



Professional Engineers. Regulatory Experts. Trusted Partners.

Natural Gas Pipeline Construction and Operation

W. R. (Bill) Byrd, PE
President
RCP Inc.

888-727-9937

wrb@rcp.com

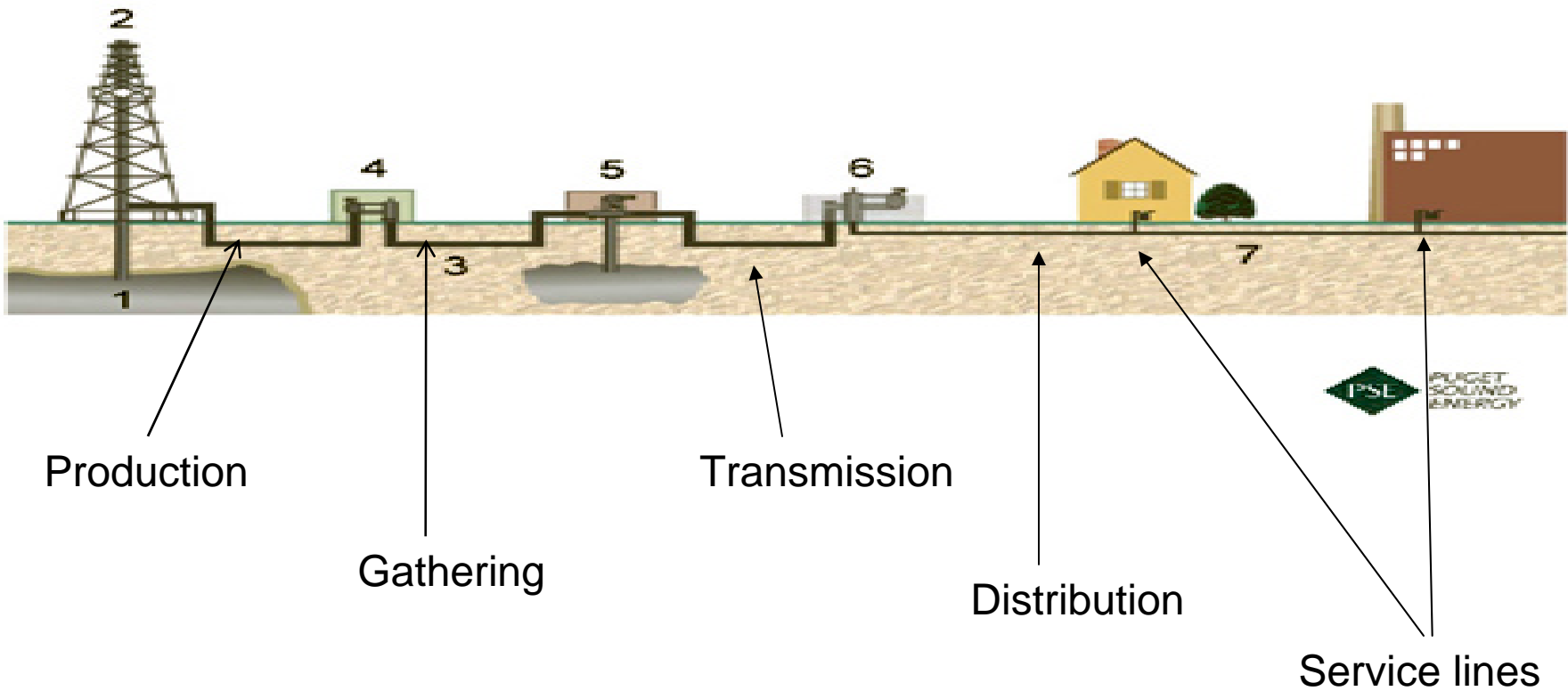
PROFESSIONAL ENGINEERS. REGULATORY EXPERTS. TRUSTED PARTNERS.

My Qualifications

- ▶ Professional Engineer in Louisiana, Texas, and others
- ▶ Summa Cum Laude graduate of the Georgia Institute of Technology
- ▶ Masters Degree in Mechanical Engineering
- ▶ 26 years of experience in oil and gas production and transportation; Area Manager of a large pipeline company;
- ▶ Professional Member of the National Association of Corrosion Engineers
- ▶ Actively involved in the Pipelines and Informed Planning Alliance (PIPA) / Protecting Communities task force

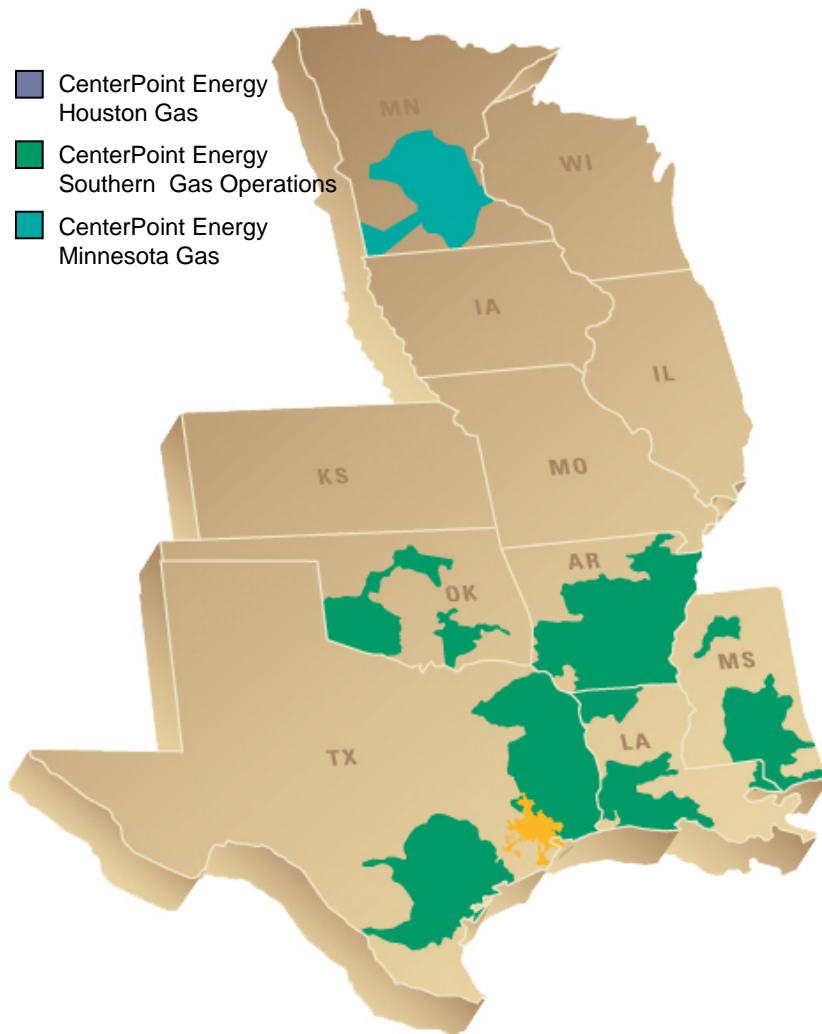


How Natural Gas is Delivered from wellhead to meter



Professional Engineers. Regulatory Experts. Trusted Partners.

Example relationship: Transmission, Distribution, Service



- ▶ 740 miles of Transmission Pipeline
- ▶ Over 65,000 miles of Distribution Mains
- ▶ 3+ million Service Lines

Pipelines and Protecting Communities

- ▶ Pipelines are by nature “dispersed” assets that may be in or near populated areas
- ▶ Transportation Research Board called for a “Risk Informed” planning approach for pipeline and community development
- ▶ The Pipelines and Informed Planning Alliance (PIPA) is currently working to develop guidelines that are risk informed, to protect both pipelines and the communities in which they operate

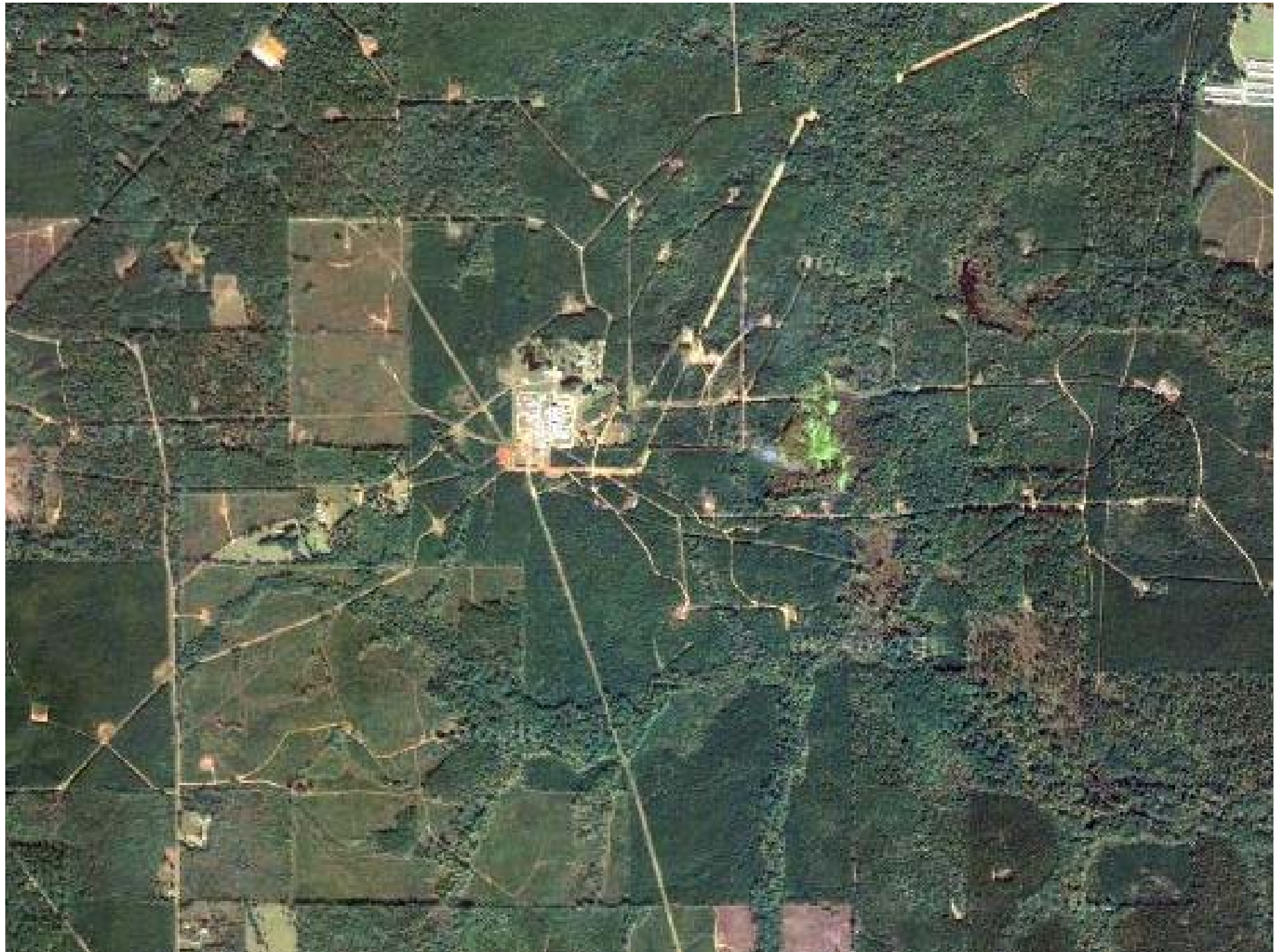
The Pipeline Safety Record

- ▶ Significant pipeline accidents are very rare, as are injuries and fatalities to the public due to pipeline accidents.
 - ▶ Easily outnumbered by the number of annual drownings in bathtubs, deaths due to bee stings, etc.
 - ▶ Within the Department of Transportation, pipeline-related fatalities can't even be seen on the graph
- ▶ This is so, even though the median decade of construction for US pipelines is the 1950s!
 - ▶ Modern pipelines will be even safer than average



Pipeline Routing

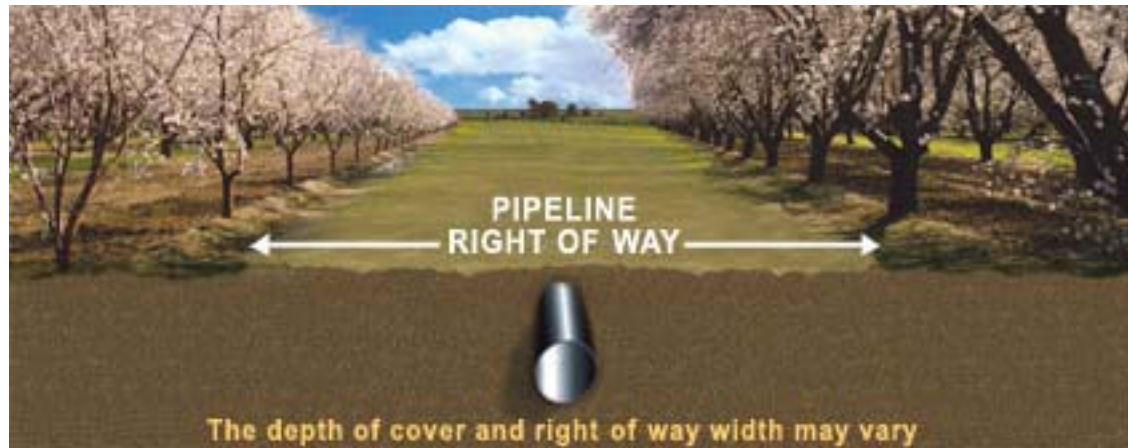
- ▶ This isn't rocket science, or a conspiracy
 - ▶ Start at the well, and get to the market...
- ▶ Routing Factors
 - ▶ Installation cost
 - ▶ Distance
 - ▶ Difficulty (initial survey work may be required)
 - ▶ Delivery point characteristics
 - ▶ Gas sales opportunities / options
 - ▶ Processing options



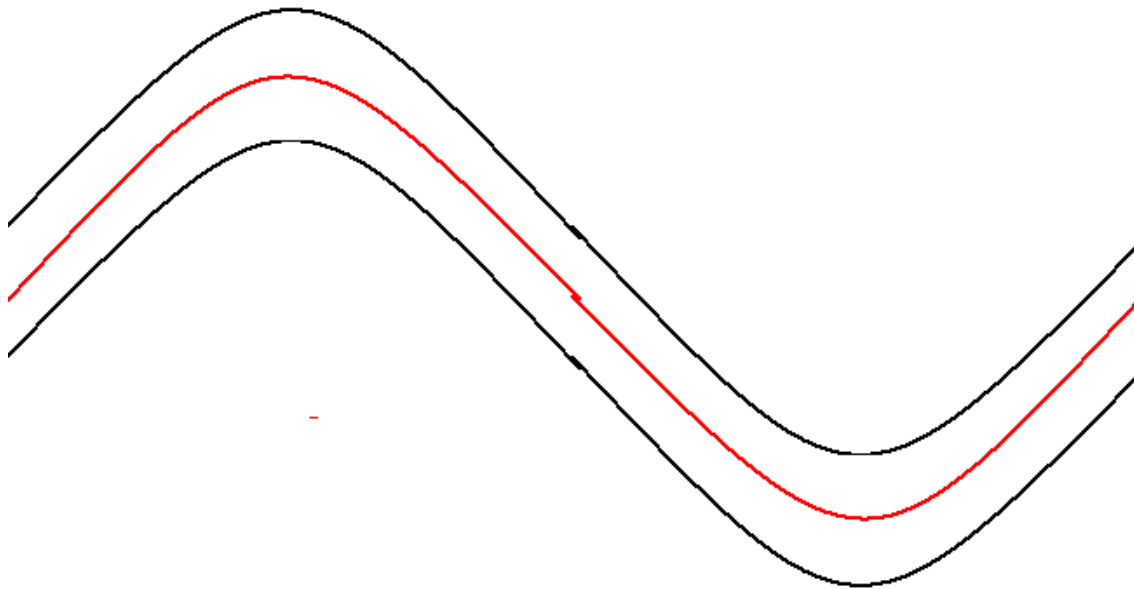
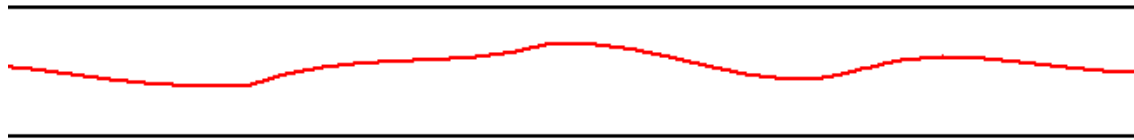
Fort Worth / Dallas Metroplex



Example Easement



Fixed vs/ Floating Easements



Easement Agreements

- ▶ Fixed or floating
- ▶ Width of easement(s)
 - ▶ During construction
 - ▶ Permanent
- ▶ How many pipelines / what other facilities will be allowed
- ▶ Access routes
- ▶ Maintenance rights / restoration obligations
- ▶ Duration, Abandonment
- ▶ Fees

Installation

Most of the time: it's a ditch, then you're done
- note extra width may be required during construction



Professional Engineers. Regulatory Experts. Trusted Partners.

Installation

- ▶ The company wants to be done just as fast as you do – it shouldn't take long
- ▶ Directional drills require more surface access on each end
- ▶ Restoration of the surface is performed after installation
 - ▶ Repair driveways, culverts, drain tiles
 - ▶ Re-seed grassy areas

Pipeline ROW after restoration



Professional Engineers. Regulatory Experts. Trusted Partners.

Operations / Maintenance

- ▶ **Surface impacts after construction are normally minimal**
 - ▶ Most ROWs just look like a grassy area
 - ▶ Might have a permanent marker / sign
 - ▶ Might have a “test lead” or a valve
 - ▶ Can still use the land for most things

Typical Pipeline Signs



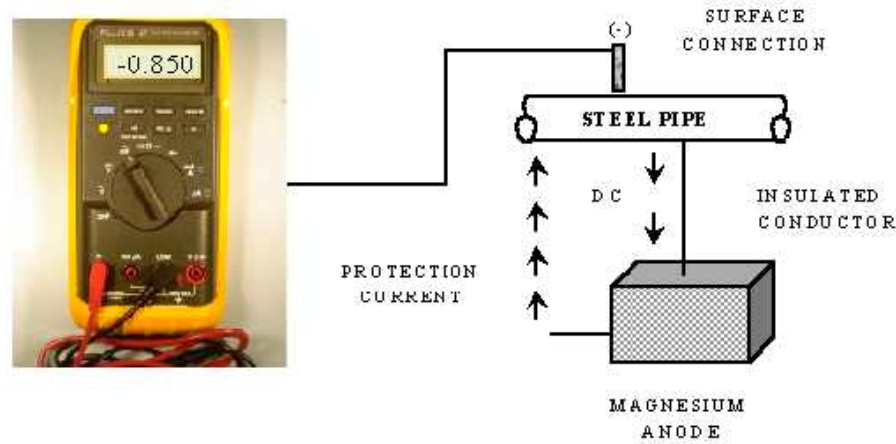
Professional Engineers. Regulatory Experts. Trusted Partners.

A Typical PL ROW



Professional Engineers. Regulatory Experts. Trusted Partners.

A Cathodic Protection Test Station



Living with a Pipeline Right of Way

- ▶ The pipeline operator really does want to be a good neighbor. If you've got special needs or concerns, they will try to work them out with you. Just realize that some things aren't really negotiable:
 - ▶ Some inspections and tests require physical access to the easement – don't block it, or build over it
 - ▶ Stability of the easement is important – don't undermine it
 - ▶ The signs are there for a reason – don't move them
 - ▶ Vegetation in or hanging over the easement may be cut, including trees, on a routine basis
 - ▶ Repairs to the pipeline, if ever needed, will require digging



Removing limbs hanging over ROW



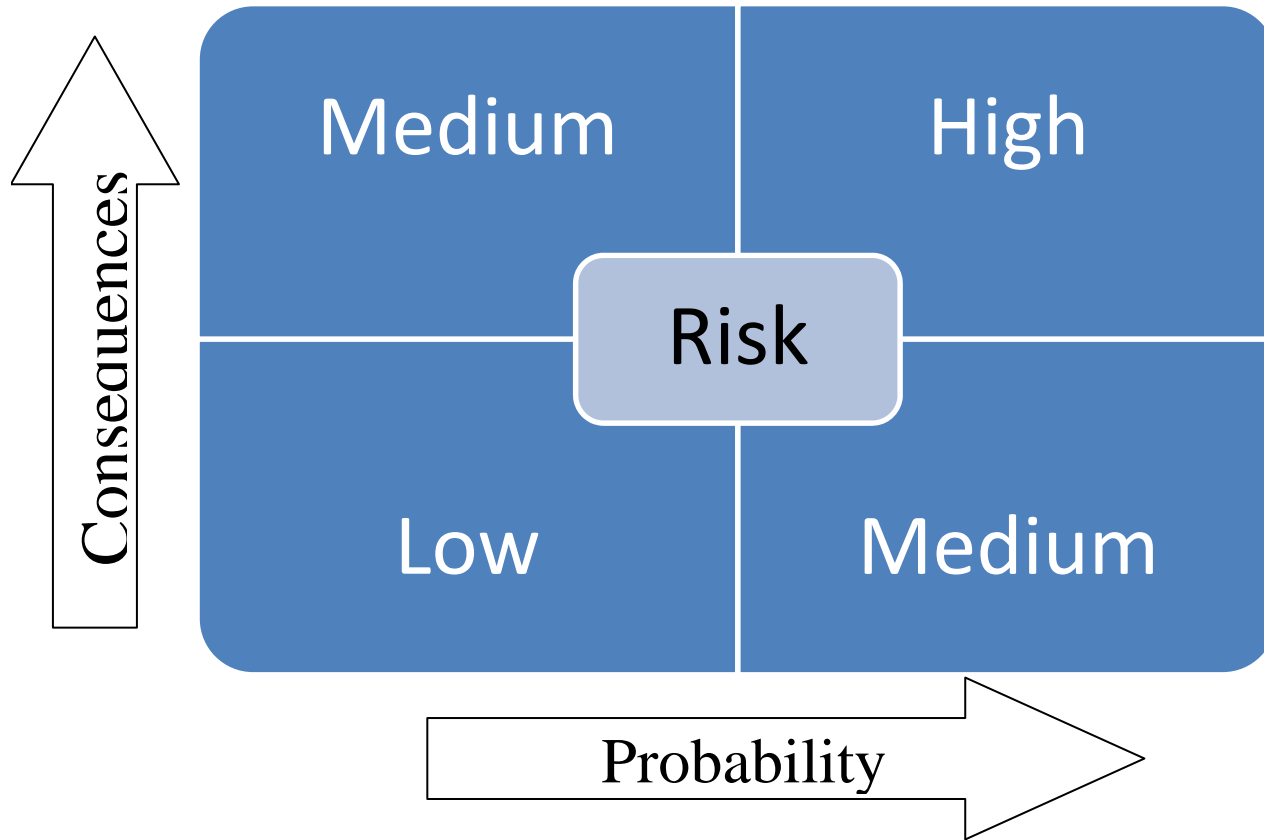
Professional Engineers. Regulatory Experts. Trusted Partners.

Conclusion

- ▶ **Communities and Pipelines can coexist and benefit from one another**
 - ▶ The risks are very small
 - ▶ The impacts are also small
- ▶ **Well-informed landowners are good for pipelines**
 - ▶ Ask questions; make sure you understand; don't be afraid
- ▶ **Pipelines can be good for well-informed landowners**
 - ▶ Get \$s for letting them use the land, but you still own it and can still sell it



Risk



Gas Pipeline Risk Factors

▶ Probability Factors

- ▶ Design and construction methods / age
- ▶ Operations and maintenance practices
- ▶ External damage

▶ Consequence Factors

- ▶ Size
- ▶ Pressure
- ▶ Contents (flammable? toxic? corrosive?)

Shale Gas Pipelines Probability Factors

- ▶ Design and construction methods / age
 - ▶ Modern design / modern specifications for pipe, materials, coatings, welding, burial, testing, etc.
- ▶ Modern operations and maintenance practices, including cathodic protection
- ▶ External damage
 - ▶ Covered by the State damage prevention regulations

Shale Gas Pipelines Consequence Factors

- ▶ **Size**

- ▶ small (mostly 4", some up to 24"; typical gas transmission is up to 42")

- ▶ **Pressure**

- ▶ low (mostly 200 – 300 psi; typical gas transmission is 1,000+)

- ▶ **Contents**

- ▶ Normal natural gas



Conclusion

- ▶ In general, these pipelines pose no unusual risk factors, and rate very well on many important factors
- ▶ Development of these types of pipelines can be compatible with urban and suburban residential and office developments