



# Pipeline Operations – Petroleum & Natural Gas

*Virgil Pfennig – Area Manager (TransCanada)  
 April 15, 2015 - Sioux Falls, SD*

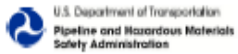
# Presentation



## Purpose:

- To help you gain a better understanding of typical pipeline operations.
- Difference between Petroleum & Natural Gas operating requirements.
- Basic understanding of PHMSA code regulations

# U.S. Pipelines

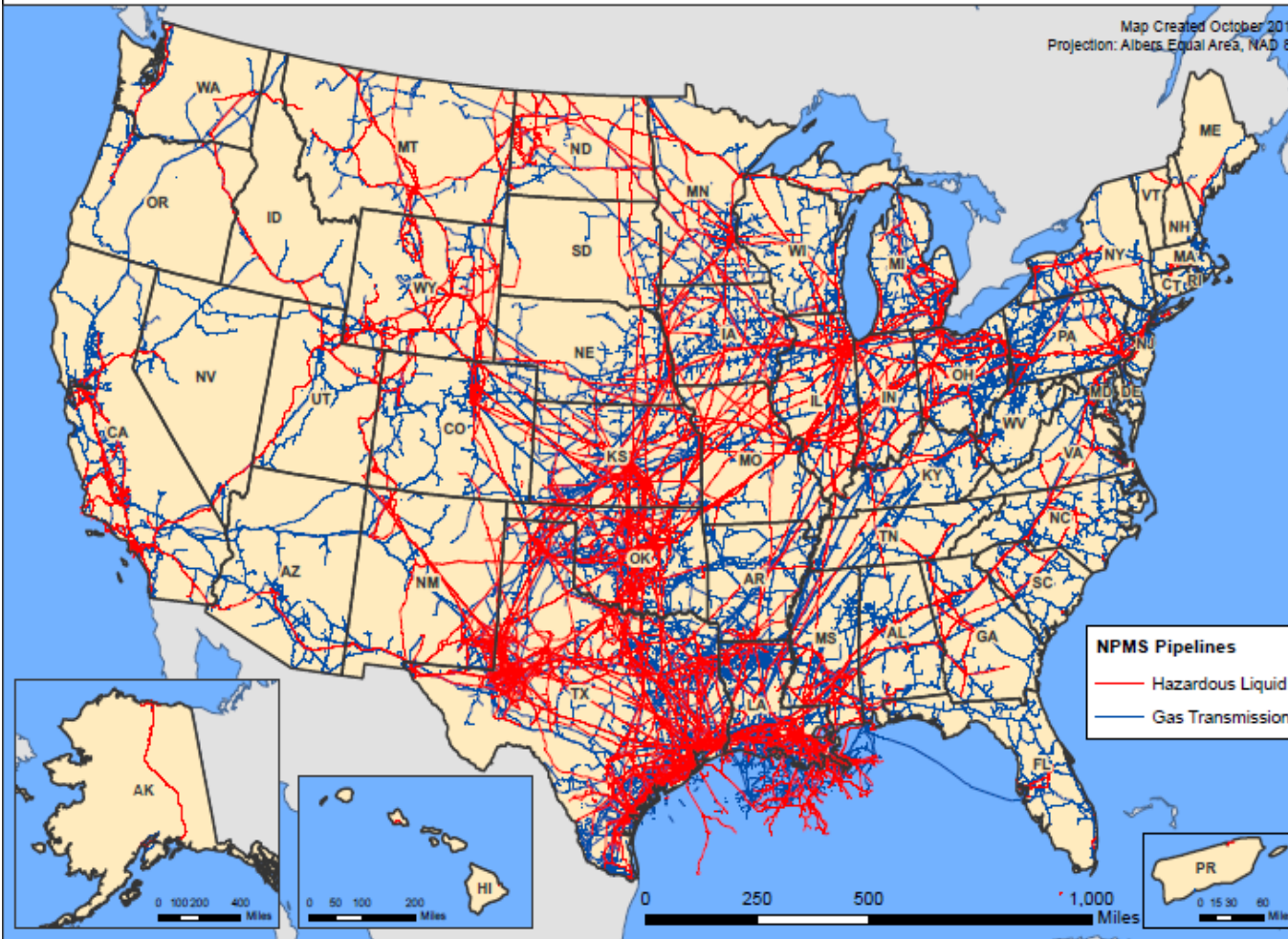


## Gas Transmission And Hazardous Liquid Pipelines

Pipeline data as of 9/29/2013



Map Created October 2013  
Projection: Albers Equal Area, NAD 83



- More than 2.5 million miles of pipelines in the U.S.
- Why pipelines? Safest and most efficient method to move energy products
- The vast majority of diesel fuel, gasoline, aviation fuel used in the United States is delivered by pipeline
- US DOT regulates safety

# Operations and Maintenance



- Procedural Manual (Operations, Maintenance and Emergencies)
- Pipeline Accidents & Reporting Requirements
- Emergency Response
- Line Markers
- Inspection of Rights-of-Way
- Valve Maintenance
- Public Awareness
- Damage Prevention Program
- External Corrosion Control
- Internal Corrosion Control
- Atmospheric Corrosion Control
- Pigging

# Procedure Manual



- Written Procedures for conducting operations and maintenance activities and for emergency response.
- Must be prepared before operations of a pipeline system commence.
- Must be reviewed and updated at intervals not exceeding 15 months but at least once a calendar year.
- Appropriate parts must be kept made available at all facilities where operations and maintenance activities are conducted.

# PHMSA (DOT) Regulations



## Operations and Maintenance:

- Natural Gas Pipelines: 49 CFR – Part 191
  - Reporting
- Natural Gas Pipelines: 49 CFR – Part 192
  - Subpart I – Corrosion Control
  - Subpart L – Operations
  - Subpart M - Maintenance
- Hazardous Liquids (Oil) Pipelines: 49 CFR - Part 195
  - Subpart F – Operation and Maintenance

# Incidents/Accidents Reporting



- Incidents = Natural Gas Pipelines
- Accidents = Petroleum Pipelines
  
- Follow your procedure when gathering information.
- Process begins as soon as site condition safety allows...**SAFETY FIRST!**
- Notify the National Response Center (NRC) in accordance with your procedures.
  - NRC will assign an incident report number
- Update the initial report if needed.
- Follow up with a written report if needed.
- Determine the cause.

# Emergency Response



- Establish written procedures to minimize the hazard resulting from a pipeline emergency.
  - Prompt and effective response for various types of emergencies
  - **PEOPLE** 1<sup>st</sup>..... Property 2<sup>nd</sup>
  - How will you communicate with the appropriate fire, police, and other public officials?
  - Do you have adequate equipment to respond?
  - Will you utilize the Incident Command System (ICS)?
  - Train operating personnel and verify that the training is effective.



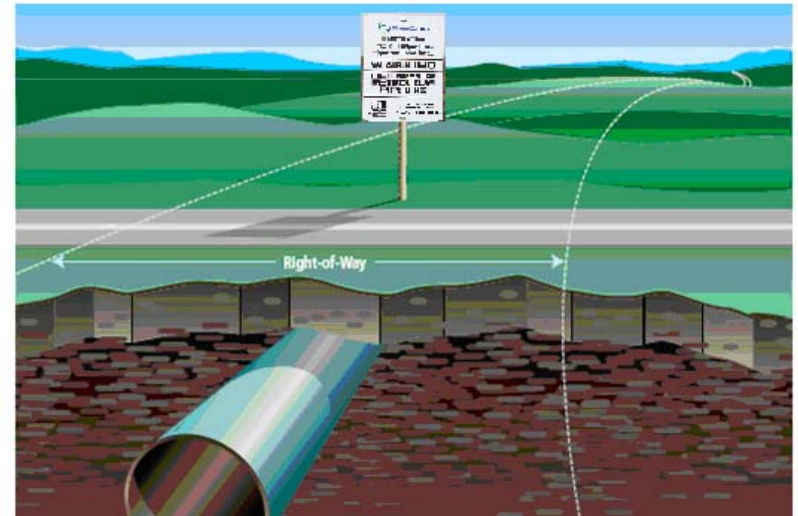
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# Line Markers



- A line marker must be placed and maintained as close as practical over each buried main and transmission line:
  - (1) At each crossing of a public road and railroad; and
  - (2) Wherever necessary to identify the location of the line to reduce the possibility of damage or interference (Exceptions for certain populated areas, offshore, and water bodies).
- Considerations:
  - Fence Lines
  - Angle points
  - Line of site
  - River Crossings
  - Private Roads
- Line marker specification:
  - Sharply contrasting color
  - Words....."Warning", "Caution", or "Danger"
  - Name of product transported....."Natural Gas", "Petroleum", etc
  - Letters at least 1 inch (25 millimeters) high with  $\frac{1}{4}$  inch (6.4 millimeters) stroke.
  - Name of company, emergency phone number.



# Line Patrol (Transmission - Natural Gas)



- Observe surface conditions on and adjacent to the transmission line right-of-way for indications of leaks, construction activity, and other factors affecting safety and operation.
- Methods of patrolling include walking, driving, flying or other appropriate means of traversing the right-of-way.
- Intervals between patrols may not be longer than prescribed in the following table

| Class location of line | Maximum interval between patrols                         |   |
|------------------------|--|---|
|                        | At highway and railroad crossings                        | At all other places                                       |
| 1, 2                   | 7 1/2 months; but at least twice each calendar year      | 15 months; but at least once each calendar year.          |
| 3                      | 4 1/2 months; but at least four times each calendar year | 7 1/2 months; but at least twice each calendar year.      |
| 4                      | 4 1/2 months; but at least four times each calendar year | 4 1/2 months; but at least four times each calendar year. |

# Line Patrol (Transmission - Petroleum)



- Patrolled for the same reason as “Natural Gas”.
- Utilize similar methods as “Natural Gas”
- Frequency is different.....
  - Intervals not exceeding 3 weeks, but at least 26 times each calendar year
  - Entire pipeline right-of-way
- Document anomalies and corrected actions
- Walk canopy areas.



# Valve Maintenance



- **Natural Gas:**
  - Emergency designated valves must be inspected and partially operated at intervals not exceeding 15 months, but at least once each calendar year.
  - Each operator must take prompt remedial action to correct any valve found inoperable, unless the operator designates an alternative valve.
- **Petroleum:**
  - Valves required for safe operation of the pipeline system are inspected and operated twice each calendar year not exceeding 7½ months.

# Public Awareness



- Program must follow the general program recommendations of API RP 1162.
- Include provisions to educate the public, appropriate government organizations, and persons engaged in excavation
- Program must be conducted in English and in other languages commonly understood by a significant number of the non-English speaking population.
- **Meetings:**
  - One Call
  - Pipeline Association
  - Excavator
- **Media:**
  - Trinkets
  - Calendars
  - Newspaper adds
  - Brochures

# Damage Prevention Program



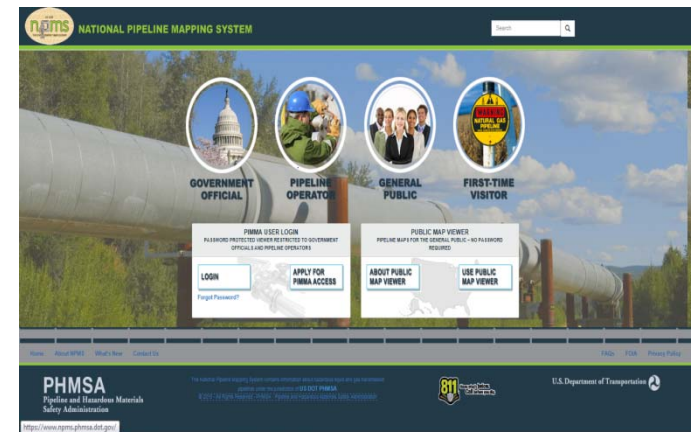
## Key Components of Pipeline Safety:

- Call before you Dig / “One Call Programs”
- Preventing accidental pipeline “dig-ins”
- Leading cause of pipeline accidents



## National Pipeline Mapping System

- Web Access via: <http://www.npms.phmsa.dot.gov/>
- Public access



# External Corrosion Control



- Coatings:
  - FBE, Tape, Wax, etc
  - Examine when exposed
- Cathodic Protection:
  - Impressed System (Rectifiers) – Inspected 6 times a year
  - Galvanic Anode System (Magnesium, Zinc, etc)
  - In operation no later than 1 year after the pipeline is constructed
  - Annual survey
- Bond with other operators
- Criteria:
  - Paragraphs 6.2 and 6.3 of NACE SP 0169
    - -850mv off (saturated copper-copper sulfate half-cell)
    - 100mv polarized voltage shift



# Internal Corrosion Control



If you transport any hazardous liquid or carbon dioxide that would corrode the pipeline, you must investigate the corrosive effect on the pipeline and take adequate steps to mitigate internal corrosion.

- Inhibitors: If you use corrosion inhibitors to mitigate internal corrosion, you must—
  - Use coupons or other monitoring equipment to determine the effectiveness of the inhibitors
  - Examine the coupons or other monitoring equipment at least twice each calendar year, but with intervals not exceeding 7½ months.

# Atmospheric Corrosion Control



- Clean and coat piping that is exposed to the atmosphere.
- Coating material must be suitable for the prevention of atmospheric corrosion
- Inspect every 3 years not to exceed 39 months
  - Pay particular attention to pipe at soil-to-air interfaces, under thermal insulation, under disbonded coatings, at pipe supports, penetrations, and in spans over water.
- If you find atmospheric corrosion that affects the safe operation of the pipe, you must provide protection against the corrosion before the next scheduled inspection

# Pipeline Inspections - Pigging



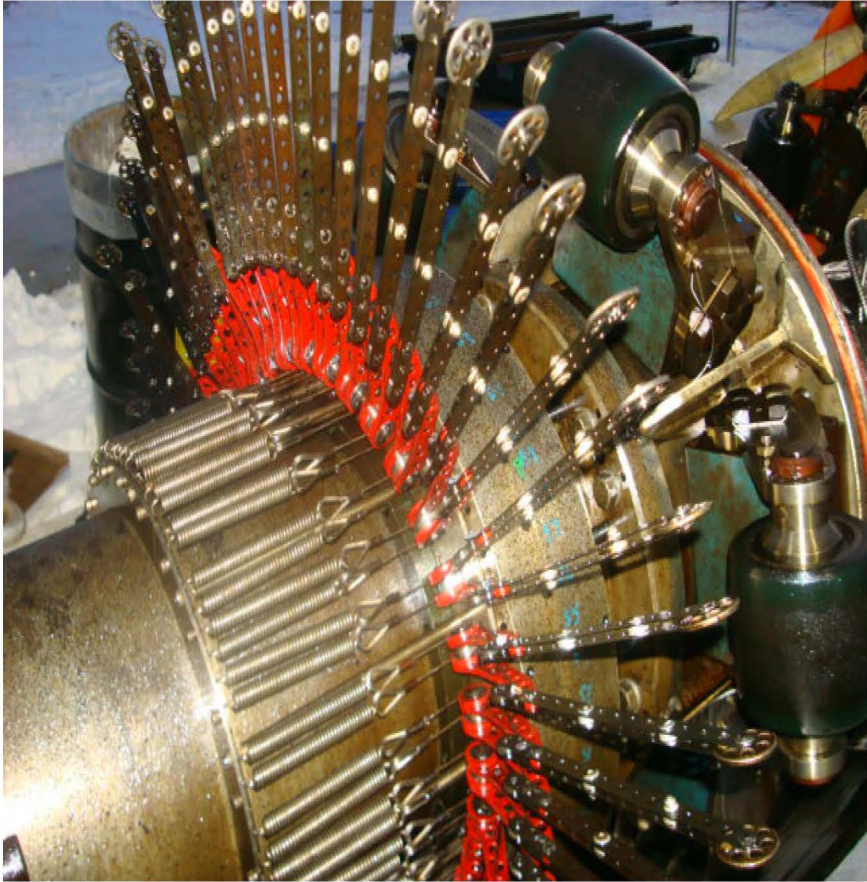
Baker Hughes - Combo Tool

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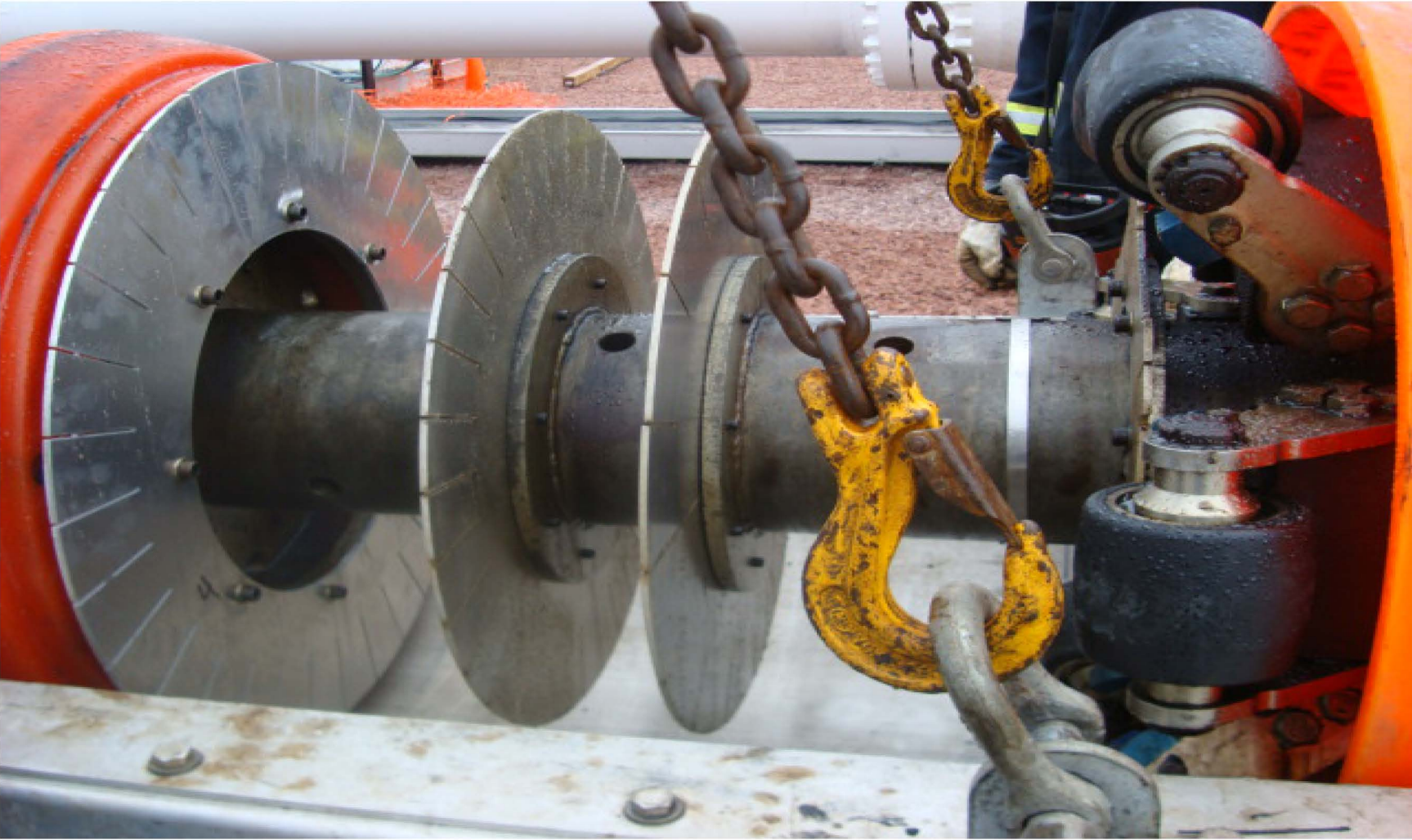


Baker Hughes - Combo Tool

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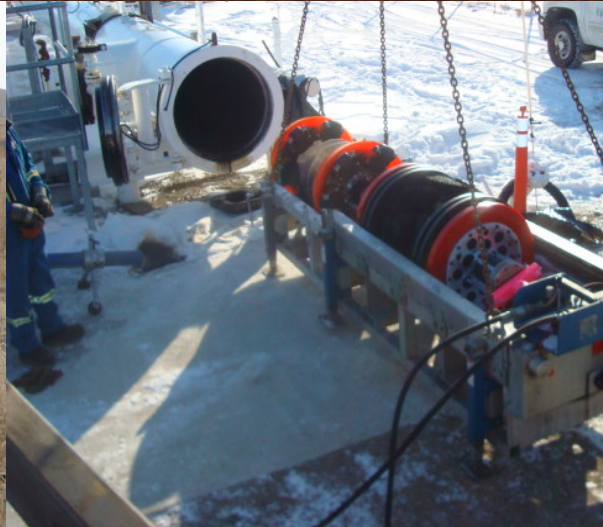


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Thank You