission and distribution pipelines.

- Supports limited use of RCVs and has installed them to alleviate manual, hand-cranking of valves; *however*, field verification is essential before remotely activating valve.

- Definition for "high risk area" would be inconsistent the established class location scheme; it would be different for each operator.

- Should be evaluated in conjunction with the consistent application of accepted risk management principles.

<u>Transco</u>

- Thinks the use of RCVs should be part of an operator's risk management strategy.

! Problems with installing RCVs:

- Today’s technology does not differentiate to a high degree of accuracy between transient operating pressures and ruptures.
- Blowdown times are often one hour or more even with immediate closure.
- With ignition time of 2-10 minutes, plume ignition will not be affected.
- Cost will be high for operators with multi-line systems.

Texas Gas Transmission

! Operates 5,700 miles of 2" - 42" pipelines.

! Retrofitting existing valves very expensive. Not so on new installations.

(no other new comments from those made by previous commenters.)

Enron Gas Pipeline Group

! Group includes FL Gas Trans., Northern Natural, Transwestern, Houston P.L. Co., Black Marlin P.L. Co., & LA Resources Co. which together operate 27,000 miles of pipe.

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- Routinely review specifics of incidents. Conclusion from reviews is that RCVs, if installed, would not have contributed to public safety or the reduction of property damage.

- Decision should be left up to operator.

(no other new comments from those made by previous commenters.)