National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation P-296B

Date: April 20, 1990

In reply refer to: P-90-12 through -21

Mr. Travis P. Dungan
Administrator
Research and Special Programs
Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

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In a 7-month period beginning September 16, 1988, the National Transportation Safety Board investigated 5 natural gas accidents in the Kansas City-Topeka area that involved the gas distribution systems of Kansas Power and Light Company (KPL). These accidents killed 4 people, injured 12 others and destroyed 4 houses.[1]

The accidents involving gas leaking from service lines at Kansas City, Missouri, and Oak Grove, Missouri, and possibly the accident at Overland Park, Kansas, could have been prevented or at a minimum, the consequences could have been substantially reduced had an excess flow valve been installed at the service line connection to the gas main. The Safety Board has advocated the use of excess flow valves since 1971 and in 1981, based on its study findings[2], the Safety Board issued Safety Recommendation P-81-38 that called for the Research and Special Programs Administration (RSPA) to require excess flow valves be installed on all new and renewed high-pressure gas distribution service lines; yet, RSPA still has no plans to require them. Rather, RSPA has tied implementation of this recommendation to Safety Recommendation P-81-39 which asked RSPA to use the results of a Gas Research Institute (GRI) research project to identify locations, in addition to those defined in Safety Recommendation P-81-38, where effective use can be made of excess flow valves to prevent or minimize the consequences of

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[1] For more detailed information, read -- Pipeline Accident Report, "Kansas Power and Light Company, Natural Gas Pipeline Accidents, September 16, 1988, to March 29, 1989," NTSB/PAR-90/01.

[2] National Transportation Safety Board Special Study, "Pipeline Excess Flow Valves," NTSB-PSS-81-1, September 9, 1981.

accidents. The GRI study[3] was issued in 1985, and the Safety Board has twice since its issuance advised RSPA of the deficiencies in the GRI study, that this study was not relevant to the implementation of Safety Recommendation P-81-38. RSPA was again urged to require the installation of excess flow valves on new and renewed single-family, residential high-pressure services. Even so, RSPA has continued to tie its failure to act on Safety Recommendation P-81-38 to the GRI study.

Excess flow valves are now used by several gas operators primarily to stop the flow of gas from excavation-caused damages to service lines; however, the valve will shut off the flow of gas no matter what the source of the damage so long as the increased flow rate is sufficient to cause the valve to operate. Had RSPA acted timely on this important recommendation, the hundreds of thousands of service lines to be renewed or replaced over the next several years by KPL would be provided the protection afforded by excess flow valves for only a nominal cost. However, continued reluctance by RSPA to implement a requirement for excess flow valves will have far greater consequences nationwide as almost 8 million bare and coated unprotected service lines will be replaced or renewed. Prompt action now by RSPA can provide this needed protection.

The Safety Board's investigation of the five natural gas accidents indicated that pipeline operator adherence to pipeline safety standards could be enhanced if the operators had a clear understanding of the requirements and of the means to be used for evaluating compliance. Although the RSPA considers its regulations to be performance-oriented requirements, many are no more than general statements of required actions without establishing any criteria against which the adequacy of the actions taken are to be evaluated. Regulations that do not contain specific objectives and measurable standards for performance make it difficult for a gas operator to understand the need for a program and to determine if the program it establishes complies with the requirement. Further, with such regulations, evaluations made by both Federal and state inspectors during compliance inspections are susceptible to nonuniformity and make enforcement difficult, if not impossible. The Safety Board believes that more effective use of RSPA's limited pipeline safety resources could be achieved if its regulations contained both readily understandable safety objectives to be achieved and specific criteria against which performance can be uniformly measured both by gas operators and by Federal and state inspectors. RSPA needs to evaluate and amend, as necessary, its pipeline safety regulations to provide requirements that contain both readily understandable safety objectives and specific criteria against which the performance of a gas operator can be readily measured. Where RSPA finds that it is unable to include in a regulation specific criteria for measuring operator compliance, it should develop a means to provide information that describes the types of actions expected of an

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[3] "Final Report (April 1982-August 1984) - Assessment of Excess Flow Valves in Gas Distribution Service Lines," Gas Research Institute, Chicago, Illinois 60631, August 1985.

operator for compliance and advises the operator of the basis RSPA will use in assessing compliance.

Unlike many of the regulations, Sections 192.613 and 192.617 both contain a statement of purpose and a general objective. However, in these and previous investigations, the Safety Board has found that gas operators either do not understand or chose to ignore the significance of these regulations and have often not established procedures to comply with their requirements. Although the Safety Board believes it is clear that procedures are explicitly required both for continuing surveillance and for failure investigations (including laboratory examinations), experience indicates that these requirements are not being met. Consequently, the Safety Board believes that RSPA needs to emphasize these requirements in its inspections of gas operators, in its training programs, and in its monitoring of state inspection and enforcement programs.

The Safety Board believes that the types and extent of program deficiencies identified during its investigations of the KPL accidents should cause the RSPA to reevaluate its state monitoring program to identify further areas for improvement. Both the States of Kansas and Missouri had inspection programs which included monitoring of KPL operations for many years and neither State had identified or corrected the deficient practices identified as a result of the Safety Board's investigations. Additionally, RSPA personnel had monitored the programs of both States and concluded that both were satisfactorily inspecting gas operations to identify deficient practices and enforcing the Federal minimum safety requirements. Yet, the deficiencies in the KPL practices identified by the Safety Board clearly suggest that the state inspection and compliance programs required improvements at the time they were monitored by RSPA personnel. Both States should have recognized that KPL was not performing adequate analyses of leakage histories and pipe failure trends and did not have an adequate program of system surveillance, and both should have acted to require needed improvements.

Since promulgated in 1971, Paragraphs 192.457 and 192.465 have required operators of gas systems to identify, through use of electrical surveys, areas of active corrosion. When appropriate, such testing immediately provides to the gas operator information sufficient to determine if protection against corrosion damage is required. Because electrical surveys do not always provide reliable data as a result of jointed pipe construction or other causes, an operator is permitted by regulation to use one of several substitute methods, such as leakage surveys. Each of the allowable alternatives requires several years of experience to compile a data base before useful analyses can be performed and are dependent upon the detection of gas after it has escaped from the pipeline. The RSPA guidance to its and the States' inspectors instructs that operators not using electrical surveys must have a program to identify areas of active corrosion and must be able to demonstrate that the program effectively identifies areas of active corrosion.

However, as written, the regulations do not require what RSPA is asking of gas operators in its guidance material. Rather, they allow a gas operator, such as KPL, to use any gas leak detection survey to comply with

the requirement for initial and the continuing assessment to identify areas of active corrosion. Because the type of leak detection survey is not specified, a gas operator can elect to use any type of survey, including a vegetation-type survey, instead of performing an electric survey. Consequently, the regulations permit the use of reactive and inferior methods to identify areas of active corrosion, rather than a demonstrated method of identifying high risk areas before corrosion severely damages the lines.

This substitution of reactive for active means of identifying areas of corrosion results in greater risks to the public. Consequently, the Safety Board believes that RSPA must require protection against corrosion damage for the thousands of miles of gas mains and millions of gas service lines and yard lines that have already been exposed for many years to potentially corrosive environments without the benefit of corrosion protection. The Safety Board is aware that RSPA soon will issue for public comment a proposal to require instrumented leak surveys be performed at least every 3 years of cathodically unprotected pipelines if these lines are not electrically surveyed to identify areas of corrosion. If made a final rule, this would be an improvement; however, this would still be a reactive rather than an active requirement. The Safety Board believes that RSPA must take action beyond that now proposed by also requiring by a time certain that all buried, metallic pipelines be protected against corrosion damage unless the pipeline operator can demonstrate through electrical tests or other positive means that all unprotected buried, metallic pipelines are located in noncorrosive environments.

When Paragraphs 192.457, 192.465, and 192.723 requiring gas leak surveys were established, they were developed essentially by adopting language from a gas industry-developed code, the 1969 USAS B31.8 Code for Gas Transmission and Distribution Piping Systems. These regulations allow a gas operator, such as KPL, to use any gas leak detection survey to comply with the requirements. Of the available leak survey methods, a vegetation survey is the least costly and also is most dependent upon employee performance and the environment for obtaining good survey results. The adequacy of a vegetation survey for detecting gas leaks is greatly dependent on the time of year in which the survey is performed, the knowledge and training of personnel performing the survey, the extent of vegetation in an area, and the time interval between leak initiation and the survey. The vegetation survey can be a useful tool for some leak monitoring needs of a pipeline operator; however, because of the many limitations of this type of survey, the Safety Board believes that surveys using instruments such as CGI's or FI's should be required to comply with the leakage survey requirements of the Federal safety standards.

Since the KPL accidents, the Kansas Corporation Commission (KCC) has required gas operators in Kansas to perform periodic leakage surveys of buried pipelines located between the gas meter and the wall of the building served (yard lines) and to repair or replace those found to be leaking. In taking this action, the KCC took the position that gas system customers do not generally understand the importance of performing periodic inspections and surveys on buried gas pipes and that they generally do not have the ability to perform such work. RSPA took a position similar to that of the

KCC when RSPA extended the requirements of the Federal pipeline safety standards to customer-owned portions of gas service lines as defined in the Federal regulations. The actions of both the KCC and of RSPA recognize that, to attain reasonable public safety, specific tests must be performed on buried gas pipelines without regard to ownership and that gas customers generally can not be expected to recognize the need for or to perform these tests. The only difference in the actions of these agencies is that RSPA's action does not acknowledge that yard lines pose hazards equal to those of customer-owned service lines. The Safety Board agrees with this action of the KCC and believes that RSPA now should extend the application of its safety requirements to all buried gas lines located between the gas main and the wall of the building served.

In two of the five accidents investigated, the odor of gas was detected long before the gas was ignited; yet, in neither case was the indication of escaping gas recognized as an imminent danger to persons and property. Therefore, the detection of odor was not reported to the gas company or to the local fire department and an opportunity to have prevented or mitigated the damage was lost. The procedures used by KPL to inform its customers and the public of the dangers posed by leaking natural gas are consistent with those of most other gas system operators and include information to inform persons of the actions they should take to protect themselves and others should the odor of gas be detected and as well provide a means for reporting the gas leak to the gas company. The Safety Board has previously addressed industry public safety education programs, and in its report of an accident at South Charleston, West Virginia,[4] the Safety Board stated that it "continues to see at times a poorly informed and unresponsive general public [for recognizing and reporting gas leaks]." The actions of the persons who detected the odor of gas before two of the KPL accidents affirm the Safety Board's earlier doubts about the effectiveness of industry's public education programs. Those who detected the odors did not recognize the odor of natural gas as an imminent danger requiring immediate reporting and remedial action. The Safety Board believes that the DOT should reassess the effectiveness of existing gas industry public education programs to inform the public about the dangers of leaking gas and about the appropriateness of instructions provided for reporting gas leaks. Such an examination should include a review of the techniques employed in other education programs, such as drug interdiction and seat belt promotion programs, to identify those techniques that, with appropriate adaptations, could improve the effectiveness of the public educational programs of the gas industry.

Therefore, the National Transportation Safety Board recommends that the Research and Special Programs Administration:

> Require the installation of excess flow valves on new and renewed single-family, residential high pressure service

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[4] Pipeline Accident Report--"Columbia Gas of West Virginia, Inc, Explosion and Fire, South Charleston, West Virginia, October 17, 1983," (NTSB/PAR-84/04).

lines which have operating conditions compatible with the rated performance parameters of at least one model of commercially available excess flow valve. (Class I, Urgent Action) (P-90-12)

Assess the adequacy of and modify, as necessary, its program for monitoring and detecting inadequacies in state pipeline safety programs accepted by RSPA for determining compliance with Federal pipeline safety standards. (Class II, Priority Action) (P-90-13)

Emphasize, as a part of its Office of Pipeline Safety's inspections and during training and state monitoring programs, the actions expected of gas operators to comply with the continuing surveillance and failure investigation, including laboratory examination requirements. (Class II, Priority Action) (P-90-14)

Evaluate each of its pipeline safety regulations to identify those that do not contain explicit objectives and criteria against which accomplishment of the objective can be measured; to the extent practicable, revise those that are so identified. (Class III, Longer Term Action) (P-90-15)

Develop and make public through advisories or other means guidance detailing the types of actions expected of pipeline operators and the basis that will be used in assessing compliance for all pipeline safety regulations that do not contain explicit objectives and criteria against which accomplishment is to be measured. (Class III, Longer term Action) (P-90-16)

Amend the provisions of 49 CFR 192 that allow alternatives to the use of electric surveys for identifying areas of active corrosion to require that any alternative must provide data equivalent, both in timeliness and quality, to that obtained using electrical surveys. (Class III, Longer Term Action) (P-90-17)

Amend 49 CFR 192 to disallow the use of vegetation-type surveys for complying with any leakage survey requirement. (Class III, Longer Term Action) (P-90-18)

Amend 49 CFR 192 to make buried lines used to transport natural gas from the outlet of a meter to a customer's building fuel lines subject to the Federal minimum pipeline safety requirements. (Class III, Longer Term Action) (P-90-19)

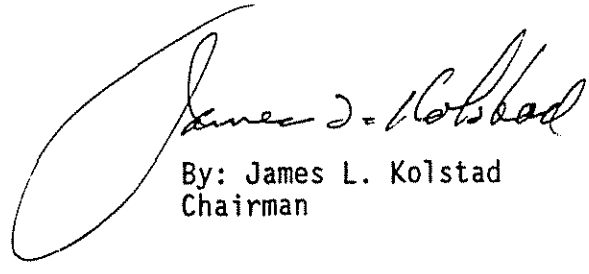
Require, by a time certain, that existing buried, unprotected gas piping be protected against damage from

corrosion or be replaced with piping resistant to corrosion damage. (Class III, Longer Term Action) (P-90-20)

Assess existing gas industry programs for educating the public on the dangers of gas leaks and on reporting gas leaks to determine the appropriateness of information provided, the effectiveness of educational techniques used, and those techniques used in other public education programs and based on its findings, amend the public education provisions of the Federal regulations. (Class III, Longer Term Action) (P-90-21)

Also, the Safety Board issued safety recommendations to the Kansas Power and Light Gas Service Company, American Gas Association, and the American Public Gas Association.

KOLSTAD, Chairman, COUGHLIN, Acting Vice Chairman, and BURNETT, Member, concurred in these recommendations. LAUBER, Member, did not participate.



By: James L. Kolstad
Chairman