RAILROAD COMMISSION OF TEXAS

PIPELINE SAFETY SECTION

Study Report on

COMPRESSION TYPE COUPLINGS

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SYNOPSIS

Over the past fifteen months, the Commission has investigated three incidents involving mechanical type compression couplings. While the leading cause of incidents in Texas is third party damage (77%), these recent incidents involving compression couplings raised our level of concern. Each of the incidents involved different type couplings and different operational characteristics, yet they all involved compression type couplings that were installed more than twenty years ago. Our investigation into the cause of these incidents has resulted in a specialized review of the installation of couplings in Texas. Of specific concern is the continued safe operation of natural gas distribution systems that contain compression type couplings. In an effort to determine the scope of the issue, the Safety Division initiated this study into the use of compression couplings in natural gas distribution systems in our State. This study has involved communication with our natural gas distribution operators, the National Transportation Safety Board (NTSB), the Pipeline and Hazardous Materials Safety Administration (PHMSA), as well as other state and federal safety representatives. Our goal is to determine the root cause(s) of these incidents, review operational history of the use of couplings, to allow us to reach consensus on appropriate actions to resolve the issues.

The path forward will require some modification to the existing directive and rulemaking initiative, as well as more communication between the operators and the Commission safety staff.

I. MECHANICAL COMPRESSION COUPLING INSTALLATION

Mechanical compression couplings are fittings used for joining two pipes together. There are other methods available for the joining of pipe and they include welding (steel pipe), heat fusion (plastic pipe), and bell and spigot joints (cast iron). Couplings join pipe segments that welding and fusion cannot, such as dissimilar materials and different pipe sizes. Couplings have been around as long as pipelines have been in existence. While there have been improvements in materials and manufacturing methods over the years, the basic design concept has not changed. The design premise is that most couplings rely on an elastomer (rubber seal) and compression (mechanical force) as the sealing mechanism. Couplings have been successfully used to connect steel, cast iron and copper pipes. Couplings have also been used successfully on polyethylene (PE) pipes when properly installed and supported.

In addition to the recent incidents in Texas, there is history within other states of significant incidents related to coupling failures. There are several manufacturers of compression couplings as well as an even larger number of vendors that sell modified versions of these products. Often times, there is a general reference to the "Style 90 Dresser" type coupling, but the name is sometimes used to describe the couplings manufactured by Norton McMurray (NORMAC), Rockwell, and Perfection.

For the purpose of describing and explaining a typical coupling, the Dresser type coupling is pictured below. This information was extracted from a diagram created by PHMSA. Figures 1 and 2 provide examples of a typical Style 90 type Dresser coupling. A number of variations are available to join similar materials (such as steel to steel or PE to PE) or different materials (such as transitioning from steel to PE as in Figure 2). In addition to the straight coupling shown below, the Style 90 can also appear as an elbow (45 or 90 degree), tee, reducing coupling, or integrated with a riser. A variety of gaskets and sleeves exist depending on the specific application.

Figure 1 – Example of a Style 90 Type Dresser Coupling, Open Ended Barrel for View of Components

Figure 2 – Cut-away of Style 90 Type Dresser Coupling Transitioning Plastic to Steel

Figure 3 shows a schematic of the compression mechanism. From the Dresser Coupling website (www.dressercoupling.com): “The “Universal” Style 90 locking design creates a positive pipe restraint. As the nut is tightened, it compresses the gasket, which forces the steel lock rings to collapse around the pipe end creating a strong grip. This gripping action actually increases as the pipe moves or attempts to pull out of the coupling. Properly assembled plastic pipe joints made with the Dresser “Universal” Style 90 product line meet or exceed the requirements of D.O.T 192.283(b).” In the cases of plastic pipe, an internal stiffener should be used, as shown in Figure 2.

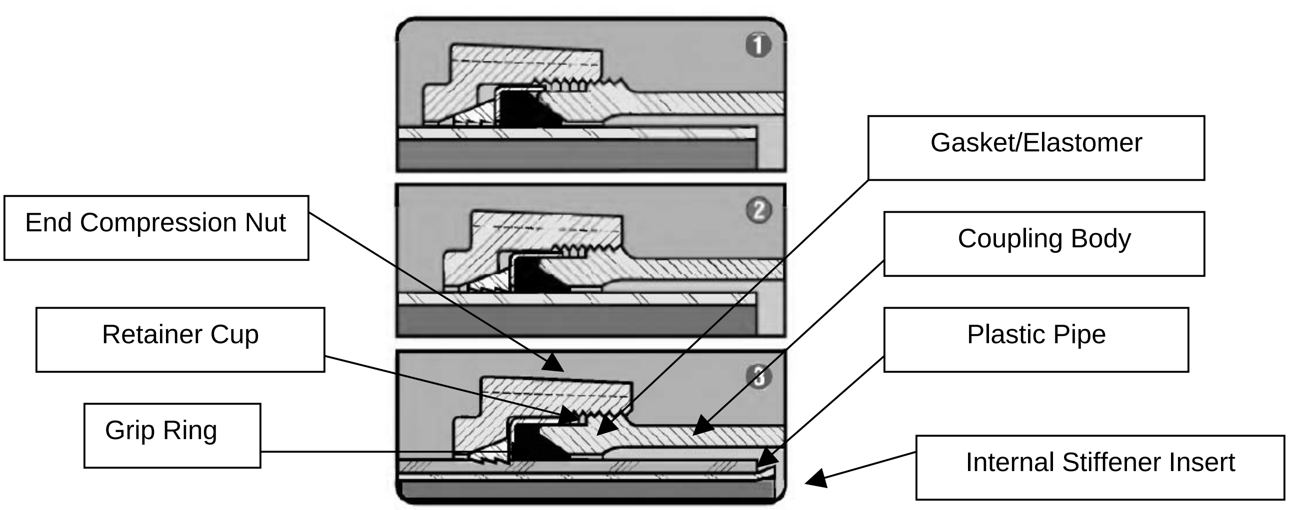

Figure 3 – Style 90 “Universal” end before tightening (1), after tightening onto steel pipe (2), and after tightening onto polyethylene pipe (3)

The ASTM International Standard D-2513 addresses different categories of compression couplings for use when joining plastic pipe. The following categories and test methods provide a uniform procedure for qualification or categorization of mechanical joints using short term pullout resistance tests and burst tests. The mechanical joint categories and test methods are as follows:

- Category 1-A mechanical joint design that provides a seal plus a resistance to a force on the pipe end equal to or greater than the force that will cause a permanent deformation of the pipe.
- Category 2-A mechanical joint design that provides a seal only. A mechanical joint designed for this category excludes any provisions in the design or installation of the joint to resist any axial pullout forces; therefore, tensile tests are not required.
- Category 3-A mechanical joint design that provides a seal plus a pipe restraint rating equivalent to the anticipated thermal stresses occurring in a pipeline. This category has a manufacturer's rated pipe end restraint less than the value required to yield the pipe as outlined in Category 1.

The regulations do not specify category designations in the rules.

II. REGULATIONS THAT APPLY TO THE INSTALLATION OF COMPRESSION COUPLINGS

The federal pipeline safety regulations have been in effect since 1971. The applicable sections that cover the installation of mechanical type couplings are found in 49 CFR Part 192, with specific sections §§192.161 (e), 192.281, 192.283, 192.285, and 192.287. The regulations require that the pipeline be designed and installed so that each joint will sustain the longitudinal pull out or thrust force caused by contraction or expansion of the piping or by anticipated external or internal loading. For most plastic service lines, anchors were not used on piping less than 2" in diameter.

An amendment to the federal regulations was issued on July 23, 1979 (44FR 42968), which amended these rule sections except for the §192.161 mentioned above. This rule became effective January 1, 1980 (Amendment 192.34). The amendment established tests for qualifying procedures and personnel to make all types of joints in plastic pipelines. The new requirements were intended to minimize the possibility of joints coming apart and causing gas pipeline failures.

All federal pipeline safety regulations are not retroactive. The only rules that can be applied retroactively are those found in Subparts A, M, I, L, K and O. The regulations for joining and installation are found in Subparts F, G, and H.

III. MECHANICAL COMPRESSION COUPLING FAILURES

In researching the use of compression couplings across the United States, two prevailing types of failures of compression couplings were identified. The first is a pullout of pipe from a compression coupling. In those cases, both steel and plastic, an additional and perhaps unique factor produced the pull-out forces. These additional factors may include thermal cycling, soil stresses, or even soil shifting by other means such as the ground movement associated with earthquakes or after heavy rains. In addition, there have been instances where improper installation or deterioration of the coupling has occurred. The common factor in all of the incidents reviewed was that the compression fittings provided inadequate restraint to assure safety under all service conditions.

The second failure mode involves leakage through the sealing surface between the coupling and the pipe, where long-term viscous and elastic effects eventually caused a leak path to develop. In some of the more recent cases, a change in distribution system gas quality was cited as a root cause of the failure.

IV. OTHER CONSIDERATIONS REGARDING SAFE OPERATION

It also may be important to consider other contributing factors can lead to incidents. With the requirement for distribution integrity management expected within this calendar year, it is important to review the operating history of distribution pipelines. While the integrity of distribution piping cannot be determined with in-line inspection activities and other current technologies, it will be important to rely on the operator and their operations and maintenance procedures and technologies to complete the first step of the integrity process which is “know your system.” Many of the operations and maintenance procedures are used to prevent accidents by continuing to monitor the daily operations of the pipeline system. Our findings have identified a need to enhance some of these routine maintenance activities.

The area the Commission has identified is leak survey, grading, and repair. If an operator is performing routine leak surveys the expected outcome is that leaks can be detected, preventing a more serious problem that may lead to an incident. Leak surveys should be conducted with qualified personnel and at the best conditions for the greatest results. Leak surveys should not be conducted during heavy rain periods where the gas can be subject to a “capping effect” where gas is prevented from properly migrating to the surface. There have been cases where a leak survey using properly calibrated equipment showed no problems in the months immediately preceeding the incident, then was followed by an incident involving sudden pullout only weeks later along with the identification of several more leaks in the immediate area.

V. INSTALLATION AND INCIDENT STATISTICS

Texas Incident Data

A review of our database from 1971 to present found 4,336 incidents were filed on the DOT incident report for distribution systems. Of those 4,336, 126 had listed a cause code of material failure, which is 2.9% of the incidents reported. The Safety Division staff reviewed the narrative descriptions of these incidents and identified a total of 84 incidents. For some of these incidents, the primary cause may have been related to third party damage; however, compression couplings were involved and are included in our count. This results in 1.9% of the reported incidents involved a compression or mechanical type coupling.

National Incident Data

PHMSA provided us information as a result of their search of over 3,400 gas distribution incident reports submitted to PHMSA since 1984. Of these 3,400 reports, they could only conclusively determine that 148 of those could potentially be coupling failures. That results in 4% of the incidents that may have been related to coupling failures on both steel and plastic pipe.

Installation Data-Texas Only

Based on the information provided by natural gas distribution operators in Texas, they report that 3,614,387 compression couplings have been installed in their systems, and currently there are 2,905,637 currently in service. The dates of installations range from the early 1900's to the present time. For compression couplings installed prior to 1980, the data indicates that an estimated 1,607,451 couplings that have been installed, and 781,398 are still in service at this time.

VI. NATIONAL INCIDENT HISTORY

In preparing this report, Pipeline Safety staff reviewed final reports issued by the National Transportation Safety Board and/or the regulating State agency involved in the investigation.

- On January 10, 1976, an explosion and fire occurred at the Pathfinder Hotel in Fremont, Nebraska when the polyethylene main was pulled out of a compression coupling. A 2" polyethylene main was inserted inside of a 4" steel casing, and the two sections of main were joined using a NORMAC compression coupling. The coupling was used to join the 2" plastic main to the 2" steel main. The NTSB found that the "pipe was not installed in accordance with several important manufacturer's recommendations, "[1] NTSB identified the probable cause to be "the contraction, due to cold temperatures, of a 2-inch polyethylene plastic main within a 4-inch casing. The contraction of the plastic main caused the pipe to pull out of the inadequately connected compression coupling.[2]

  This report also included an important distinction between plastic pipe installed in casings versus pipe that is directly buried in the soil. The report suggests that pipe buried directly is restrained by the weight of the soil, and it has to overcome soil frictional forces when the pipe contracts or expands. Specifically the report states "Therefore, the possibility that the pipe will pull out is minimized by direct burial, especially the pipe due to the weight of the soil, and it has to overcome soil frictional forces when the pipe contracts or expands. Therefore, the possibility that the pipe will pull out is minimized by direct burial, especially when the pipe is snaked in the ditch near the connections to provide slack and to ensure that the pipe is in compression rather than in tension when the end is placed in the compression coupling."[3]

- On February 8, 1976, an explosion and fire occurred at a residence in Phoenix, Arizona. A compression coupling on a 2-inch plastic main was found leaking in the alley behind the house. The NTSB reported that the "2-inch pipe appeared to have been inserted insufficiently through the gasket and into the coupling. Gas which leaked from this joint was trapped from above by heavily compacted soil; it consequently seeped into the house, where it was ignited by an unknown source."[4] NTSB found that the gas company had prior history of a similar incident due to inadequate installation training and procedures.

- On December 15, 1977, an explosion and fire occurred in downtown Lawrence, Kansas when a polyethylene main pulled out of a compression coupling. The 2-inch polyethylene gas main was inserted inside of a 3-inch abandoned steel gas main. The plastic pipe was connected to the associated steel main with a Dresser Style 90 standard compression coupling. One end of the polyethylene main was anchored and the other end, where the pull out occurred, was not anchored.

- On January 8, 1981, an explosion and fire occurred in downtown Mexico, Missouri when a 2-inch plastic gas main pulled loose from a compression coupling. The 2-inch polyethylene main was inserted inside of an abandoned 4-inch cast iron main. The plastic pipe was connected with two standard compression couplings. The pipe was not restrained and was installed with a smooth steel insert. NTSB did issue a recommendation to the natural gas supplier to "Review company records and maps to identify locations where compression couplings are installed on unrestrained plastic pipe of sufficient length that thermal contraction could cause separation from the couplings and take corrective action as necessary to prevent such separations."[5]

- On February 22, 1985, an explosion and fire occurred at a tavern and a connecting building killing three persons in Sharpsville, Pennsylvania. The explosion resulted when a 6-inch polyethylene main pulled out of a Dresser compression coupling. The 1500 feet of polyethylene pipe and the five Dresser 70 "posi-hold" compression couplings were installed in the summer of 1979. The NTSB report notes, "The engineering department did not calculate any forces due to contraction that might be experienced on this line, nor did the department check any of the couplings for pullout ratings. The fact that approximately 120 feet of the 6-inch-diameter plastic pipe was to be installed in an 8-inch-diameter steel casing pipe and would be unrestrained also was not considered."[6]

  The NTSB final report listed as one of its conclusions, "The pullout occurred near the steel casing pipe on the south side of the railroad track where approximately 120 feet of the plastic pipe in the casing lay unrestrained by soil forces and was free to contract and expand." In addition, "Three of the other four couplings in this gas main, which were of the same type as the failed coupling, did not fail because soil frictional forces on the plastic pipe aided in restraining the contraction of the pipe."[7]

- On February 19, 2004, and explosion and fire occurred in Buffalo, Minnesota when a service line pulled out of its compression coupling at the service riser. The Minnesota Office of Pipeline Safety's report included a finding that…"there is a potential for similar installation in the Old Midwest Gas Area." [8] All of the findings related to this incident are included in the findings for the explosion that happened in the same area on December 24, 2004. The investigation also revealed that the coupling was installed using a split sleeve stiffener. No violations of the pipeline safety regulations were identified regarding the installation of the compression coupling.

- On December 28, 2004, and explosion and fire occurred in a downtown building in Ramsey, Minnesota killing three. This incident was the second in Minnesota during the same calendar year that involved a pull out of a service line from its compression coupling. The MNOPS determined that the "fitting was not assembled properly to resist the pull-out forces of thermal contraction and soil loading."[9]

VII. TEXAS INCIDENT HISTORY

- On September 28, 1980, and explosion occurred in Keller, Texas. The incident was a result of natural gas leaking from a compression coupling at the service tap off of the main. The Dresser coupling was installed in 1950, and the leak was found after an extended period of dry weather follow by heavy rains. The NTSB report stated, "Although not designed to prevent pullout, the standard compression coupling would probably have held, had it been properly tightened during installation; witness the downstream end of the coupling which did hold." This sentence precedes the sentence regarding the soil stress and the near record drought followed by rainfall information.

- On October 10, 1998, an explosion occurred in Arlington, Texas. Natural gas was found leaking at the compression coupling on the service tap on the main. The type of coupling was not identified. The service line was found separated from the tap.

- On December 13, 2000, an incident occurred in North Richland Hills, Texas. It appears that a tree root grew around the compression coupling that was used to join the polyethylene service line to the customers copper yard line. The manufacturer of the coupling was not known, however, the coupling was installed in 1973. The service lines were not separated from the coupling, the coupling was leaking.

- On May 24, 2001, and incident occurred in Dallas. A steel service line was pulled out of the compression coupling at the service tap off of the main. It is unclear as to the manufacturer of the coupling, the report refers to a dresser which is often used generically for all compression type couplings. There was third party damage, where a contractor pulled the service line out of the coupling. A contractor for the City of Dallas was working on the sewer line and failed to report the damage to TXU.

- On October 16, 2006, and explosion and fire occurred in Wylie, Texas, at a residence killing two people. The incident was the result of a service line pulling out from its compression coupling at the service riser. The compression coupling and service line were installed in 1979 with an internal stiffener. There was change in the soil conditions in the years leading up to the incident. There was a long period of dry weather and at the time of the incident there were heavy rains.

- On January 25, 2007, an explosion and fire occurred in Missouri City. A compression coupling on the 2 inch poly main was found leaking. The leak was on the main not at a tap location. The style of compression coupling is not known, nor the date of installation. The coupling was found leaking on the main, not separated. The coupling was installed without the required internal stiffener.

- On May 29, 2007, an explosion and fire occurred in Cleburne, killing two people. A leak on a steel compression coupling at the steel service tap off of the steel main was found leaking. The compression coupling is a NORMAC coupling installed in the 1950's.

VIII. ADVISORIES/NTSB RECOMMENDATIONS

The NTSB has issued several recommendations after each of the incidents they investigated. P-73-3, P-76-43 through P-76-45, and P-78-33, related to compression couplings. In P-76-45 asked the DOT to "Determine if there are locations or circumstances where standard compression coupling are unsafe, and amend 49 CFR Part 192 accordingly to prohibit their use for such applications. " The Material Transportation Bureau replied "We believe that a properly installed compression coupling can be utilized in virtually all locations or circumstances. At this time, we have no evidence to indicate that the use of compression couplings must be predicated on the location or other circumstances. Furthermore, there are many situations where the flexibility offered by the use of a mechanical coupling is an added safety factor. A special study to define where mechanical joints should or should not be used will require considerable staff time which, in our opinion, would result in a comparatively minor improvement in safety."[10] In September 1988 the NTSB accepted DOT's response to these items, which was the rulemaking found in docket PS-54, which is the amendment 192-34 adopted in 1980. The actions were considered "Closed-Acceptable Alternate Action" by the NTSB.

As a result of the NTSB recommendation to DOT following the Sharpsville, Pennsylvania incident, DOT issued Advisory Bulletin ADB-86-02 to all pipeline operators. As stated in the bulletin, OPS' purpose was to "Inform natural gas pipeline operators to review procedures for using mechanical couplings…." Operators were asked to "review their procedures for using couplings" and they were asked to "evaluate the procedures used for each type of coupling connection and take action as appropriate." This document is considered an advisory bulletin and did not require any action regarding the removal of pipeline components. The bulletin specifically mentions the Sharpsville incident and states that failures were attributed to temperature related contraction of the plastic pipe and the inadequate restraining capabilities of the mechanical coupling.

The bulletin was issued at a time when DOT was also issuing Alert Notices. In the year following, OPS issued an alert notice, ALN-87-01, which OPS "strongly recommended" all operators to review their procedures and if they used those procedures, "immediately discontinue this procedure." This strong language was not used in the 1986 advisory bulletin.

Additionally, the OPS website contains information regarding the use of advisory bulletins, and the states:

> "PHMSA uses Advisory Bulletins to inform affected pipeline operators and all Federal and state pipeline safety personnel of matters that have the potential of becoming safety and/or environmental risks."[11]

IX. STATE PROGRAM INITIATIVES

In conducting research regarding compression coupling and fitting replacement programs, we identified the following states that have taken action. This list does not include all of the states activities, more data is being collected as part of the federal/state initiative on the PPAHC.

- In May 1994, the New York State Public Service Commission issued their findings in NY PSC Case 93-G-0401. The NYPSC initiated an investigation to review the increased number of leaks found involving the gaskets and seals on the Norton McMurray (NORMAC) compression couplings. The study was limited to their distribution system on Long Island. The report entitled "In the Matter of the Consumer Protection Board Petition to Establish a Prudence Proceeding against the Long Island Lighting Company (LILCO) Related to the Replacement of Approximately 45,000 Natural Gas Service Lines equipped with Norton-McMurray Couplings." Their report and findings were based on the quality of the gas being transported in the pipelines that were resulting in a deterioration of the gasket material inside the compression coupling. The company voluntarily replaced the identified couplings.

- In May 2005, the Minnesota Office of Pipeline Safety issued a compliance order to Centerpoint Energy to replace service lines installed prior to January 1, 1984, or visually inspect the entire service line to verify if it contains only mechanical fittings that comply with §192.283(b). Any mechanical fitting identified that does not meet the requirements of §192.283(b) must be replaced.[12]

  This compliance order was issued after CenterPoint Energy (CPE) experienced its second incident involving compression couplings that were installed without the proper restraining device made for the coupling. The first incident occurred in February 2004. After the first incident, MNOPS began to review the couplings installed in the North Central system, and while the study was ongoing the second incident occurred on December 24, 2004.

The MNOPS and CPE review and replacement was limited to the Old Midwest Gas Area/North Central Public Service Company

- The State of Ohio has conducted an investigation to examine the installation, use and condition of gas risers and their failures. In 2004, Batelle delivered a report to the Cincinnati Gas and Electric Company summarizing their findings on the investigation into Leaks from Risers. Ohio compression couplings also involve the service riser but the compression coupling is located at the surface of the meter riser as it comes out of the ground. The couplings in Texas have been on the end of the service riser where the service lines connect to the riser underground. Ohio safety staff has presented their findings to their Commission for further action. At this time there has not been a mandatory replacement program initiated; however, Columbia gas conducted a review of their service riser couplings and have found over 300,000 of their 1.3 million customers that will be changed out.

- In 2005, Washington Gas Company reported the increased incidence of natural gas leaks attributed to gaskets and gas quality on mechanically coupled steel pipe in a major portion of its distribution system. Their study was initiated based on the transportation of LNG where the gas appears to be drying out the compression coupling seals.

X. PHMSA AND NTSB INITIATIVES

PHMSA's goals pertaining to pipeline safety are designed to accurately assess pipeline operational safety, identify problems, and take action to correct them. Thus, the regulations have been updated to reflect such issues in 49 CFR Part 192, Subpart F (1980). PHMSA currently has several regulations in place on design, installation and maintenance of plastic pipe and fittings: §192.159 Flexibility, §192.191 Design pressure of plastic fittings, §192.273 Design and installation of joints and couplings, §192.281 Plastic pipe, and §192.283 Mechanical joints.

PHMSA is looking at how distribution integrity management (DIMP) can help to identify leading and lagging indicators, and what actions PHMSA and the States can take to help assure DIMP effectiveness.

PHMSA currently facilitates the newly formed Plastic Pipe Ad Hoc Committee (PPAHC) comprised of members of the National Association of Pipeline Safety Administration (NAPSR). The Committee's primary focus is addressing the causes of mechanical fitting and appurtenance failures in the Nation's pipelines and recommending specific regulations be considered for amendment. At the last meeting on December 5-6, 2007, representatives from states such as Texas, Ohio, and Minnesota addressed the fitting and riser problems they are experiencing. Although there was no single common criteria present in all incidents, a few factors did overlap. Participants also received useful information on lessons-learned and repair/replacement programs that exist in other states.

No previous or present PHMSA Research and Development is directly addressing the coupling issue. However, a number of projects have been identified as worth following to provide some useful info for the PPAHC. PHMSA is now reviewing proposals under a current R&D solicitation. There was one proposal submitted by the Texas Gas Associations that does address the elastomer issue of compression couplings.

The Safety Division staff has been in contact with the NTSB during the course of this study. PHMSA and NTSB have also met to discuss this issue.

XI. TEXAS INITIATIVES

In April 2007, the Commission initiated a study to review operational history of compression couplings installed at service riser locations. The initial request for information was limited to compression couplings installed as part of a "prebent" service riser installation.

Following the incident in Cleburne, Texas, the Safety Division felt the study should be extended to the use of compression couplings or mechanical fittings on any portion of the pipeline. The study asked for information on the installation of mechanical type fittings for the entire pipeline systems. In addition, we requested failure data on compression couplings installed in the systems. Our subsequent letter was sent in July 2007, and operators sent in installation data by date and manufacturer to the Commission. The data for the failures of compression couplings continue to be collected and reported to the Commission and will continue in the current rulemaking process for repaired leak data.

Pipeline Safety inspections conducted since July 2007, have included information regarding the leak surveys conducted on the distribution systems and the results of those surveys. There has been a more focused review of the leak survey procedures and the employee qualifications regarding leak surveys. We also expect the rule changes that have been proposed will address some of the issues identified during the specialized safety evaluations.

In July 2007, the Commission also supported the Texas Gas Association's application to PHMSA for Research and Development funding to research the use of elastomers in compression couplings. The Commissioners sent a letter of support on this project to help evaluate the serviceability of compression couplings.

On October 9, 2007, the Commission adopted the first directive as a result of our study. The directive required all operators that find compression couplings leaking to replace the coupling or repair the coupling by welding over a protective sleeve. The Commission also required the replacement of mechanical couplings that were identified through a leak repair that may be susceptible to pull out forces. For steel pipe using a coupling, the coupling can be repaired by welding a sleeve over the coupling. If they choose not to repair the coupling, they must replace the coupling. The directive required, for plastic pipe, to replace any leaking coupling, and to replace any coupling that is exposed that the operator can not confirm is resistant to pullouts and provide a secondary form of restraint.

The Commission is also working on a rule proposal to require all pipeline operators to report all repaired leaks on their pipeline system. The report will include information on the type of leak, the cause of the leak, and the leak repair method. While the safety inspections request information during the field reviews, the requirement for all operators to semiannually report their leak repairs by pipeline system, will allow the Safety Division to review the data to determine if there are any trends in the data at the system level, company level, and statewide level. This data will aide the staff in determining where to focus the inspection programs for each year.

On November 2007, the Commission approved a rulemaking to address two of three recommendations, and adopted the third as a directive. The first recommendation is for each operator to create a risk based model for scheduling and conducting leak surveys of their pipeline system based on established risk factors. The Pipeline Safety Section recommended the use of the model as an alternative to a prescriptive based regulation to increase leak survey frequencies. Staff felt that conducting leakage surveys in some areas at five year intervals was too long in certain areas. For example, the sample model developed, discussed the need for more frequent leakage surveys in those areas with steel pipe installed prior to the requirement for cathodic protection that has been experiencing leaks on the pipeline system. The model also confirmed the five year leakage survey period for new polyethylene lines installed below ground in areas that were not subject to third party damage (its greatest risk for damage in the model.) The Safety Division is proposing to incorporate this risk model into the current requirements for natural gas distribution system for two reasons. The first reason is the changes in the operations of the distribution systems in Texas. We have identified risks that affect the continued safe operation of pipelines. By adopting this model, each operator can apply the risk factors to their pipeline segments or systems to determine if a more frequent leak survey is warranted for enhanced safety. The second reason is to reduce the number of leaks that may be leaking over a period of time. For example, if a leakage survey is conducted on an annual basis and a leak is identified, the leak will be repaired within a six month to thirty six month time frame. If the leak survey frequency remained at the five year time frame, the leak could remain unrepaired for that period of time. This change in the survey frequency combined with the requirements for leak repairs, more leaks will be repaired sooner.

Additionally, the leak survey model suggested as part of this rule will go in hand with the distribution integrity management rules being developed by the federal Office of Pipeline Safety. Leak survey, leak monitoring, and leak repair are a very important factor in the integrity assessment and management of the pipeline systems. The implementation of a risk model and consistent leak grading and repair procedures will allow Texas operators to assess the overall integrity of their systems and manage them according to the federal requirements.

The second recommendation was a leak grading and repair proposal. This second proposal provides a consistent application of what a “graded” leak is in Texas. For many years, operators throughout Texas and the United States have used different systems to characterize leaks. The Commission is attempting to adopt what is considered a national standard developed through consensus as part of the Gas Piping and Technology Committee’s (GPTC) work. The rule proposal takes the guidelines for determining what a Grade 1, 2 or 3 leak is and then establishes time frames for repair. While the GPTC guide has different repair timeframes for the Grade 2 and 3 leaks, the Commission is recommending the six month time for repair of Grade 2 and the three year time for repair of Grade 3 to reduce the overall number of unrepaired leaks in our state. Data collected from annual reports submitted to the Commission reflect that while the number of leaks repaired each year grows, so does the number of leaks scheduled for repair also grow. Applying the grading of leaks consistently across the state, will allow the regulators and the operators within the State to “talk the same language” when it comes to existing leaks and the methods of repair on those leaks.

The third recommendation involves the replacement of certain compression couplings. This past year, the Commission has investigated several incidents that have involved compression couplings. Through our investigations, staff has recognized that there may be performance issues with certain types of compression couplings. While we have not concluded that all compression couplings manufactured before 1980 are susceptible to pull outs, we have identified certain couplings that have experienced leaks. These couplings may already be subjected to a replacement program and this rule requires the couplings to be removed within a two year time frame. The rule is written to require the replacement of those compression couplings already identified by the operator as part of their replacement program.

XII. Path Forward

I recommend that the directive issued on October 9, 2007, be amended to specifically require all 2” and under compression couplings be ASTM D 2513 Category 1 only. The Category 1 designation replaces the description that the coupling be resistant to pullout. This change will require that any time a compression coupling is installed to join plastic pipe, it must be designated as a Category 1 type fitting. Anytime that a coupling is exposed, if the operator cannot confirm that the fitting is indeed a Category 1 fitting, the fitting must be replaced with a Category 1.

Fittings for larger diameter plastic pipe (>2”) may also have to be addressed, and that data will be reviewed during the semi annually reporting of repaired leaks. At this time I would recommend that for pipe larger than 2” the fitting be designated as a Category 1 or Category 3 type fitting.

For compression couplings used to join steel pipe, I would recommend we continue the requirement to repair or replace the leaking couplings. In addition to this, I would recommend that anytime a coupling used to join steel pipe is exposed, if the coupling was installed prior to 1980, the fitting must also be replaced.

Modify the form used in the July 2007 questionnaire that required information on failed compression couplings to require the information be filed with the Commission as a part of the semi-annual leak repair data. This would require a change to the proposed PS-95 form for reporting to capture the data specific to compression coupling model and manufacturer.

Conduct annual meetings with the industry to evaluate and review the leak repairs reports and the annual incidents to determine if there are any trends or concerns regarding the pipeline systems. The meeting will be a discussion of events within the industry, trends or characterization of the leaks repaired during the year as well as the number of leaks scheduled for repair at the end of each year. The most important portion of the meeting will be a discussion of the incidents that occurred over the prior 12 months. The discussion will include a presentation by each operator of their incidents with their findings as required as part of §192.617. These discussions will assist in the determination if new rules are required to address any problem areas or omissions that may be found in the pipeline safety regulations.

Continue to participate on the PPAHC subcommittee and follow the projects underway with the group. One of the initiatives underway is a survey related to repair/replacement programs underway throughout the country. The survey has been circulated amongst the National Association of Pipeline Safety Representatives (NAPSR) membership and the group is scheduled to meet the first week of March 2008.

[1]NTSB-PAR-76-6, page 9.
[2]NTSB-PAR-76-6, page 20.
[3]NTSB-PAR-76-6, page 14.
[4]NTSB Safety Recommendations P-76-17 through 19.
[5]NTSB Recommendation P-81-21, Issued August 3, 1981.
[6]NTSB-PAR-85-02, page 8.
[7]NTSB-PAR-85-02, page 26.
[8]State Fire Marshal and Pipeline Safety, Minnesota Office of Pipeline Safety, Case 004635, page 3.
[9]State Fire Marshal and Pipeline Safety, Minnesota Office of Pipeline Safety, Case 005217
[10]NTSB-PAR-78-4, page 25.
[11] http://ops.dot.gov/regs/advise.htm

[12]State Fire Marshal and Pipeline Safety, Minnesota Office of Pipeline Safety, correspondence dated May 3, 2005.