



PHMSA TAG Grant DTPH 56-09-PHPT06
Final Report – Narrative – June 2011

In September 2009, a PHMSA Technical Assistance Grant was awarded to the Fort Worth League of Neighborhoods to produce a report (“State of Gas Pipelines in Fort Worth”) to call attention of the public, governmental officials, and industry to natural gas pipeline planning and placement issues in the city.

With TAG funds, in the spring of 2010, the League hired nationally recognized gas pipeline technical expert and engineer Richard Kuprewicz of Accufacts, Inc. (Redmond, Washington) and pipeline policy expert Carl Weimer, Executive Director of the Pipeline Safety Trust, (Bellingham, Washington) to research and write the report. Kuprewicz and Weimer visited Fort Worth twice in the spring and fall of 2010. The League arranged information gathering meetings for them with energy company and pipeline company representatives, local and state elected leaders, and neighborhood representatives as well as representatives of the Texas Railroad Commission.

The team wrote and produced the report (“The State of Natural Gas Pipelines in Fort Worth”) for public presentation on October 21, 2010. The League arranged extensive press coverage of the report and its conclusions. The report was later presented at the November 2010 Pipeline Safety Trust conference held in New Orleans. Through the release of the report on the League’s website (www.fwlina.org) and through the presentation of the report to Fort Worth neighborhood organizations through the website, League general membership meetings, individual neighborhood association meetings, and various meetings of energy industry professional groups, thousands of Fort Worth citizens have seen the report’s conclusions.

In January 2011, the members of the Fort Worth City Council requested a special briefing on the report which was provided by Carl Weimer at the council’s January 4, 2011 pre-council work session. Favorable response to information in the report as well as to the release of the national PIPA document has led the council to direct Fort Worth city staff to draft both a pipeline consultation zone ordinance and a pipeline notification zone ordinance. The ordinances are expected to receive further council review and approval in summer 2011. The League continues to present regular updates and workshops on the report and the state of natural gas pipelines to its member organizations and the public at large. The PHMSA TAG funded “State of Natural Gas Pipelines in Fort Worth” report has been an important tool to better inform the public, elected leaders and industry on pipelines in the city and to affect beneficial changes in local pipeline policy and practices.

The State of Natural Gas Pipelines in Fort Worth



Produced By

Accufacts Inc.

"Clear Knowledge in the Over Information Age"

Richard B. Kuprewicz
President, Accufacts Inc.
(425) 836-4041
kuprewicz@comcast.net

Pipeline Safety
TRUST

Credible.
Independent.
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1155 N. State St. Suite 609
Bellingham, WA 98225
(360) 543-5686
<http://www.pstrust.org>

Produced For



October 2010



P.O. Box 3088, Fort Worth, Texas 76113 <http://www.fwlina.org>

Dear Neighbor,

As I am sure you are well aware, many of the neighborhoods within Fort Worth have struggled for the past few years with the growing natural gas development in our midst. Drilling is a complex issue, particularly in an urban setting. While gas well drilling can represent a significant economic benefit to many, it also brings with it an increased safety risk to all of us who live in Fort Worth. As many newspaper and television stories have portrayed, trying to understand and measure that increased risk is often difficult and contentious.

In the spring of 2009 the Fort Worth League of Neighborhood Associations learned of a new grant program from the U.S. Department of Transportation's Office of Pipeline Safety. Each grant made up to \$50,000 available for local communities to hire independent pipeline expertise to investigate and report on pipeline issues that are of concern to those communities. We applied for, and received, one of those grants to help provide expert, objective information about the safety of the growing number of natural gas pipelines that increasingly crisscross our neighborhoods and our city.

The following report is the culmination of this grant effort. We hope you find it informative and helpful in ensuring the safety of the pipelines in your neighborhood and in our city.

Sincerely,

Libby Willis
President
Fort Worth League of Neighborhood Associations

Report Summary

Since early in 2010 the Pipeline Safety Trust and Accufacts have been discussing with members of the Fort Worth League of Neighborhood Associations their concerns about the level of urban gas drilling occurring in Fort Worth, and the large expansion of pipelines that will naturally follow. In April we traveled to Fort Worth and met League members, members of the Fort Worth City Council and City staff, representatives of the Railroad Commission of Texas (RRC), state legislators, and representatives from many of the pipeline companies. From these discussions, meetings, area news stories, and publicly available information we have prepared the following report on the state of natural gas pipelines in Fort Worth.

Drilling in urban areas poses many difficult questions including impacts to air and water quality, and increased risk to human health and safety. This report focuses solely on the issues associated with the natural gas pipelines in Fort Worth, with a particular emphasis on the increasing number of pipelines created by the urban drilling.

The report tries to provide enough information so those not involved with pipelines on a daily basis can understand the differences between the different types of pipeline and how they are regulated, operated, maintained and where more information is available. We also try to address, from our point of view, the various concerns we have heard from people in the Fort Worth Area.

In preparing this report we used a good deal of information that is publicly available, mainly from the federal Office of Pipeline Safety (OPS)¹ and the Railroad Commission of Texas (RRC). In some cases we tried to verify pieces of information that we found confusing, but for the most part we took this information at face value. In other words, if the RRC website says there is a 30 inch pipeline with a maximum allowable operating pressure of 1200 PSIG running along the east side of Old Denton Road we have assumed that information is accurate enough for the purposes of this report.

Among the questions this report tried to answer are:

- What are the types of natural gas pipelines in Fort Worth and how to learn the general locations?
- Who regulates the siting and safe operation of these pipelines?
- What are the basic safety requirements for constructing, operating and maintaining these pipelines?
- What risks do these pipelines pose to public safety?
- What can be done to reduce these public safety risks even further?

In the report you will find a number of recommendations that various agencies and stakeholder groups could adopt that would make pipelines in Fort Worth even safer. Those recommendations include:

The U.S. Congress or the federal Office of Pipeline Safety Could:

1. Implement a rulemaking to clarify the point where onshore regulated gas gathering lines begin (49 CFR Part 192.8). That point should be defined to ensure there are no unregulated gas pipelines off of well pads in class 2, 3, or 4 areas, or other “identified sites” where large groups may gather.
2. Implement a rulemaking to include all Type A gathering lines (49 CFR Part 192.9) under the full requirements of the Integrity Management program (49 CFR Part 192 Subpart O) that currently only applies to transmission pipelines.

¹ The Office of Pipeline Safety (OPS) is within the Pipeline and Hazardous Materials Safety Administration (PHMSA), which is part of the U.S. Department of Transportation. Often OPS and PHMSA are used synonymously.

3. The federal Office of Pipeline Safety or the RRC should undertake a study to determine the benefits and risks of odorizing gathering lines in populated areas. That study should at a minimum address the concern of proper injection of odorant at multiple well sites, how and at what concentrations heavier than air gas components may change the need for odorants, and the apparent disconnect between the requirements for odorant in Type A gathering lines in populated areas and the various exemptions to those requirements, particularly related to gathering lines transporting gas in urban areas.

The Texas State Legislature Could

4. Make clear that in urban areas pipeline routing using road rights-of-way under TxDOT control is an approved use as long as it is done in a way that does not conflict with highway safety or future planned expansion of highways.
5. Consider forming some type of pipeline siting commission that would be independent from the inherent conflict of interest that pipeline operators or the monetary beneficiary for well leases and rights-of-way agreements often have. Such a body could be empowered to establish safe pipeline routes for high stress pipelines in populated urban areas.
6. Fund a study of the Fort Worth area to determine how much duplicate pipeline infrastructure could have been avoided already, and into the future, if those companies drilling in urban areas were required to master plan shared pipeline infrastructure as part of their well development strategy.

The Railroad Commission of Texas (RRC) Could

7. Use their own authority on intrastate pipelines in Texas to adopt recommendation 2 above.
8. Amend current rules to allow municipal government to adopt stricter pipeline safety standards on intrastate pipelines as long as they are compatible with state and federal regulations.
9. Undertake a study of the production pipelines that occur before the first point of measurement on or off the well pads in Fort Worth to determine if those pipelines are putting people at the same level of risk as regulated production, gathering and transmission pipelines and therefore need to be under the same pipeline safety regulations.
10. Make it clear in their rules that the exemption available under TITLE 16, PART 1, CHAPTER 8, SUBCHAPTER A, RULE §8.1(c)(2) will not be granted if it will allow a company to operate pipelines under regulations less stringent than what the RRC has set.
11. Provide clear publicly available documentation regarding their involvement during construction of new intrastate pipelines. That documentation should either provide evidence that they have the involvement necessary to catch the types of problems identified by OPS, or are taking the steps necessary to do so.
12. The federal Office of Pipeline Safety or the RRC should undertake a study to determine the benefits and risks of odorizing gathering lines in populated areas. That study should at a minimum address the concern of proper injection of odorant at multiple well sites, how and at what concentrations heavier than air gas components may change the need for odorants, and the apparent disconnect between the requirements for odorant in Type A gathering lines in populated areas and the various exemptions to those requirements, particularly related to gathering lines transporting gas in urban areas.
13. Add the cause of the excavation incident as well as the fines levied to the database fields in their Texas Pipeline Damage Prevention Query system.

14. Review and remove most of the exemptions included in their damage prevention regulations (TAC Title 16, Part 1, Chapter 18).
15. Create a publicly accessible docket system that would include all information about pipeline enforcement cases and fines. It also would include any requests for exemptions or waivers and the RRC reasoning for granting or denying such requests.
16. Make its incident database available to the public. Instead of just reporting the number of incidents reported, information about the particular pipeline involved, date, location, damage caused, and cause should also be provided.

The City of Fort Worth Could

17. Use the powers granted them for protecting public welfare, and for the approval of where pipelines cross public property and rights-of-ways, to ensure that whenever feasible, new natural gas pipelines are routed in the least populated areas. This would include corridors along main roads and railroads, and current open space not slated for future residential or commercial occupancy or intense recreational use.
18. Ensure that adequate public discussion of pipeline route selection is included before siting approval is granted. This would include review by the appropriate advisory committees such as the Gas Drilling Review Committee, the Zoning Commission, the Plan Commission, the Parks and Community Services Advisory Board, etc.
19. Schedule a City Council work session to get a presentation on the final Pipelines and Informed Planning Alliance Report when it is released, and then decide how to proceed to adopt the parts they feel important. At a minimum they should adopt the Consultation Zone process into City Code.
20. Review their employee training regarding damage prevention to ensure the One Call system is being used before all excavation and that safe excavation practices are followed.
21. Make all pipeline permit information publicly available online, and ensure that the maximum allowable operating pressure (MAOP), pipe diameter, and potential impact radius distances of all pipelines are provided in such information before approval is sought from various committees or the City Council.
22. Make all permitted pipeline routes available online before approval is provided. To ensure the City is using its approval authority to help develop safe pipeline routes, when approval for crossing of City rights-of-way or other city controlled property is sought the route of the entire pipeline should be provided not just the location where the pipeline will cross.

The Pipeline Industry Could

23. Provide their expertise and cooperation in working with the City of Fort Worth to route pipelines in the least populated areas feasible.
24. Make specific information about pipeline routes, construction, specifications, operations and inspections of their pipelines available on their websites.

The Citizens of Fort Worth Could

25. Learn where the pipelines are in their neighborhoods, and make sure they use the One Call system before digging. They should learn whom to contact if they see someone else they believe is digging without using the free One Call locate service, and who to notify and what actions to take if they suspect a release is occurring.

26. Continue to review pipeline safety information and make elected officials, regulatory agencies and the pipeline industry aware of concerns they have regarding the inability to access pipeline safety information.

Background



The Natural Gas Resource

The Barnett Shale is situated in North Texas, and is one of the largest natural gas reserves in the country. Covering an area of 5,000 square miles, production takes place in 23 counties from nearly 14,000 wells.² Much of the Barnett Shale gas reserve lies under the Fort Worth metropolitan area. In 2003, the U.S. Geological Survey estimated that this area held a volume of 26 trillion cubic feet of recoverable gas.³

The City of Fort Worth

Fort Worth is the 17th largest city in the United States and over the last several years has consistently been among the fastest growing cities in the country. Within Fort Worth's city limits, an area of 300 square miles, reside more than 736,200 people.⁴

Although drilling for gas in urban areas is not new, it is unlikely that the extraction activities in other areas have been of the magnitude of those in the City of Fort Worth. There are currently at least 1224 producing gas wells in the city, an additional 450 wells that have been permitted, and 64 applications are pending⁵.

Top Ten 2009 Barnett Shale Gas Operators According to RRC Data

Operator Name	Gas Produced (MCF)
1. DEVON ENERGY PRODUCTION CO, L.P.	70,186,229
2. CHESAPEAKE OPERATING, INC.	53,895,594
3. XTO ENERGY INC.	46,089,101
4. EOG RESOURCES, INC.	27,573,566
5. QUICKSILVER RESOURCES INC.	17,260,127
6. ENCANA OIL & GAS(USA) INC.	11,759,229
7. RANGE PRODUCTION COMPANY	8,306,251
8. CARRIZO OIL & GAS, INC.	6,072,955
9. WILLIAMS PROD. GULF COAST, L.P.	5,958,004
10. BURLINGTON RESOURCES O & G CO LP	5,934,708

With gas drilling activities located in such densely-populated areas, there naturally arises a heightened public awareness of and concerns about the impact of these activities on public safety and health.

² Railroad Commission of Texas, "Newark, East (Barnett Shale) Statistics updated 12/29/09"

<http://www.rrc.state.tx.us/data/fielddata/index.php>

³ "Barnett Boom Ignites Hunt for Unconventional Gas Resources" January 2007,

www.jsg.utexas.edu/news/feats/2007/barnett.html

⁴ North Central Texas Council of Governments, <http://www.nctcog.dst.tx.us/ris/demographics/population.asp>

⁵ City of Fort Worth website, <http://www.fortworthgov.org/gaswells/default.aspx?id=50608>

What Kind of Natural Gas Pipelines Are in Fort Worth

There are four main types of natural gas pipelines in Fort Worth, and it is important to understand what the different types are since they have different safety considerations and are regulated by different agencies under different rules.

The four main types, in order from the gas well to your house, are:

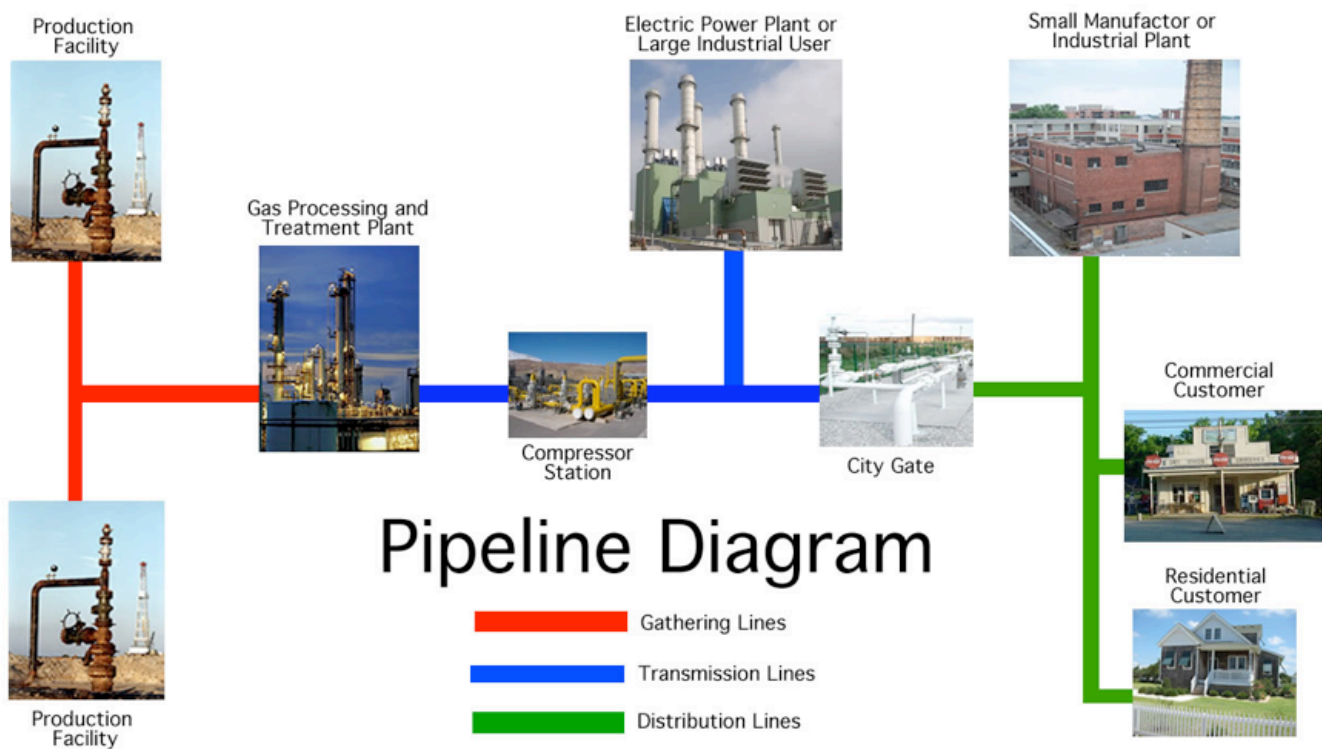
Production Lines: These are the pipes and equipment, normally near the wellhead, used to produce and prepare the gas for transport.

Gathering Lines: These are the pipelines that transport natural gas from a production facility to a transmission line. In general, higher-pressure gathering lines in populated areas are designated as “Type A” gathering lines. Most of the gathering lines in Fort Worth are Type A.

Transmission Lines: These are the relatively larger, higher-pressure pipelines that move gas from production or storage to where the gas is distributed to our homes and businesses.

Distribution Lines: A distribution line is a relative small, lower pressure pipeline used to supply natural gas to the consumer. A distribution line is any part of the distribution system, a network of pipes consisting of mains and service lines located downstream of a natural gas transmission line.

The figure below may help make all this clearer.



Two other important distinctions are **interstate pipelines** compared to **intrastate pipelines**. Interstate pipelines run across state borders, while intrastate pipelines do not cross state borders.

Two of the key measurable determinants of the risks a pipeline poses to public safety are the pipeline's location and enforcement of the safety governing its design, construction, operation, and maintenance.

The Siting of a Gas Pipeline

- Interstate Pipelines

In general, the federal government can only determine the siting of interstate gas transmission pipelines. It has no authority over the siting of intrastate gas pipelines, regardless of whether they are production, gathering, transmission or distribution lines.

Those intending to construct pipelines and the associated facilities for use in the interstate transportation of gas must apply to the Federal Energy Regulatory Commission (FERC) for a certificate of public necessity and convenience for siting of pipelines. The vast majority of new gas pipelines being proposed for the Fort Worth area are not interstate pipeline, so no federal agency is involved in the siting.

- Intrastate Pipelines

The Railroad Commission of Texas (RRC) generally does not have authority over the siting of intrastate gas pipelines. One exception is for the location of certain pipelines and ancillary equipment that transport “sour gas,” which is gas that contains a concentration of 100 parts per million or more of hydrogen sulfide—levels the RRC has determined to be toxic.

In Texas, the siting of most intrastate gas pipelines is left to gas corporations. This is because the Texas Legislature has given such corporations the right of eminent domain: the power to condemn private property for public use upon payment of adequate compensation.

Eminent domain is commonly thought of as a government right. In upholding the Texas Legislature's granting of this right to gas corporations, Texas courts have ruled the Legislature made a determination that transporting gas from places of production to places of sale serves a “public purpose.”

Through their eminent domain power, gas corporations have broad authority to acquire private land for a public purpose. Their ability to acquire public property through eminent domain is more limited.

The Texas Legislature also granted gas corporations—and gas utilities—the authority to “lay and maintain” their pipelines on certain public lands and waters. But generally this authority is not unbridled: to do so requires the consent of an affected state agency or municipality.

Even though a municipality has limited power to directly dictate where an intrastate gas pipeline can be sited, a municipality such as Fort Worth may indirectly impact the routing of a pipeline. It can do this through its authority to protect public health and safety by the adoption and enforcement of “police power” ordinances and zoning regulations. These are actions that are “necessary to protect health, life, and property and to preserve the good government, order, and security of the municipality and its inhabitants.”⁶ In addition, the Legislature allows a municipality to adopt an ordinance “that establishes conditions for mapping, inventorying, locating, or relocating pipelines over, under, along, or across a public street or alley or private residential area in the boundaries of the municipality.”⁷

⁶ Texas Statutes, Local Government Code, §54.004

⁷ Texas Statutes, Utilities Code, §121.202(b)(2)(A)

Using these powers, the City of Fort Worth adopted Ordinance 18449-02-2009, which amended in its entirety the provisions of the City's Code pertaining to gas drilling and oil production. Included in this portion of the City Code are technical and permitting requirements for gas pipelines. The pipelines that are subject to these requirements include—but are not limited to—production lines, gathering lines and transmission lines, regardless of where they are laid in the city.

Under the City's Code the City's Gas Drilling Review Committee must review proposed pipelines before a construction permit can be issued for the pipeline. Between the provisions of the City's Code and the requirement that gas corporations get the consent of the municipality before they lay pipelines across city owned property, the City has a significant indirect ability to control where pipelines are routed within the city limits.

Eminent Domain versus Public Health and Safety

The Texas Legislature has created a legal puzzle with regard to the siting of intrastate gas pipelines. It has given gas corporations the right of eminent domain, which would appear to give them the ability to site pipelines almost anywhere they want on private lands. Yet the Legislature has also empowered municipalities to protect the public health and safety through ordinances and zoning regulations, which could indirectly affect where these pipelines are routed.

The courts have tried to reconcile these grants of power and their decisions seem to turn on the specific facts of the cases before them: do the zoning regulations dilute the eminent domain power of the gas corporation and dictate where a pipeline can be sited? Or do these regulations merely protect the public health and safety from activities related to the construction, operation, and maintenance of the pipeline? Until this issue is resolved—either judicially or legislatively—gas corporations, municipalities, and the public will not be able to act with a complete understanding of the limits of their powers.

Issues Around the Siting of Pipelines and Policy Recommendations

As remarkable as it may seem, neither federal nor state pipeline safety regulations address the issue of safely siting pipelines. Part of the reason for this disconnect is that pipeline siting is not under the jurisdiction of the agencies chartered with the administration and enforcement of pipeline safety regulations.

It is our opinion that wherever possible production, gathering and transmission pipelines should be sited in locations that are “generally empty areas.” Locations such as major roadway and railroad corridors, and current open space not slated for future residential or commercial occupancy or intense recreational use should be used for gas pipelines as opposed to residential neighborhood settings. The City of Fort Worth has special powers associated with public rights-of-way, protection of public welfare, as well as zoning that can allow them to

encourage such prudent routing. All siting in public areas requires that adequate considerations, such as adequate pipeline depth to handle surface loading in roadways for example, be included in these specific decisions. From our review it is not clear there is any entity that currently is empowered and functioning to strategically route pipelines in the safest locations possible.

“it is not clear there is any entity that currently is empowered and functioning to strategically route pipelines in the safest locations possible”

In cities it is often difficult to determine the best route for a pipeline given the many complications and competing interests that can come into play. Often the incentive for a pipeline company may be that the shortest path is the least expensive. While this is certainly one consideration someone also needs to ensure that longer routes that may provide greater safety to current populations and less impact to future development are also considered.

Pipelines can either leak or rupture, and these two very different types of failure should be considered in choosing routes for pipelines.

Because of the many tons of resulting gas released and considerably larger potential impact zones associated with gas pipeline ruptures, additional care should be exercised in the placement of large diameter, high-pressure gas pipelines. For gas pipelines capable of rupture, sites where large groups of unsheltered individuals may gather, or structures that cannot be easily evacuated, such as schools, hospitals and facilities that house the elderly, should be avoided.⁸

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For pipelines that can rupture, distancing and site specific screening, such as the prudent placement of trees, concrete structures and parking lots, can also play an important role in prudent pipeline placement. These screening techniques can buy some survival time by helping to block people from the initial heat flux or creating more distance between people and a potential rupture.

In pipeline siting for leaks, proximity of pipelines to structures where gas can collect and build up, especially if the pipelines are not odorized, is critically important. Leaking gas that builds up in a structure can result in very destructive forces upon ignition and detonation. That is why for gas distribution pipelines that cannot avoid proximity to structures, odorization of the gas as an early warning of leaks is mandatory. Because transmission and gathering pipelines can also leak, odorant injection is required in certain high population areas to assist in leak detection, but there are many exclusions even in such areas. As a result, most transmission and gathering pipeline miles don't include odorant.

In a related siting issue, it is not uncommon, especially in cities, for pipelines to share a common right-of way given the limited availability of suitable land for such purposes. In such shared pipeline rights-of-way it is incumbent on all those involved that certain pipeline construction, operations, maintenance, and emergency activities be communicated amongst all pipeline operators in the shared right-of-way. Another problem with the current system in Texas that provides pipeline operators with the right of eminent domain is that there are multiple operators and there is little incentive to build and share common pipeline infrastructure. With each company building its own systems the risk is multiplied, with little apparent thought to how to minimize pipelines through shared facilities.

Our review of Fort Worth pipeline maps from the RRC indicates that the vast majority of existing pipelines (although certainly not all) have been sited in the types of open areas that we recommend. The information available to us during our review did not allow us to interpret whether much of this current open space is planned for future development, or the current or future intensity of recreational uses. Good planning would certainly include not just the current use, but the future uses also to avoid foreclosing potential future planned uses by siting pipelines in such places now.

⁸ Gas distribution pipelines, and low stress production, gathering and transmission pipelines cannot rupture.

Siting Recommendations

- The City of Fort Worth should use the powers granted them for protecting public welfare, and for the approval of where pipelines cross public property and rights-of-ways, to ensure that whenever feasible, new natural gas pipelines are routed in the least populated areas. This would include corridors along main roads and railroads, and current open space not slated for future residential or commercial occupancy or intense recreational use.
- The City of Fort Worth should ensure that adequate public discussion of pipeline route selection is included before construction approval is granted. This would include review by the appropriate advisory committees such as the Gas Drilling Review Committee, the Zoning Commission, the Plan Commission, the Parks and Community Services Advisory Board, etc.
- The State Legislature, or failing that the City of Fort Worth, may want to consider forming some type of pipeline siting commission that would be independent from the inherent conflict of interest that pipeline operators or the monetary beneficiary for well leases and rights-of-way agreements often have. Such a body could be empowered to establish safe pipeline routes for high stress pipelines in populated urban areas.
- The Texas Department of Transportation (TxDOT) or the State Legislature should make clear that in urban areas pipeline routing using road rights-of-way under TxDOT control is an approved and encouraged use as long as it is done in a way that does not conflict with highway safety or future planned expansion of highways.
- The State Legislature should fund a study of the Fort Worth area to determine how much duplicate pipeline infrastructure could have been avoided already, and into the future, if those companies drilling in urban areas were required to master plan shared pipeline infrastructure as part of their well development strategy.
- The pipeline industry should provide their expertise and cooperation in working with the City of Fort Worth to route pipelines in the least populated areas feasible.

Regulating Pipeline Safety

- Federal Powers

The U.S. Department of Transportation, through its Office of Pipeline Safety (OPS) establishes the minimum safety standards for the interstate and intrastate transportation of gas by pipelines, as well as for the “pipeline facilities” used in these activities. The term “pipeline facilities” includes pipelines, rights-of-way, facilities, buildings, and equipment used in transporting gas or treating gas during its transportation.

Congress mandated that OPS adopt certain safety standards. Among the areas in which standards must be adopted are operator qualifications, facility information and documents (for example, emergency response plans and mapping), and periodic pipeline inspections. Other mandated standards include those addressing risk analyses and integrity management programs for pipeline facilities (other than distribution pipelines) in high-density population areas, as well as a separate integrity management program for distribution pipelines. All of the mandates vary depending on whether a pipeline is for production, gathering, transmission or distribution.

Congress also gave PHMSA authority to adopt other safety standards on its own. This discretionary authority is extremely broad and covers the entire range of the public safety risk areas—except for siting—related to

pipeline facilities and transportation: design, installation, inspection, emergency plans and procedures, testing, construction, operation, replacement and maintenance.

PHMSA's minimum federal safety standards for natural gas pipelines are set out in Title 49, Part 192 of the Code of Federal Regulations (49 CFR Part 192), which can be found at: <http://phmsa.dot.gov/pipeline/regs>

- State Powers

The federal Office of Pipeline Safety has certified Texas as having a valid pipeline safety program. Because of this certification the Legislature has given regulatory authority over the safety of intrastate pipeline facilities and intrastate pipeline transportation to the Railroad Commission of Texas (RRC). Although the federal government is responsible for setting minimum pipeline safety standards, Texas can adopt additional or stricter safety standards for intrastate pipeline facilities and intrastate pipeline transportation. However, any intrastate safety standards adopted by Texas must be compatible with the federal standards.

Number of Probable Violations on Natural Gas Pipelines Identified by the RRC	
2001	2,942
2002	3,002
2003	4,352
2004	3,884
2005	2,242
2006	2,563
2007	2,052
2008	2,007
2009	2,100

Only in a few instances has the RRC imposed requirements beyond the federal regulations that significantly affect intrastate pipeline safety. The additional requirements include:

- Clarifies the beginning of gathering lines to the first point of measurement
- Requires excavators and pipeline operators to report all damage to pipelines

The Texas RRC pipeline safety regulations can be found at:

[http://info.sos.state.tx.us/pls/pub/readtac\\$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=8](http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=8)

- Municipal Powers

The Texas Legislature has expressly prohibited a municipality from adopting and enforcing safety standards and practices over pipelines regulated by the federal government or the RRC. By doing so, the Legislature seems to have implicitly given a municipality the power to adopt and enforce safety standards and practices over pipelines that are not regulated by the federal and state governments.

The Legislature also has expressly stated this prohibition does not prevent a municipality from establishing conditions for "mapping, inventorying, locating or relocating of pipelines over, under, along, or across a public street or alley or private residential area." This implies that: (1) a municipality can establish conditions for these activities when the pipeline is regulated by the RRC (that is, an intrastate pipeline); and (2) establishing these conditions does not constitute the imposition of a safety standard or practice.

- The City of Fort Worth's Ordinance

In its Code, the City of Fort Worth has adopted a set of requirements for "City Regulated Pipelines." For example, all operators of these pipelines must:

- Bury these pipelines at a certain depth.
- Bury—during a backfill of an excavation for these pipelines—a warning tape one foot above the line so future excavators will be aware of the presence of the pipeline.

- Install on these pipelines an automated pressure monitoring system that can detect leaks and shut off any pipeline or section of pipeline that is leaking⁹.

There is some ambiguity over what is and isn't a "safety standard." If these requirements apply only to pipelines not regulated by the federal government or the RRC, then it would not matter whether or not they were considered to be safety standards or practices: the City would be within its authority to impose them. It also may be that the City's requirements fall under the legislative intent to provide cities with the ability to require systems for "mapping, inventorying, locating or relocating" pipelines. If ambiguity exists between what the city believes it can require and what the pipeline operators in the City think the City can require then the legislature should step in to clarify this situation.

There is nothing in state or federal law that restricts a city's ability to ask for increased safety measures as part of their negotiations regarding the use of city rights-of-way or other public property. While the City may not be able to require or enforce such measures, cities nationwide have been able to obtain increased safety measures through such voluntary requests, especially when such safety measures are well thought out and supported by the public.

Increasing Pipeline Safety Through Land Use and Zoning

One area in which the City of Fort Worth has considerable ability to increase pipeline safety is through their land use and zoning authority. Over the past year and a half the Pipelines and Informed Planning Alliance (PIPA), started by the federal Office of Pipeline Safety, has worked to determine recommended best practices that local governments can use to ensure greater safety near pipelines. PIPA is made up of over 150 representatives from a wide variety of stakeholder groups. The final PIPA report includes 46 recommended practices, many of which would need to be adopted by local government. Those practices include things like:

- Consider the potential impact of a pipeline incident in new development
- Ensure pipeline rights-of-way are shown on all relevant zoning, planning, and public works maps
- Consider the Potential Impact of a Pipeline Incident in the Design and Location of New Roads
- Incorporate Emergency Response Plans into Land Development
- Creation of Consultation and/or Planning Zones Near Pipelines

"One area in which the City of Fort Worth has considerable ability to increase pipeline safety is through their land use and zoning authority."

Land use practices near pipelines have three major goals:

- ✓ Ensure communication between builders/developers/excavators and pipeline operators so everyone knows what is planned near pipelines
- ✓ Put in place practices that protect pipelines from construction damage
- ✓ Put in place more protective planning and building codes to protect people that live near pipelines

The Municipal Research and Services Center has developed an entire website that covers these "planning near pipelines" issues. It can be found at: <http://www.mrsc.org/Subjects/PubSafe/transpipes.aspx>

⁹ Given the compressibility of gas, Accufacts believes the ability to detect leaks by pressure loss is highly unlikely and probably ineffective in most gas systems.

Regulatory loopholes between production and gathering pipelines

Federal pipeline safety regulations that define where unregulated production pipelines stop and where regulated gathering lines start, are less than clear, potentially allowing for large unregulated pipelines in urban areas. To the RRC's credit they have clarified and expanded the federal definitions to include under their pipeline safety regulations all gas pipelines after "the first point of measurement." Since the RRC requires measurement on each well pad, this expanded definition should put under regulation all pipelines leaving well pads.

While many production and gathering pipelines are not as large as transmission pipelines, there are currently some in Fort Worth as large as 24 inches in diameter with maximum allowable operating pressures similar to transmission pipelines. Additional considerations are warranted given the

"Currently these pipelines are exempt from federal Integrity Management rules that require some form of inspection at a minimum of every seven years, and clearly define how and when problems found during these inspections are reported and repaired."

capability of pipelines of this size to release many tons of gas upon rupture. Currently these pipelines are exempt from federal Integrity Management rules that require some form of pipe quality inspection at a minimum of every seven years, and clearly define how and when problems found during these inspections are reported and repaired. The RRC has also not addressed this issue for pipeline under their authority.

There also appears to be a loophole in the RRC pipeline safety rules (Title 16, Part 1, Chapter 8, Subchapter A, Rule §8.1(c)(2)) that would allow large companies that also operate pipelines that fall under federal regulations to be exempted from the more stringent state rules. According to our conversations with the RRC, to date no companies have applied for this exemption.

Regulatory Recommendations

- The federal Office of Pipeline Safety should implement a rulemaking to clarify the point where onshore regulated gas gathering lines begin (49 CFR Part 192.8). That point should be defined to ensure there are no unregulated gas pipelines off of well pads in class 2, 3, or 4 areas, or other "identified sites" where large groups may gather.
- The federal Office of Pipeline should implement a rulemaking to include all Type A gathering lines (49 CFR Part 192.9) under the full requirements of the Integrity Management program (49 CFR Part 192 Subpart O) that currently only applies to transmission pipelines.
- The RRC should use their own authority on intrastate pipelines in Texas to adopt the recommendation above regarding integrity management requirements for Type A gathering lines.
- To avoid any conflict over whether the City of Fort Worth has jurisdiction to adopt pipeline safety standards such as depth of cover, use of warning tape, and automated pressure monitoring the RRC or the state legislature should amend current rules to allow municipal government to adopt stricter pipeline safety standards on intrastate pipelines as long as they are compatible with state and federal regulations.
- The RRC should undertake a study of the production pipelines that occur before the first point of measurement on or off the well pads in Fort Worth to determine if those pipelines are putting people at the

same level of risk as regulated gathering and transmission pipelines and therefore need to be under the same pipeline safety regulations.

- The RRC should make it clear in their rules that the exemption available under Title 16, Part 1, Chapter 8, Subchapter A, Rule §8.1(c)(2) will not be granted if it will allow a company to operate pipelines under regulations less stringent than what the RRC has set.
- The Fort Worth City Council should schedule a work session to get a presentation on the final Pipelines and Informed Planning Alliance Report when it is released, and then decide how to proceed to adopt the parts they think are important. At a minimum they should adopt the Consultation Zone process into City Code.

Pipeline Safety Requirements During Design and Construction

The construction phase of pipeline installation is a critically important time to ensure the long-term integrity of the pipeline. Below are a few of the issues dealt with during the construction phase that affects pipeline safety. These various safety precautions pertain mainly to gas transmission and regulated gathering pipelines. Some gathering and production lines are not required to follow these standards.

Choosing Pipe

Pipe sections are fabricated in steel rolling mills and inspected to assure they meet government and industry safety standards. Generally between 40 and 80 feet in length, they are designed specifically for their intended location in the pipeline. A variety of soil conditions and geographic or population characteristics of the route will dictate different requirements for pipe size, strength, wall thickness and coating material. Not all pipe is steel. Some low pressure gathering, transmission and distribution pipelines use other materials such as other metals, and nonmetallic material, such as plastic or composites.

Pipe Burial

Mechanical equipment such as wheel trenchers or backhoes is used to dig the pipe trench. Occasionally, rock drilling and blasting is required to break rock in a controlled manner. The material that is excavated during trenching operations is temporarily stockpiled on the non-working side of the trench. This material will be used again in the backfill operation. In some limited locations, horizontal directions drilling (HDD) as well as boring is used to place pipe underground without the need of trenching.

The trenches are dug deep enough to allow for an adequate amount of cover when the pipe is buried. Federal regulations require that transmission pipelines and regulated type A gathering lines be buried at least 30 inches below the surface in rural areas and deeper (36 inches) in more populated areas. In addition, the pipeline must be buried deeper in some locations, such as at road and railroad crossings (36 inches) and crossings of navigable bodies of water (48 inches), and may be less in other locations such as when it is installed in consolidated rock (18 to 24 inches). The depth of burial must be according to these regulations at the time of burial, but there is nothing that requires this depth be maintained over time.

Welding of Steel Pipelines

To carry out the welding process, the pipe sections are temporarily supported along the edge of the trench and aligned. The various pipe sections are then welded together into one continuous length, using manual, semiautomatic or automatic welding procedures.

As part of the quality-assurance process, each welder must pass qualification tests to work on a particular pipeline job, and each weld procedure must be approved for use on that job in accordance with federally adopted welding standards. Welder qualification takes place before the project begins. Each welder must

complete several welds using the same type of pipe as that to be used in the project. The welds are then evaluated by placing the welded material in a machine and measuring the force required to pull the weld apart. It is interesting to note that a proper weld is actually stronger than the pipe itself.

For higher stress pipelines over 6 inches in diameter, a second level of quality-assurance ensures the quality of the ongoing welding operation. To do this, qualified technicians sample a certain number of the welds (the sample number varies based on the population near the pipeline) using radiological techniques (i.e., X-ray or ultrasonic inspection) to ensure the completed welds meet federally prescribed quality standards. The X-ray technician processes the film in a small, portable darkroom at the site. If the technician detects certain flaws, the weld is repaired or cut out, and a new weld is made. Another method of weld quality inspection employs ultrasonic technology.

Coating

Several different types of coatings may be used to coat the pipe at the factory and the joints made in the field, with the most common at this time being fusion bond epoxy or polyethylene heat-shrink sleeves. Prior to application, the bare pipe is thoroughly cleaned to remove any dirt, mill scale or debris. The coating is then applied and allowed to dry. After field coating and before the pipe is lowered into the trench, the entire coating of the pipe is inspected to ensure that it is free from defects.

Lowering and Backfilling

Once the pipeline is welded and coated, it is lowered into the trench. Lowering is done with multiple pieces of specialized construction equipment called sidebooms. This equipment acts in tandem to lift and lower segments of the assembled pipeline into the trench in a smooth and uniform manner to prevent damaging the pipe.

Once the pipeline is lowered into the ground, the trench is backfilled, to ensure that the pipe and its coating are not damaged. This is generally accomplished with either a backhoe or padding machine depending on the soil makeup.

Care is taken to protect the pipe and coating from sharp rocks and abrasion as the backfill is returned to the trench. In areas where the ground is rocky and coarse, the backfill material is screened to remove rocks or the pipe is covered with a material to protect it from sharp rocks and abrasion. Alternatively, clean fill may be brought in to cover the pipe. Once the pipe is sufficiently covered, the coarser soil and rock can then be used to complete the backfill.

As the backfill operations begin, the excavated material is returned to the trench in reverse order, with the subsoil put back first, followed by the topsoil. This ensures the topsoil is returned to its original position.

Valves and Valve Placement

A valve is a mechanical device installed in a pipeline and used to control the flow of gas. Some valves have to be operated manually by pipeline personnel, some valves can be operated remotely from a control room, and some valves are designed to operate automatically if a certain condition occurs on the pipeline. If a pipeline should fail, how quickly the valves can be closed and the distance between the valves are some of the main determinations for how much gas is released.

Operating Pressure

Maximum allowable operating pressure (MAOP) is the maximum internal pressure at which a natural gas pipeline or pipeline segment may be continuously operated. MAOP is set at levels meant to ensure safety be

requiring that the pressure does not cause undue stress on the pipeline. How this pressure is determined is defined in federal regulations and is based on a number of different factors such as the location of the pipeline, pipe wall thickness, previous pressure tests, and the pressure ratings of various components.

Testing

Generally, but with certain exceptions, all newly constructed natural gas transmission pipelines must be hydrostatically tested before they can be placed into service. The purpose of a hydrostatic pressure test is to eliminate any defect that might threaten the pipeline's ability to sustain its maximum operating pressure plus an additional safety margin, at the time of the hydrostatic test. A pipeline is designed to a specified strength based on its intended operating pressure. Hydrostatic pressure testing consists of filling the pipeline with water and raising the internal pressure to a specified level above the intended operating pressure. Critical defects that cannot withstand the pressure will fail. Upon detection of such failures, the defects are repaired or the affected section of the pipeline is replaced and the test resumed until the pipeline "passes".

Hydrostatic testing is not the only means for detecting pipe defects. For example, inline inspection (ILI) technologies are used that permit the identification of specific types of defects, such as corrosion. But because not all lines can be inspected with ILI tools and because of the need to find types of imperfections that are not currently detected by ILI technology, hydrostatic testing is an accepted method for demonstrating the fitness of a pipeline segment for service.

Concerns During Pipeline Construction

In 2009 the federal Office of Pipeline Safety (OPS) held a special workshop to go over the numerous problems they found during just 35 inspections of new transmission pipelines under construction. These inspections found significant problems with the pipe coating, the pipe itself, the welding, the excavation methods, the testing, the design, etc. The findings and presentations from this workshop can be found at: <http://www.regulations.gov/search/Regs/home.html#docketDetail?R=PHMSA-2009-0060> OPS's findings call into question the current system of inspections for the construction of new pipelines. This construction phase is critical for the ongoing safety of these pipelines for years to come. It is unclear to us how involved the RRC is in inspecting the construction of new pipelines.

Recommendations Regarding Pipeline Construction

The Railroad Commission of Texas should provide clear publicly available documentation regarding their involvement during construction of new intrastate pipelines. That documentation should either provide evidence that they have the involvement necessary to catch the types of problems identified by OPS, or are taking the steps necessary to do so.

Pipeline Safety Requirements During Operation

Corrosion Protection

Unprotected steel pipelines are susceptible to corrosion, and without proper corrosion protection every steel pipeline will eventually deteriorate. Corrosion can weaken the pipeline and make it unsafe. Luckily, technology has been developed to allow corrosion to be controlled in many cases to extend pipeline life if applied correctly and maintained consistently.

Here are the three common methods used to control corrosion on pipelines:

- Cathodic protection (CP) is a system that uses direct electrical current to counteract the normal external corrosion of a metal pipeline. CP is used where all or part of a pipeline is buried underground or submerged in water. On new pipelines, CP can help prevent corrosion from starting; on existing pipelines, CP can help stop existing corrosion from getting worse.
- Pipeline coatings and linings are principal tools for defending against corrosion by protecting the bare steel.
- Corrosion inhibitors are substances that can be added to a pipeline to decrease the rate of attack of internal corrosion on the steel since CP cannot protect against internal corrosion.

Supervisory Control and Data Acquisition System (SCADA)

A SCADA is a pipeline computer system designed to gather information such as flow rate through the pipeline, operational status, pressure, and temperature readings. Depending on the pipeline this information allows pipeline operators to know what is happening along the pipeline, and allows quicker reactions for normal operations, and to equipment malfunctions and releases. Some SCADA systems also incorporate the ability to remotely operate certain equipment, including compressor stations and valves, allowing operators in a control center to adjust flow rates in the pipeline as well as to isolate certain sections of a pipeline. Many SCADA systems also include leak detection systems based on the pressure and mass balance in the pipelines.

Right-of-way Patrols

Regulations require regular patrols of pipeline right-of-ways to check for indications of leaks and ensure that no excavation activities are taking place on or near the right-of-way that may compromise pipeline safety. For transmission pipelines these patrols are often accomplished by aerial patrols.

Leakage Surveys

Regulations also require regular leakage surveys for all types of natural gas pipelines along the pipeline routes. Personnel walk or drive the route using specialized equipment to determine if any gas is leaking and to then quantify the size of the leak. Very small leaks are a normal part of most gas pipeline systems.

Odorization

All distribution pipelines, and some transmission and gathering lines (those mainly in highly populated areas), are required to be odorized so leaking gas is readily detectable by a person with a normal sense of smell.

Integrity Management

Integrity Management refers to a relatively new set of federal rules that specify how pipeline operators must identify, prioritize, assess, evaluate, repair and validate - through comprehensive analyses - the integrity of their pipelines. Some form of integrity management now applies to both transmission and distribution pipelines, although gathering lines are exempt from these requirements. For gas transmission pipelines integrity management requires that lines that could affect High Consequence Areas (mainly more populated areas) have to be re-inspected by their operators every seven years. This re-inspection is done mainly with internal inspection devices called smart pigs, but may also be done through pressure tests or direct assessment. Once inspected the rules require that operators respond to certain anomalies found on their pipeline in certain ways within certain timeframes. In the first 5 years of this program these rules required nearly 3000 repairs be made to natural gas transmission pipelines that fall within High Consequence Areas. Unfortunately, only about 7% of the gas transmission pipelines nationwide are required to do these important inspections.

Concerns During Pipeline Operations

As already discussed above under regulatory authority, there is still considerable confusion regarding which regulations apply to intrastate gathering and production pipelines. The federal Office of Pipeline Safety or the

RRC needs to provide clarity so the public knows which of the pipelines that run through Fort Worth neighborhoods are and are not included in a variety of federal and state regulations. This is particularly true regarding corrosion protection, odorization, leak surveys and integrity management.

Recent newspaper stories and information coming from the RRC seem to indicate that a serious corrosion problem exists on steel distribution service lines. It is commendable that the RRC has moved forward to address this problem, but it would also be beneficial if they made it clear whether all the pipelines that leave the well pads in Fort Worth are required to meet the same corrosion and leak survey requirements as these distribution lines, or similar regulations for transmission pipelines.

There is also a good deal of discussion about whether the gathering lines leaving well pads should be odorized, and whether certain Type A gathering lines are required to be odorized. The federal regulations require that Type A gathering lines (the majority of gathering lines in Fort Worth are Type A) be odorized in densely populated areas, but provides an exemption to odorization if over 50% of the pipeline downstream is in sparsely populated areas. The RRC has told us that gathering lines in Fort Worth are not required to be odorized, and pipeline companies have confirmed that is because of the exemption in the federal regulations. If odorization is seen as a safety measure that is important enough to be required of similar pipelines in populated areas, then this exemption to that safety requirement needs to be reexamined.

If odorization was required of gathering lines in Fort Worth then another issue that would have to be carefully addressed would be the various drilling operators' ability to correctly inject the odorant into the lines at multiple well pads throughout the community. Frequent fugitive emissions of odorant would cause needless emergency response calls, and could potentially undermine the public's response to a real leak.

One other issue that is frequently talked about in relation to odorization is whether the gas being produced is "wet" gas. Wet gas does not refer to moisture content, but to the presence of compounds such as ethane, propane and butane. These compounds are heavier than air, which can create a more dangerous situation if there is a leak. Currently neither federal nor Texas regulations contain a definition of wet gas, or describe any difference in how pipelines that contain significant concentrations of these heavier components should be treated. Normally these components are removed at gas treatment plants, but in an area such as Fort Worth where raw gas is being transported through populated areas it is an issue that needs to be addressed. The RRC has told us that the gas in Fort Worth is not wet gas, but that could change as the gas fields age, and with no requirements to test for and define wet gas this is an issue that should be addressed.

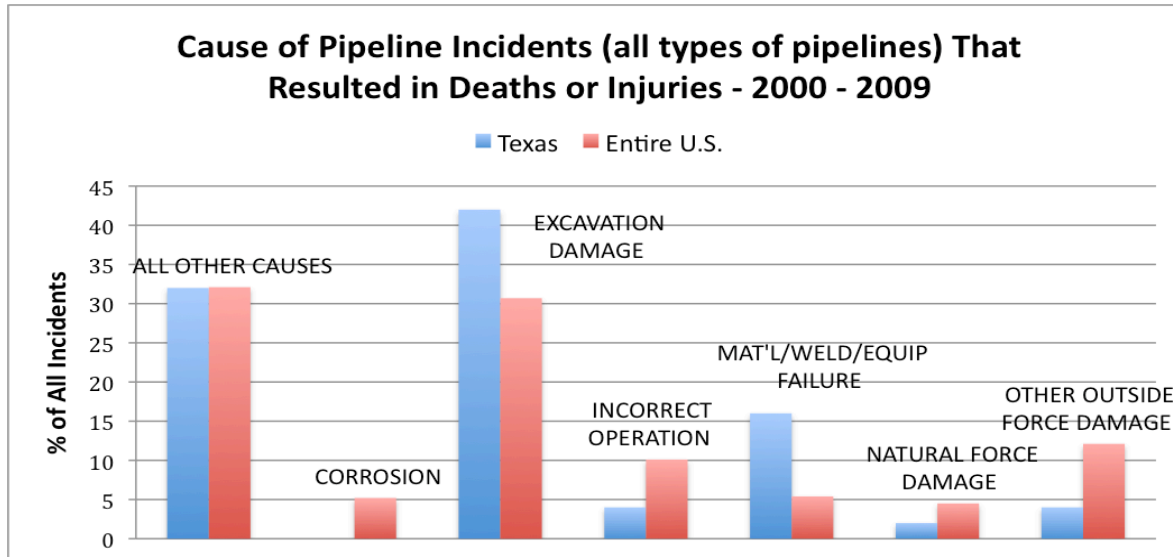
Recommendations Regarding Pipeline Operation

The federal Office of Pipeline Safety or the RRC should undertake a study to determine the benefits and risks of odorizing gathering lines in populated areas. That study should at a minimum address the concern of proper injection of odorant at multiple well sites, how and at what concentrations heavier than air gas components may change the need for odorants, and the apparent disconnect between the requirements for odorant in Type A gathering lines in populated areas and the various exemptions to those requirements, particularly related to gathering lines transporting gas in urban areas.

"The federal Office of Pipeline Safety or the RRC should undertake a study to determine the benefits and risks of odorizing gathering lines in populated areas."

Pipeline Damage Prevention Programs

One of the leading causes of all pipeline incidents is damage to pipelines from people digging. In fact, as shown below, for the past 10 years this has been the main cause of deaths and injuries when all types of pipelines are considered together in the U.S. and Texas¹⁰. For this reason programs designed to decrease damage to pipelines caused by excavation are extremely important to protect people and the environment. Below are brief descriptions of the major damage prevention efforts in Texas.



Reporting of Excavation Damage and Enforcement

The Railroad Commission of Texas (RRC) has adopted regulations that require both pipeline companies and excavators to report all damage to pipelines. The reporting of incidents is tracked on a publicly accessible database which gives the RRC and the public the ability to analyze which excavators are hitting pipelines, the cause of that damage, and what penalties the RRC imposed. This publicly available database is fairly unique in the entire nation, with many states having no ability to even track excavation damage. Even the federal pipeline incident tracking system lacks the data of Texas's system. For comparison according to the federal Office of Pipeline Safety's incident database over the past ten years Texas averages about 10 pipeline incidents per year caused by excavation damage. The RRC database shows an average of about 18,000 incidents per year. You can view the database at:

<http://webapps.rrc.state.tx.us/TPD/publicHomeAction.do>

In 2009 the RRC database shows that there were 290 incidents of excavation damage to pipelines in Fort Worth, with 78 of those happening after the excavator failed to use the One Call system. Excavation by the City of Fort Worth accounted for around 40 of the 290 incidents, although improperly marked pipelines caused more than a third of the incidents involving the City.



One-Call Centers

The primary tool for avoiding damages to underground facilities is timely communication between those digging (excavators) and the owners of the facilities. It is important to Call Before You Dig. One-call centers facilitate this communication process by enabling an excavator to place just one call, prior to digging, to request that all underground facilities in the area of a planned excavation be located and marked.

¹⁰ PHMSA website:

http://primis.phmsa.dot.gov/comm/reports/safety/SerPSIDet_2000_2009_US.html?nocache=3912#_all
http://primis.phmsa.dot.gov/comm/reports/safety/SigPSIDet_2000_2009_TX.html?nocache=5631#all

By simply dialing 811 or 1-800-545-6005, you can reach the one-call center where, at no cost to you, companies that may operate underground utilities in the area you plan to dig will be notified. Those companies can then dispatch locate crews to determine and surface mark the location of their utilities so that you can avoid hitting them when you begin your excavation. Texas law requires anyone doing excavation to call to have the location of the utilities marked at least 48 working hours before any excavation is done, and Texas law defines excavation as the movement of earth by any means. This includes inserting, moving, or removing any object in the ground, even fence posts, rods, stakes, picks, shovels or other hand tools to a depth greater than 16 inches.

Hitting underground utilities when you are digging can cause injuries, even deaths, environmental damage and loss of critical infrastructure and services. Strikes that don't cause immediate problems can lead to failures years later. If you don't make the call, you could be liable for damage costs and repairs, as well as subject to potential penalties. Don't take the chance – Call before you dig.

Best Practices Regarding Damage Prevention

In 2000 a national organization called the Common Ground Alliance (CGA) was launched in an effort to reduce damages to all underground facilities in North America through shared responsibility among all stakeholders. In promoting a spirit of shared responsibility, the CGA welcomes all stakeholders who would like to be a part of the identification and promotion of best practices that lead to a reduction in damage. Any "best practices," endorsed by the CGA come with consensus support from experts representing the following stakeholder groups: Excavators, Locators, Road Builders, Electric, Telecommunications, Oil, Gas Distribution, Gas Transmission, Railroad, One Call, Public Works, Equipment Manufacturing, State Regulators, Insurance, Emergency Services and Engineering/Design.

CGA has taken the lead nationally is developing best practices to reduce damage to underground utilities, including pipelines. The latest version (Version 7.0) of their Best Practices manual includes 147 best practices in the following categories:

- | | |
|--------------------------------------|--|
| 1. Planning & Design Best Practices | 7. Public Education Best Practices |
| 2. One Call Center Best Practices | 8. Reporting & Evaluation Best Practices |
| 3. Location & Marking Best Practices | 9. Miscellaneous Practices |
| 4. Excavation Best Practices | |
| 5. Mapping Best Practices | |
| 6. Compliance Best Practices | |

To obtain a free copy of the CGA Best Practices manual visit the CGA website at: <http://www.commongroundalliance.com/>

Public Awareness

For many years, the pipeline industry has provided information to a variety of groups living and working near pipelines to ensure they know about the pipelines in their area, how to recognize and respond to a problem, and ways to prevent damage to pipelines. The American Petroleum Institute developed a series of recommended practices for pipelines operators to use to help ensure the effectiveness of these public awareness efforts. In 2005 these recommended practices were incorporated by reference into the federal pipeline safety regulations (49 CFR 192.616 and 49 CFR 195.440), and now require that pipeline operators conduct continuing public awareness programs to provide pipeline safety information to four stakeholder audiences: *** Affected Public * Emergency Officials * Local Public Officials * Excavators**

Under these regulations, pipeline operators must provide the above groups with information about how to recognize, respond to, and report pipeline emergencies. The importance of using the one-call notification system prior to excavation is to be emphasized for all stakeholders. Emergency officials and local public officials must be provided information about the location of transmission pipelines to enhance emergency

response and community growth planning. Affected municipalities, school districts, businesses, and residents must be advised of pipeline locations. Of particular significance is the requirement that operators must periodically review their programs for effectiveness and enhance the programs as necessary. A non-printable copy of these recommended practices can be downloaded at:

<http://committees.api.org/pipeline/standards/docs/1162nonprintable.pdf>

Concerns With Damage Prevention Programs

We were quite pleased with the recent changes that the RRC made to their Damage Prevention regulations. In particular, the damage reporting requirements and their publicly accessible database of damage done to pipelines seems progressive and unique in the entire nation. It is unclear and nearly impossible from the available data to know whether the RRC is using this information to provide adequate enforcement of damage prevention laws to reduce such incidents. The reporting system could be made more valuable to local government and the public by including in the database query results the cause of the incident and the penalties assessed. This would make it possible for the public to not only see who was hitting pipelines, but also why, and whether the RRC is providing enough enforcement to deter future damage.

“the RRC’s damage reporting requirements and their publicly accessible database of damage done to pipelines seems progressive and unique in the entire nation.”

In June of 2010 there were three deaths in two days in Texas from damage done to pipelines. Those incidents made clear the need for constant vigilance, education and enforcement to keep those living and working near pipelines safe. Often failure to use the One Call system is believed to be the only problem regarding excavation damage, but it would appear from these recent incidents that how pipelines are located after the call is made, and the communication between excavators, and pipeline operators and locators also needs to be carefully re-evaluated. This is particular true in areas such as Fort Worth where the density of people living, working and playing near pipelines continues to increase. Of concern is the number of exemptions for certain groups in the RRC damage prevention regulations (TAC Title 16, Part 1, Chapter 18).

It is also disconcerting that the City of Fort Worth is one of the main culprits when it came to damaging pipelines. While it seems understandable that the City probably does more digging in areas around the city where pipelines are located in the course of their activities than most others, it demonstrates there is room for improvement in their own damage prevention activities. The City’s Gas Drilling Ordinance requires all pipelines regulated by the City to provide as built drawings of the pipelines “sufficient to locate the Pipelines in the future.” While this is a good way to keep track of the basic types and locations of the pipelines, the City and others should not rely on such drawings for the location of pipelines when excavation activities are planned. The One Call system should always be used to communicate with pipeline companies to ensure necessary precautions are taken before digging begins.

We have a large number of the public awareness materials provided by pipeline companies to the “affected public” that live near their pipelines. While much of the information provided is very important (call before you dig, what to do if you suspect a leak, contact information) it often is presented in such a way that it appears to be more of a public relations piece on how safe and necessary pipelines are. We fear that these multiple mixed messages may undermine the public’s understanding of the important information included. Also, the information the public wants is not always included in the public awareness materials. The OPS is currently working to implement inspection standards for these programs to ensure their effectiveness, and we hope that through that process and the industry’s own review this valuable program will continue to improve.

Recommendations for Damage Prevention Programs

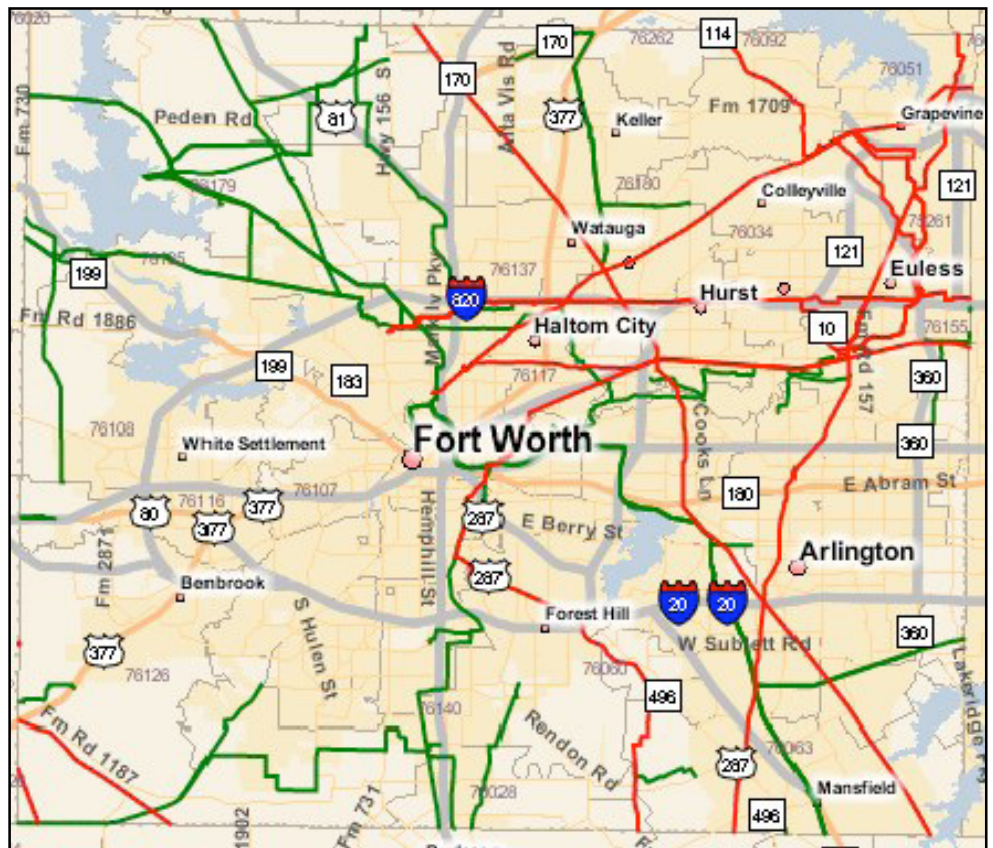
- The BRC should add the cause of the excavation incident as well as the fines levied to the database fields in

- The RRC should add the cause of the excavation incident as well as the fines levied to the database fields in their Texas Pipeline Damage Prevention Query system.
- The City of Fort Worth should review their employee training and that of their outside contractors and sub-contractors regarding damage prevention to ensure the One Call system is being used before all excavation and that safe excavation practices are followed.
 - The RRC should review and remove most of the exemptions included in their damage prevention regulations (TAC Title 16, Part 1, Chapter 18).
 - The Citizens of Fort Worth should familiarize themselves with where the pipelines are in their neighborhoods, and make sure they use the One Call system before digging. They should learn who to contact if they see someone else who they believe is digging without using the free One Call locate service.

Where Are the Pipelines in Fort Worth?

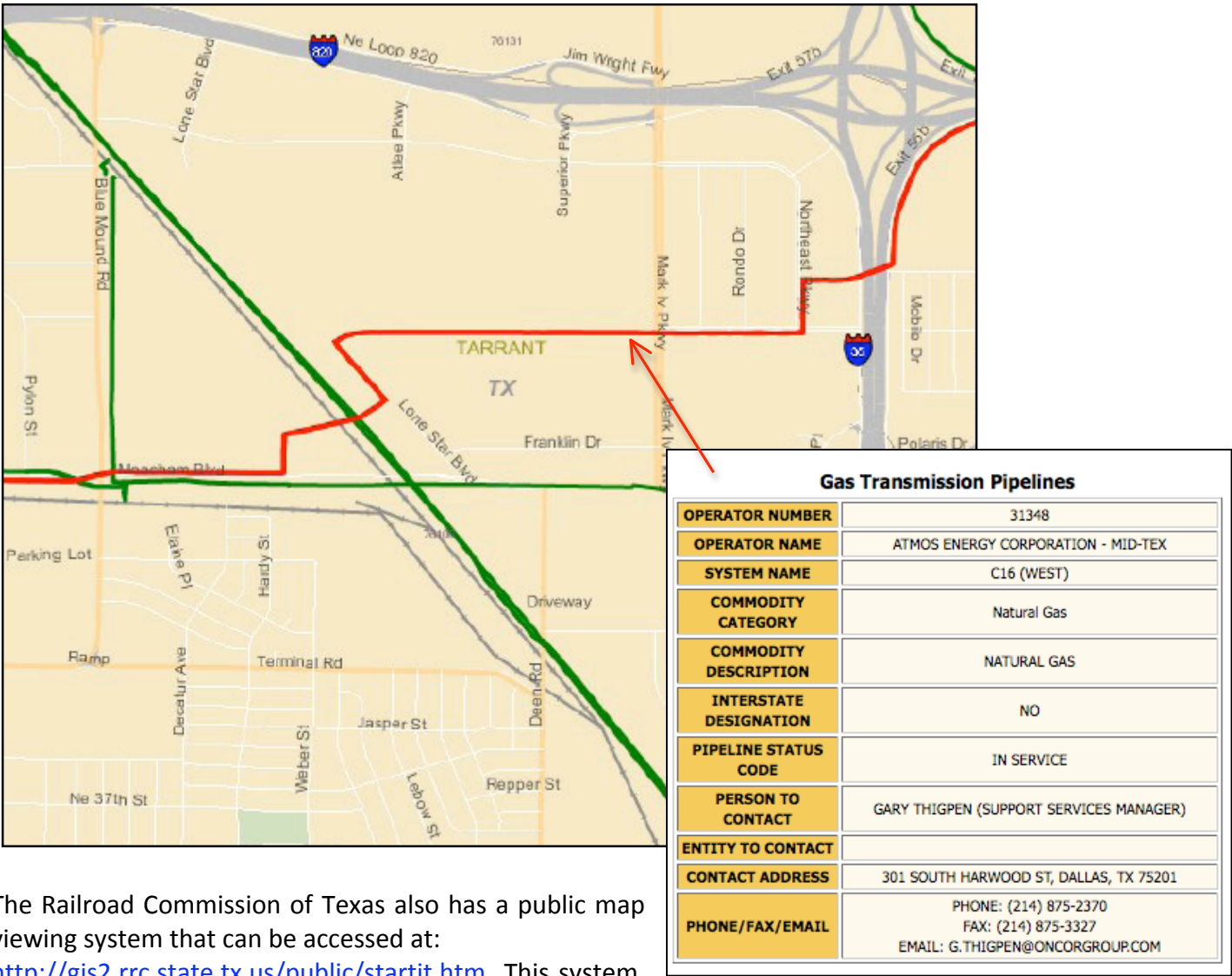
The reality is that there are pipelines of one type or another in every area of Fort Worth. Certainly the largest network of pipelines is the distribution pipeline system that consists of gas mains running throughout the city and the individual service pipelines that deliver natural gas to individual homes and businesses. If you were to view this on a map it would look like a spider web of pipelines covering the entire city.

The larger hazardous liquid and natural gas transmission pipelines are more limited throughout the community. On this map of Tarrant County developed by the National Pipeline Mapping System the hazardous liquid pipelines are shown in green and the natural gas transmission pipelines are shown in red.



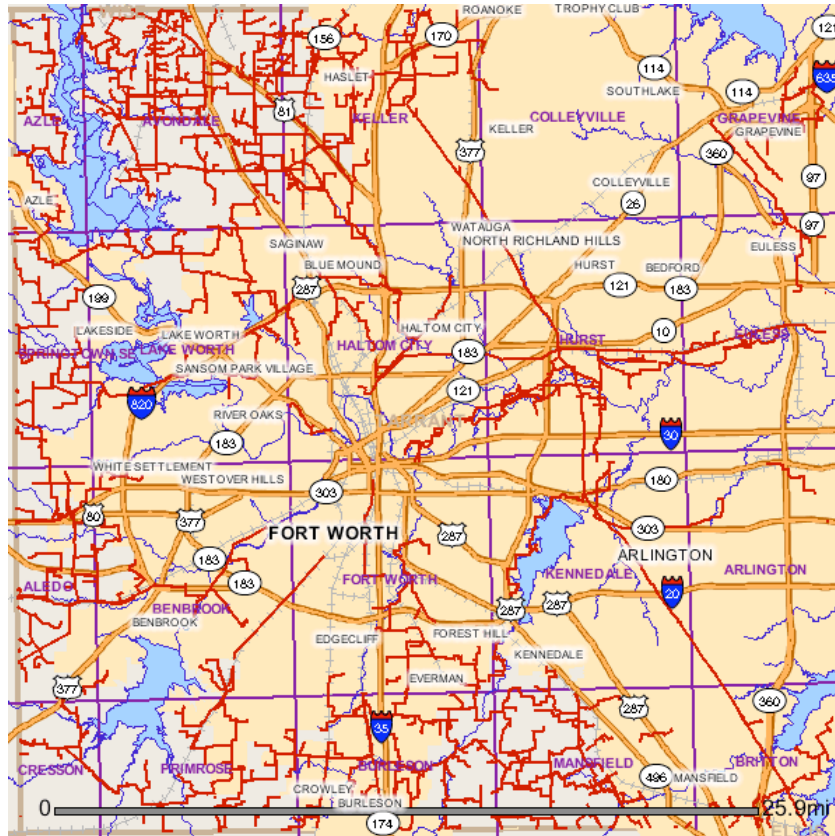
Anyone can access these maps to see where hazardous liquid and gas transmission pipelines run through their community. The “public viewer” for the maps is at: <https://www.npms.phmsa.dot.gov/PublicViewer/> . The system takes practice to navigate, but once a person figures it out it is possible to zoom in to get an idea of where these types of pipelines are generally located and some basic information about the pipelines themselves. The map below shows the maximum scale that can be viewed on the maps and the information

available for one of the included pipelines. While these types of maps can provide a general idea of where pipelines are located they should never be used as an indication of where it might be safe to dig. The One Call system is the only way to identify the location of a pipeline.



The Railroad Commission of Texas also has a public map viewing system that can be accessed at: <http://gis2.rrc.state.tx.us/public/startit.htm> This system, one of the few provided by any state agency in the entire nation, also takes some practice, but once understood can provide maps of the same pipelines as shown above. This is also the only system we are aware of that allows people to look at gathering pipelines as well as where actual gas wells are located. The Railroad Commission mapping site also provides some basic information about the pipelines found, and allows anyone to look up the pipeline permit where more in depth information (such as pressure, pipe wall thickness and grade, class location, etc.) can be found.

The number of gathering pipelines in Fort Worth will continue to increase as the number of wells increases in the city. Below is a map from the Railroad Commission of Texas' mapping system that show where the current active gathering pipelines are in Tarrant County. The density of pipelines surrounding the urban areas of the county may provide a view of the possible future of how many pipelines may end up in the City as well drilling reaches its full density.



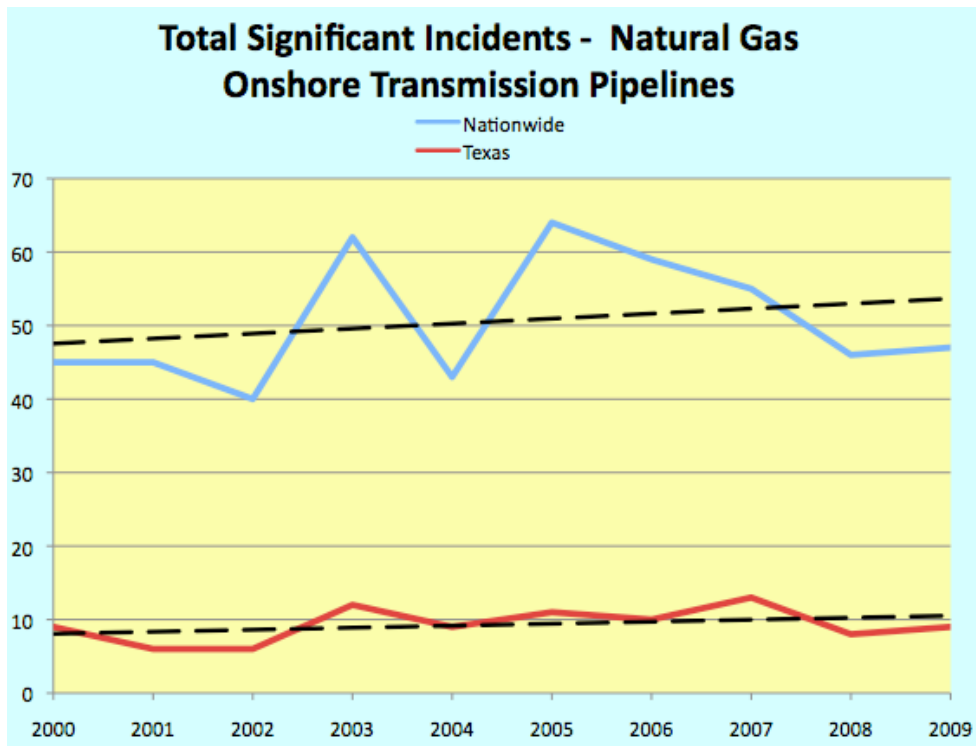
Gathering Pipelines in Tarrant County

How Much Risk is There From the Pipelines in Fort Worth?

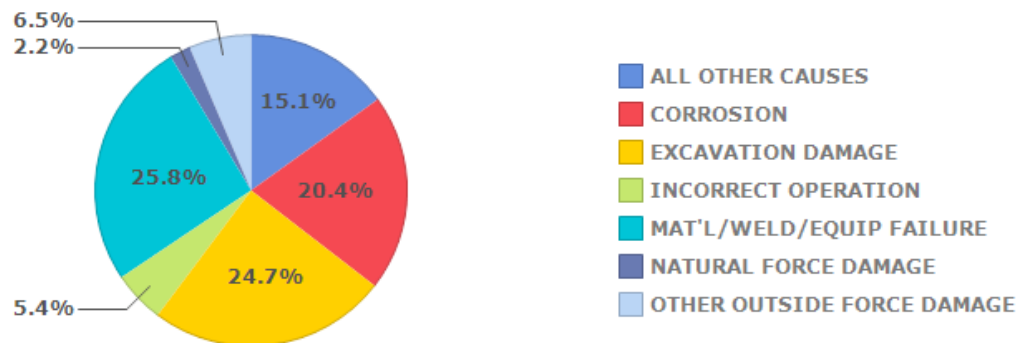
Risk is one of those things that one person cannot really define for another, since each person thinks about risks in their own personal way. While some feel that skydiving is a risk worth taking, others won't even go up in the airplane. In other words, it is not possible for us to say whether the increase in the number of pipelines associated with urban gas drilling is safe enough or too much of a risk to take. All we can do is to try to provide enough information so individuals can make that decision on their own, and then work with others in their community to set policies based on the beliefs of as many people as possible.

We believe that risk is made up of two different factors both of which need to be carefully considered when deciding how risky an activity is. Those factors are the probability that an event will occur (chance a pipeline will rupture or leak), and the possible consequences if it does. We have already talked about the various things that pipeline operators are required to do to keep their pipelines safe and therefore reduce the probability of an event occurring.

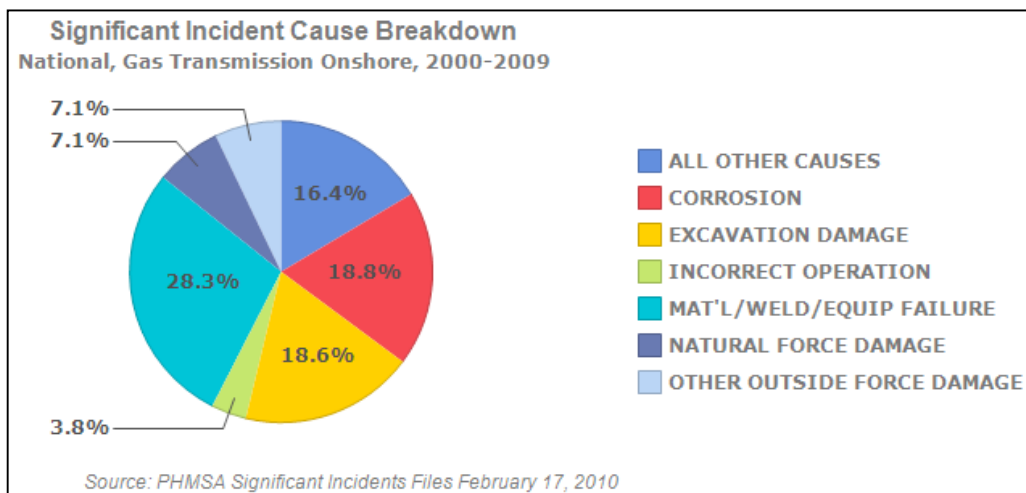
One other measure that helps shed light on the probability of an occurrence is the past incident rates for pipelines in a given area. Past performance cannot accurately reflect future incidents since many factors could change over time, but such data can provide trend lines that point to needed changes in pipeline operation, maintenance, public outreach and regulations. Below are some graphs that show the number of significant incidents occurring on the different types of pipelines in the past ten years in both Texas and nationwide. These graphs also indicate the trend lines for incidents during this period. We have also included graphs that show the causes of the incidents, so it is easier to tell which incidents were within the control of the pipeline operator.

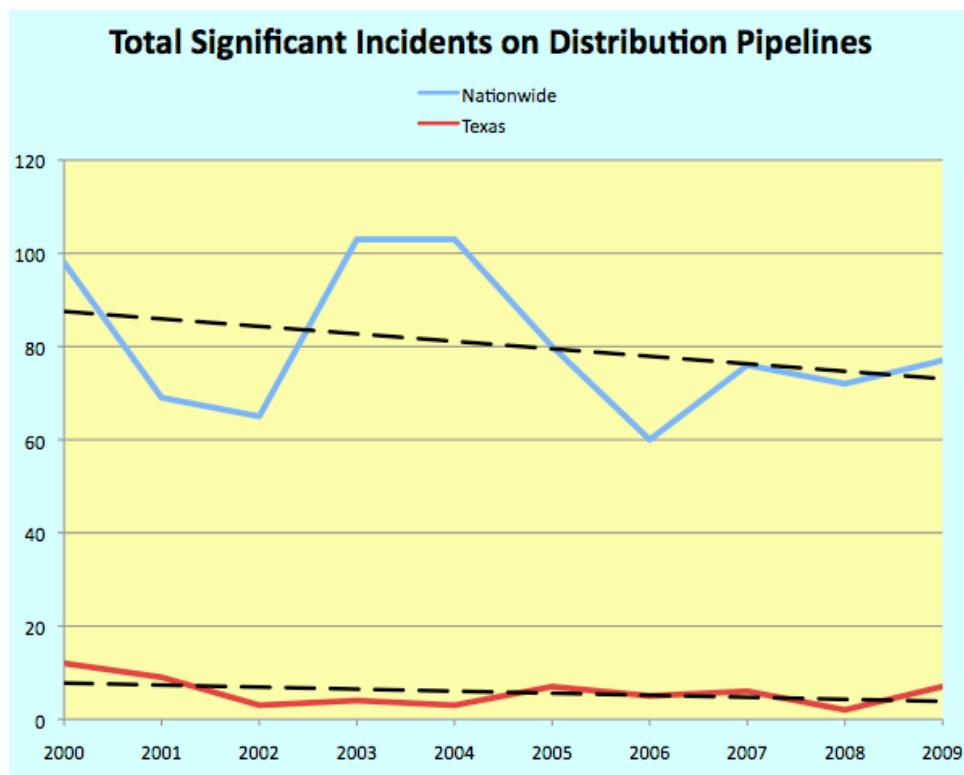


Significant Incident Cause Breakdown
Texas, Gas Transmission Onshore, 2000-2009

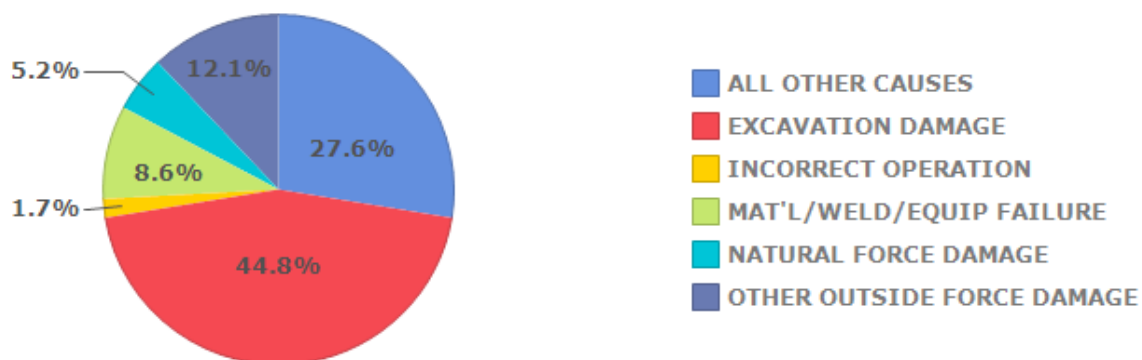


Source: PHMSA Significant Incidents Files February 17, 2010

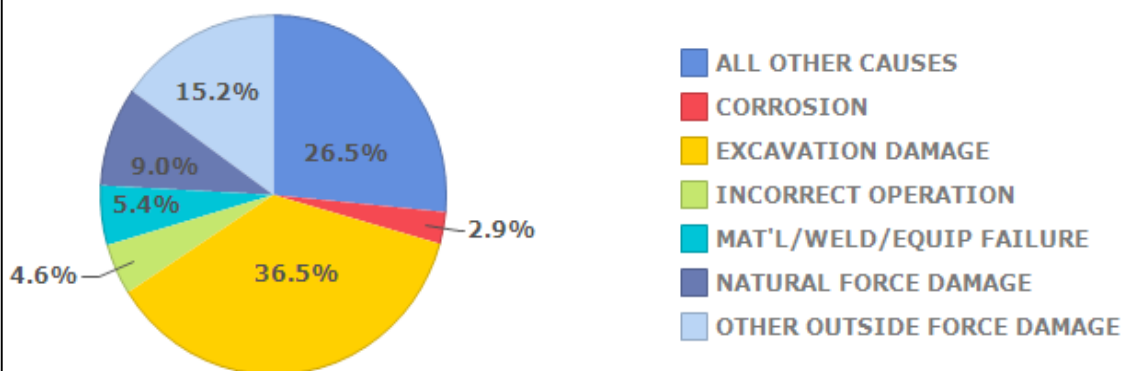




Significant Incident Cause Breakdown
Texas, Gas Distribution, 2000-2009

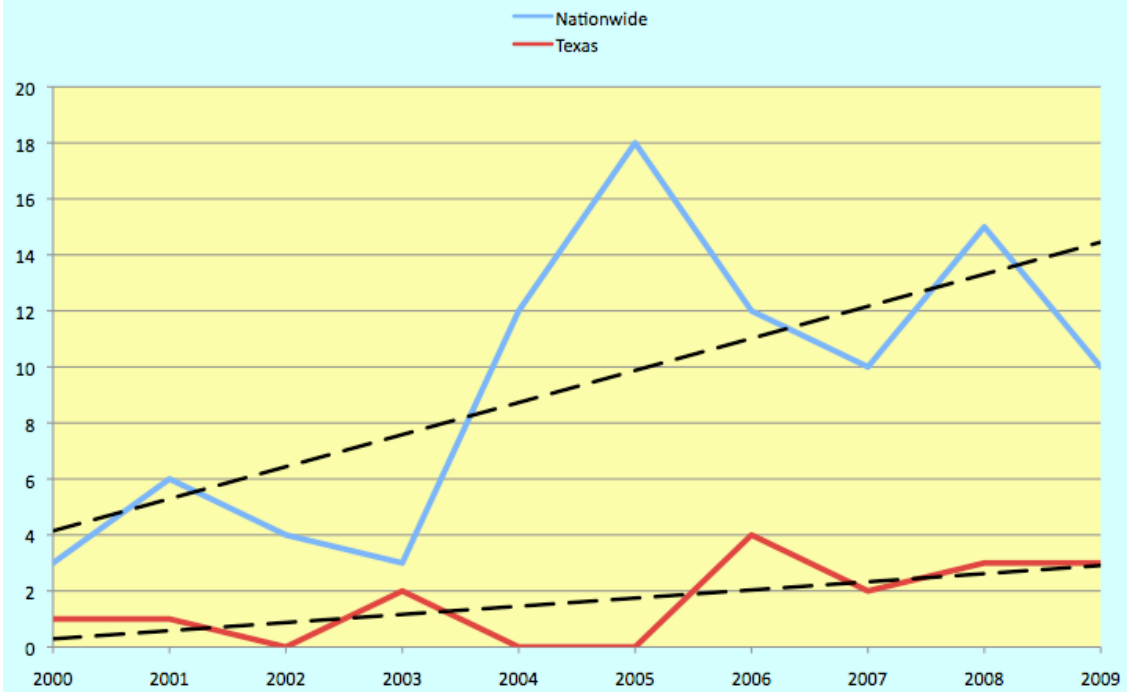


Significant Incident Cause Breakdown
National, Gas Distribution, 2000-2009

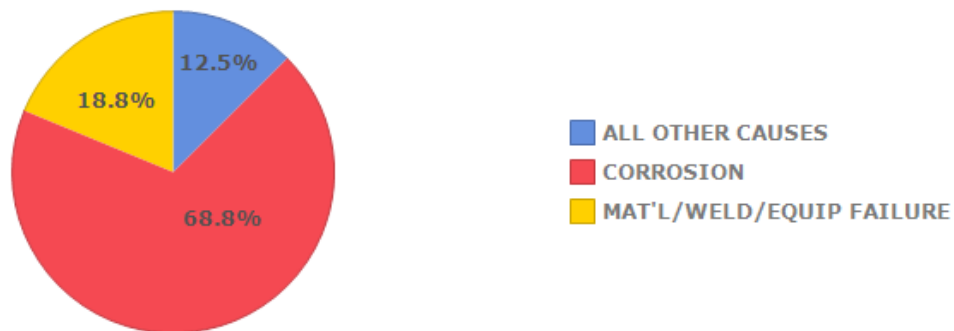


Source: PHMSA Significant Incidents Files February 17, 2010

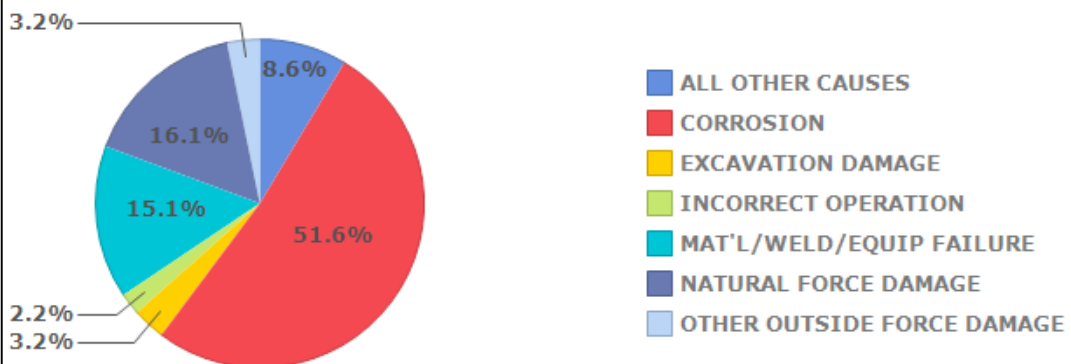
Total Significant Incidents on Natural Gas Gathering Pipelines



Significant Incident Cause Breakdown Texas, Gas Gathering, 2000-2009



Significant Incident Cause Breakdown National, Gas Gathering, 2000-2009



Source: PHMSA Significant Incidents Files February 17, 2010

These graphs appear to show that the trend for pipeline incident in Texas is similar or less than the same types of pipelines nationwide. The information regarding the cause of incidents seems to indicate that corrosion and excavation damage are larger problems in Texas on some types of pipelines.

We also have provided below the number of incidents, injuries and deaths, and property damage during the past ten years for the different types of pipelines in Texas. Below that are the specific incidents that have occurred in Fort Worth.

Texas Significant Incidents* 2000 - 2009					
	Miles of Pipeline	Number of Incidents	Incident Per Mile of Pipeline Per Year	Number of Deaths & Injuries	Property Damage
Hazardous Liquid	56,375	341	0.00060	14	\$171,007,707
Natural Gas Transmission	66,918	108	0.00016	12	\$156,137,110
Natural Gas Distribution	92,333	58	0.00006	49	\$9,623,362
Natural Gas Gathering	6,659	16	0.00024	0	\$27,448,856

** Significant Incidents are incidents that include deaths, injuries requiring hospitalization, \$50,000 in property damage in 1984 dollars, and for liquid lines certain spill volumes and incidents involving unintentional fires or explosions*

*** Distribution mileage does not include the individual service lines to each home and business*

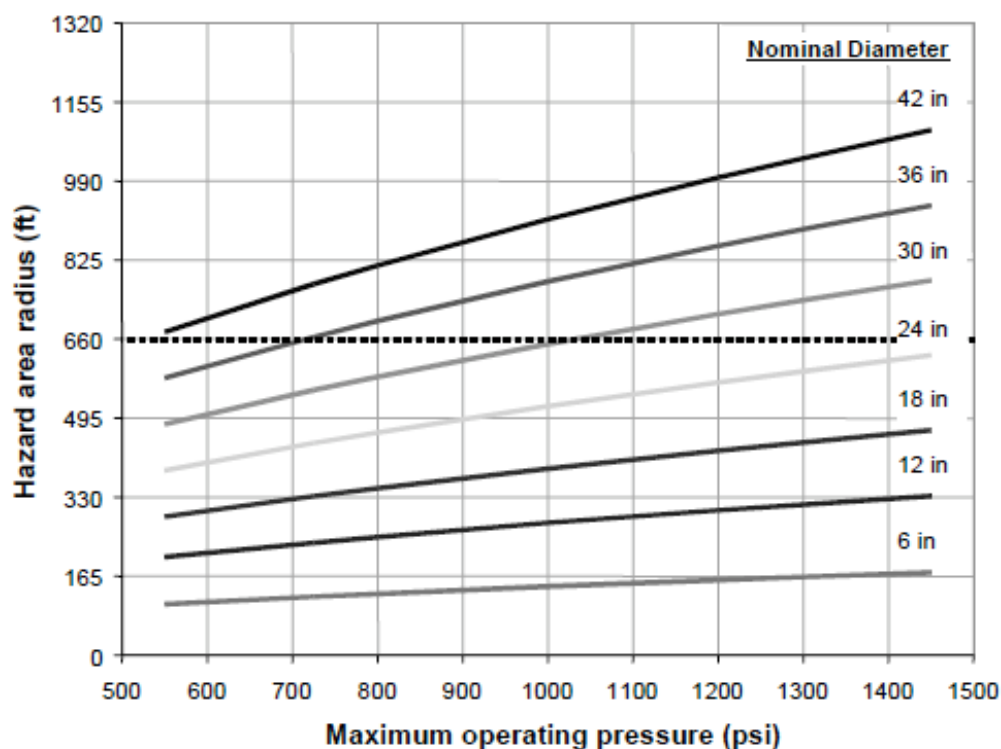
**** All numbers based on PHMSA incident database*

NAME	DATE	CITY	FATALITY	INJURY	PROPERTY DAMAGE	PIPELINE TYPE	CAUSE
LONE STAR GAS CO	19840723	FORT WORTH	1	1	\$25	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19840907	FORT WORTH	0	0	\$5,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19841106	FORT WORTH	0	0	\$20,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19850205	FORT WORTH	0	0	\$30,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19850529	FORT WORTH	0	2	\$50	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19860312	FORT WORTH	0	19	\$1,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19880129	FORT WORTH	0	0	\$5,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19880929	FORT WORTH	3	4	\$30,000	DISTRIBUTION	OTHER
LONE STAR GAS CO	19911230	FORT WORTH	0	0	\$12,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19921209	FORT WORTH	0	1	\$0	DISTRIBUTION	CONST./OPERATING ERROR
LONE STAR GAS CO	19940119	FORT WORTH	0	0	\$20,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19970730	FORT WORTH	0	3	\$15,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19971110	FORT WORTH	1	0	\$0	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19980707	FORT WORTH	1	0	\$450,000	TRANSMISSION	DAMAGE BY OUTSIDE FORCE
TXU GAS DISTRIBUTION	20001125	FORT WORTH	0	1	\$40,000	DISTRIBUTION	NO DATA
ATMOS ENERGY CORP	20050614	FORT WORTH	0	0	\$123,577	DISTRIBUTION	EARTH MOVEMENT
ENERGY TRANSFER CO	20070423	FORT WORTH	0	0	\$235,889	TRANSMISSION	MISCELLANEOUS
LONE STAR GAS CO	19840907	FT. WORTH	0	0	\$1,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES
LONE STAR GAS CO	19841016	FT. WORTH	0	0	\$5,000	DISTRIBUTION	DAMAGE BY OUTSIDE FORCES

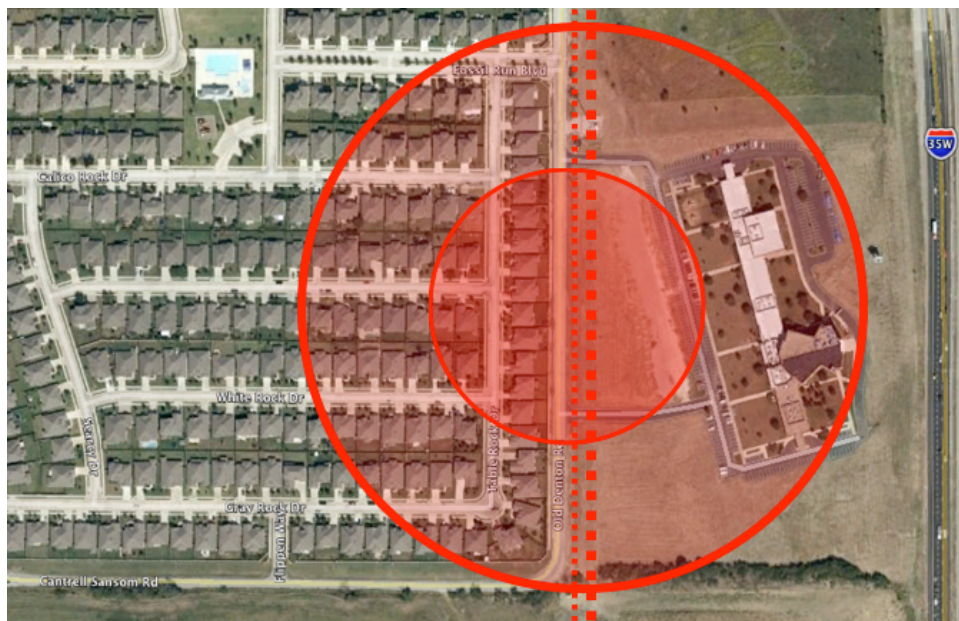
All Fort Worth Reported Incidents 1984 - 2009

The above charts and graphs should provide some measures of the probability of a pipeline incident happening and some of the consequences if it does. It is fairly clear from the data that the chance of a pipeline failing in any particular spot is very, very small, but of course if you ask the families of any of the 15 people who were killed by pipeline incidents over the past ten years in Texas they would tell you that the consequences are huge. So what are the possible consequences of natural gas pipeline failures, and how can they be quantified?

In 2000 the Gas Research Institute contracted with C-FER Technologies to produce a model – A Model For Sizing High Consequence Areas Associated With Natural Gas Pipelines¹¹ - that became instrumental in helping define potential impact zones around natural gas pipelines. While the model is complex, the basic idea is that by considering the diameter of the pipeline and the pressure it is operating at, it is possible to predict the impact area around the pipeline that could lead to a fatal exposure in the event of a catastrophic failure. Below is the chart out of the model that predicts these different zones.



It is possible to use this graph to analyze the potential impact radius of specific pipelines in Fort Worth. Below is an aerial photo of a neighborhood along Old Denton Road that has both a gas transmission (Enterprise Products, 30 inch diameter, Maximum Allowable Operating Pressure (MAOP) 1200psi) and gas gathering (Crosstex, 16 inch diameter, 1200 MAOP) pipeline running close by.



The outer red circle shows the Potential Impact Radius (PIR) for the transmission pipeline and the inner red circle is the PIR for the gathering line. As you can see over 60 homes and a large church fall within the PIR of the transmission pipeline, while about 15 homes and none of the actual church building fall within the PIR of the gathering pipeline.

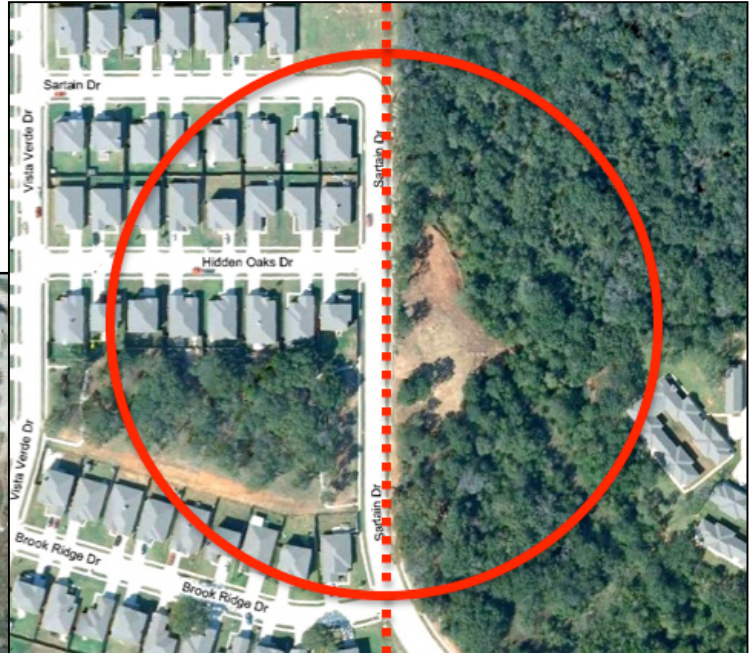
This dramatically illustrates how the pressure and size of a pipeline can affect the area impacted by a

¹¹ www.pstrust.org/library/docs/C-FERstudy.pdf

complete pipeline rupture. It should be remembered that the PIR calculations are based on a rupture in an open area, so people or homes sheltered by walls, trees or other buildings will be shielded from some of the effects of the initial blast wave and heat radiation.

Below are some additional pictures of different neighborhoods in Fort Worth with the PIR of the pipelines overlaid on them. It should be remembered that these illustrations are for the MAOP that these pipelines are allowed to operate within. Both the RRC and the pipeline operators have told us that they normally operate these pipelines at much lower pressures, which would increase the pipeline's safety.

Some experts have argued that the C-FER Model underestimates the impact areas around natural gas pipelines, especially for large diameter pipelines at high pressures, however the basic



concept provides a good context for understanding the function between pipeline size, pressure, and potential impact.

Another way is to consider the actual consequence of a pipeline incident is by reviewing actual previous incidents. The National Transportation Safety Board investigates many of the most significant incidents and the reports of their investigations can be found at:

http://www.nts.gov/Publictn/P_Acc.htm

The photos below also provide some indication of the consequences of natural gas pipeline failures.



Natural Gas
Transmission
Pipeline
Failure.
Bushland TX,
November
2009



Failure of a natural gas transmission pipeline. In this incident there was no explosion or fire, the crater was created by the pressure of the gas coming out of the pipeline. Note how far the pipe in the upper right corner was thrown.



Failure of a natural gas transmission pipeline. Arrow shows point of failure. Note how far from point of failure houses were destroyed



Fire caused by gas from a distribution pipeline leak building up in house and then exploding.

Neighbor involvement, Transparency and Where to Get More Information

If you have made it this far in this report then you have taken an important step to help ensure that pipelines in Fort Worth will be as safe as possible by educating yourself about how they work, who's in charge, and what needs to be done to ensure the public's safety is being looked after. We believe that pipeline safety is like a three-legged stool with the industry, regulators and public each serving as one leg of the stool and each playing a crucial role. If any leg of the stool falters pipeline safety is at risk.



The industry uses its vast resources and expertise to install, operate and maintain safe pipelines. The regulators verify through inspections and data collection that the minimum safety regulations are appropriate and are being met, and when necessary use enforcement authority to ensure compliance. The public, including elected officials, serve as the watchdogs to push for greater regulation and enforcement when necessary, and to make sure complacency doesn't set in.

The public can only do their part of the job if there is adequate transparency in what the industry and the regulators are doing. Adequate performance, inspection, and enforcement data needs to be easily publicly available so compliance can be verified. Adequate information about the specifications, contents, and routes of proposed pipelines also need to be easily available so people living in potentially impacted neighborhoods can decide for themselves if adequate safety precautions have been taken. And the information that decision makers use to make pipeline safety decisions also needs to be available to the public so they can decide whether their officials are making decisions with full knowledge of the impacts and with the public's safety and welfare in mind.

We believe that Ronald Reagan was right when he said "trust but verify." Only through such verification can trust in pipeline safety grow, and only when government and industry is truly transparent is such verification possible.

As stated earlier much of this report is based on information that is publicly available. The federal Office of Pipeline Safety (OPS) has made great strides in the past few years increasing transparency by making better incident, enforcement and inspection data available. The RRC has a robust website that includes pipeline maps, individual permits and annual reports, and information on excavation damage that is not available from the vast majority of other state pipeline regulators.

Concerns With Pipeline Information Transparency

While a large amount of information is publicly available and verifiable, there is still important information missing, which may lead to distrust of the process. With the current electronic abilities to post nearly unlimited materials online industry and government could create more trust by posting information that they already are required to prepare, instead of creating barriers by expecting the public to go through a formal public information request process. The industry in particular provides very little information about their particular pipelines and the associated operations, maintenance and inspection.

One of the very basic measures of pipeline safety is incident data. OPS has worked hard to upgrade their incident database in the past years, and now provides state-by-state breakouts of incident data including the specifics for each incident. The RRC provides data that shows how many more incidents on intrastate pipelines were reported to them than to OPS, but no specifics are provided regarding these incidents that allows analysis of safety trends or gaps in regulations.

One other concern is that often security issues are raised as a reason to prevent the public from access to important pipeline information. It is our opinion that these concerns are often overblown, and that a well informed public increases safety in many ways.

Transparency Recommendations

- The RRC should create a publicly accessible docket system that would include all information about pipeline enforcement cases and fines. It also should include any requests for exemptions or waivers and the RRC reasoning for granting or denying such requests.
- The RRC should make its incident database available to the public. Instead of just reporting the number of incidents reported, information about the particular pipeline involved, date, location, damage caused, and cause should also be provided.
- The City of Fort Worth should make all pipeline permit information publicly available online, and ensure that the maximum allowable operating pressure (MAOP), pipe diameter, and potential impact radius distances of all pipelines are provided in such information before approval is sought from various committees or the City Council.
- The City of Fort Worth should make all permitted pipeline routes available online before approval is provided. To ensure the City is using its approval authority to help develop safe pipeline routes, when approval of crossing of City rights-of-way or parks are sought, the route of the entire pipeline should be provided, not just the location where the pipeline will cross the right-of-way or park.
- Pipeline operators should make specific information about pipeline routes, construction, specifications, operations and inspections of their pipelines available on their websites.
- The Citizens of Fort Worth should continue to review pipeline safety information and make elected officials, regulatory agencies and the pipeline industry aware of concerns they have regarding the inability to access pipeline safety information.

Where To Get More Information

Citizen Organizations

Fort Worth League of Neighborhood Associations - <http://www.fwlina.org/>
Pipeline Safety Trust – <http://www.pstrust.org>

Regulations

Federal pipeline safety regulations - <http://phmsa.dot.gov/pipeline/regs>
Texas pipeline safety regulations & underground pipeline damage prevention regulations –
[http://info.sos.state.tx.us/pls/pub/readtac\\$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=8](http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=8)
[http://info.sos.state.tx.us/pls/pub/readtac\\$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=18&rl=Y](http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=16&pt=1&ch=18&rl=Y)
City of Fort Worth – Gas Well Drilling and Pipeline Info - <http://www.fortworthgov.org/gaswells/>

Pipeline Maps and Data

Federal Office of Pipeline Safety's –
Texas Info Pages – <http://primis.phmsa.dot.gov/comm/StatePages/Texas.htm>
Stakeholder Communications - <http://primis.phmsa.dot.gov/comm/>
Railroad Commission of Texas –
Pipeline and gas well maps - <http://gis2.rrc.state.tx.us/public/startit.htm>
Pipeline excavation damage query – <http://webapps.rrc.state.tx.us/TPD/publicHomeAction.do>
T-4 Pipeline Permits - <http://rrcsearch.neubus.com/esd-rrc/#results>
Pipeline Safety Data - <http://www.rrc.state.tx.us/data/pipeline.php>

About the Authors

The principal authors of this report were Richard Kuprewicz, president of Accufacts Inc and Carl Weimer, executive director of the Pipeline Safety Trust.

Richard Kuprewicz has over 35 years experience in the energy industry offering special focus on appropriate pipeline design and operation in areas of unique population density or of an environmentally sensitive nature. He is currently a member of the U.S. Department of Transportation Technical Hazardous Liquid Pipeline Safety Standards Committee (THLPSSC) and is the past chairman of the Washington State Citizens Committee on Pipeline Safety. He is a chemical engineer, experienced in production, pipeline, and refinery design, construction, operation, maintenance, risk analysis, management, acquisition, and hazard analysis. He has also authored many papers on pipeline safety, both nationally and internationally.



Carl Weimer has been the executive director of the Pipeline Safety Trust since 2005. The Trust is the only national non-profit public interest organization that focuses on pipeline safety issues. He also serves on the U.S. Department of Transportation's Technical Hazardous Liquid Pipeline Safety Standards Committee, and the steering committee for the Pipelines and Informed Planning Alliance. Mr. Weimer has testified to both the U.S. House of Representatives and Senate on pipeline safety issues multiple times, organized five national pipeline safety conferences, runs the national Safe Pipelines and LNG Safety listserves that include over 700 people from around the country, and regularly serves as an independent source of pipeline safety information for news media, local government, and citizens around the country. Mr. Weimer was elected in 2005 to the Whatcom County Council, and re-elected in 2009. He has a degree in Natural Resources and Environmental Education from the University of Michigan, as well a degree in Industrial Electronics Technology from Peninsula College.

