
# DISTRIBUTION PIPELINE INTEGRITY PHILADELPHIA GAS WORKS

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# PIPELINE INTEGRITY HISTORY

- Bellingham, WA - 1999
- Carlsbad, NM - 2000
- High consequence, high profile incidents resulting in Congress passing the Pipeline Safety Improvement Act of 2002. Pressure on PHMSA (OPS) to take action and improve Pipeline Integrity throughout the nation

# PHMSA (OPS) ACTIONS

- Liquid Pipeline Integrity rule issued
- Natural Gas Transmission Pipeline Integrity rule issued
- Efforts to develop a rule on Natural Gas Distribution Pipeline Integrity began December 2004

# First Steps

- Public Meeting December 16, 2004 – DOT Inspector General recommends Distribution Integrity should include the following operator requirements:
  - Know the infrastructure
  - Identify the threats in the system
  - Reduce risk

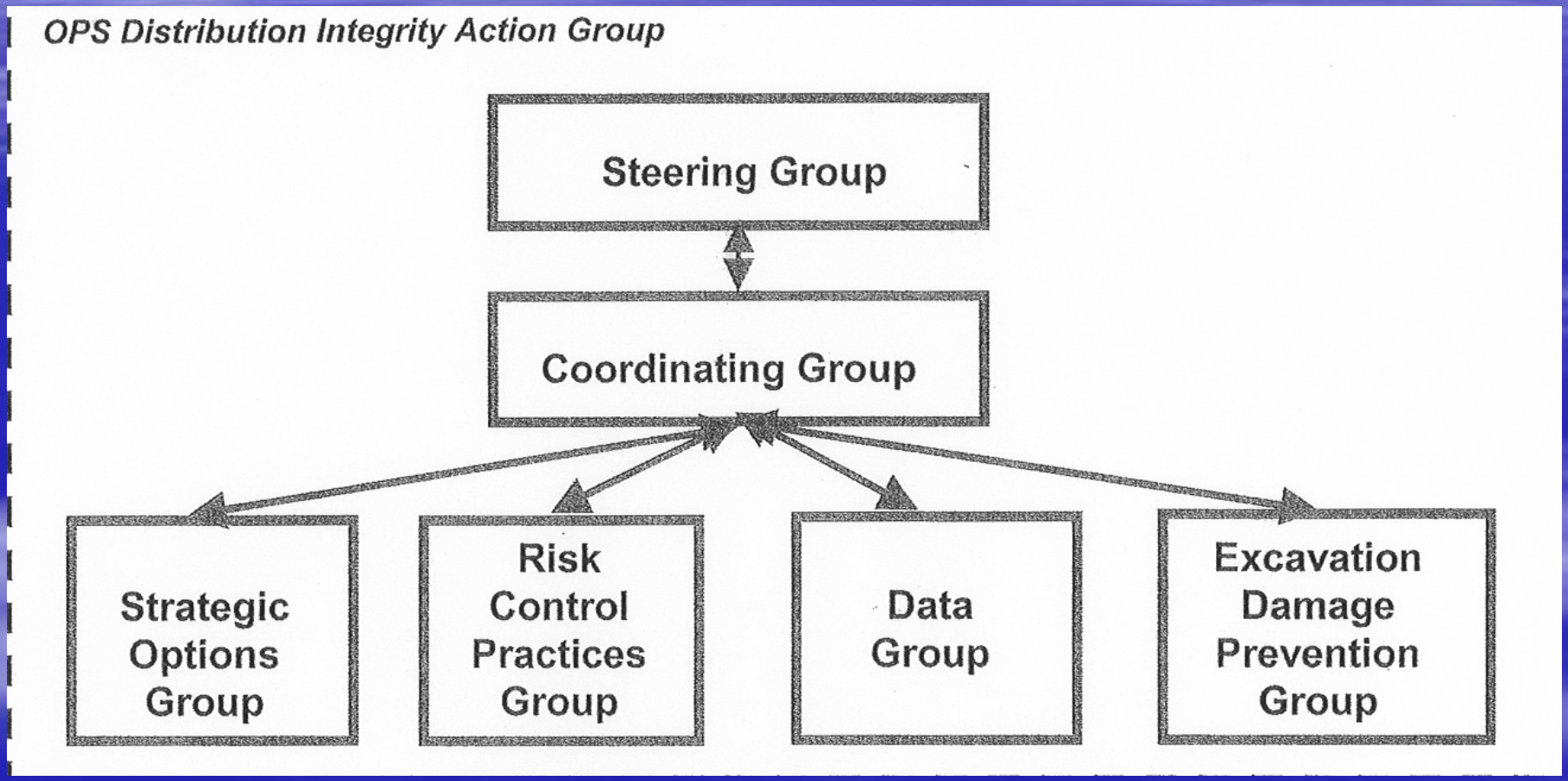
# Additional Goals

- Maintain balance between public safety and reliability of service at **reasonable costs to consumers**
- Consideration should be given for existing strengths, current regulations, recent mandates, initiatives and state Distribution programs
- Transmission model for Pipeline Integrity Management is inappropriate for Distribution systems

# Game Plan

- Phase One started in January 2005
  - Quality Action team established to assist PHMSA (OPS) in developing plan to be communicated to members of Congress
    - Gather and develop background information
    - Collect and analyze data
    - Identify concepts

# Game Plan


OPS Distribution Integrity Action Group
Steering Group
Coordinating Group
Strategic Options Group
Risk Control Practices Group
Data Group
Excavation Damage Prevention Group

# Game Plan Cont'd

- Distribution Integrity Management Steering Group – DIMSG - Team Structure
  - Four State Commissioners
  - Trade Associations (AGA, APGA, CGA)
  - Private LDC Executive
  - Municipal LDC Executive
  - Public
  - PHMSA (OPS) Stacey Gerard and Ted Wilke

# Coordinating Groups

- NARUC
- NAPSR
- PHMSA (Fortner, Israni)
- Trade Associations (AGA, APGA, CGA)

# Work Study Groups

- Team members include participants from PHMSA, NARUC, NAPSR, AGA, APGA, CGA, GPTC, Industry, National Association of State Fire Marshals and the Public
  - Data Team
  - Strategic Options
  - Risk Control
  - Excavation Damage

# Excavation Damage Prevention Group Objective & Approach

## Objective

To devise a plan to enhance natural gas distribution pipeline safety by significantly reducing excavation damages.

## Approach

Review and analyze available data, damage prevention processes, best practices and performance metrics.

# Excavation Damage Prevention Group Findings

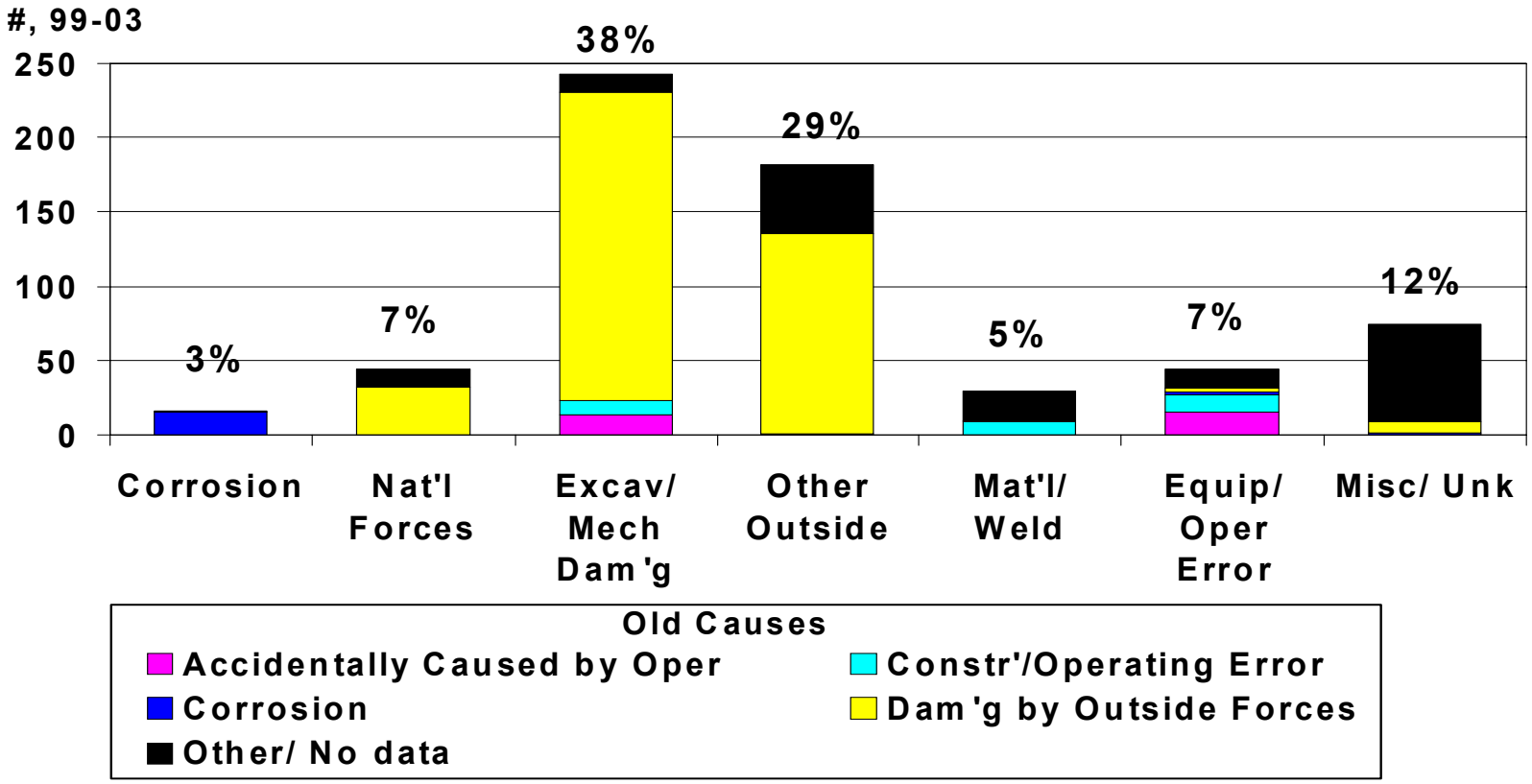
The 2005 Allegro study found that 38% of gas distribution pipeline incidents that result in injury or fatality are caused by excavation damage.

Education and other efforts to date have resulted in decreasing trends in excavation damage.

# Excavation Damage Prevention Group Findings

Allegro Energy Consulting

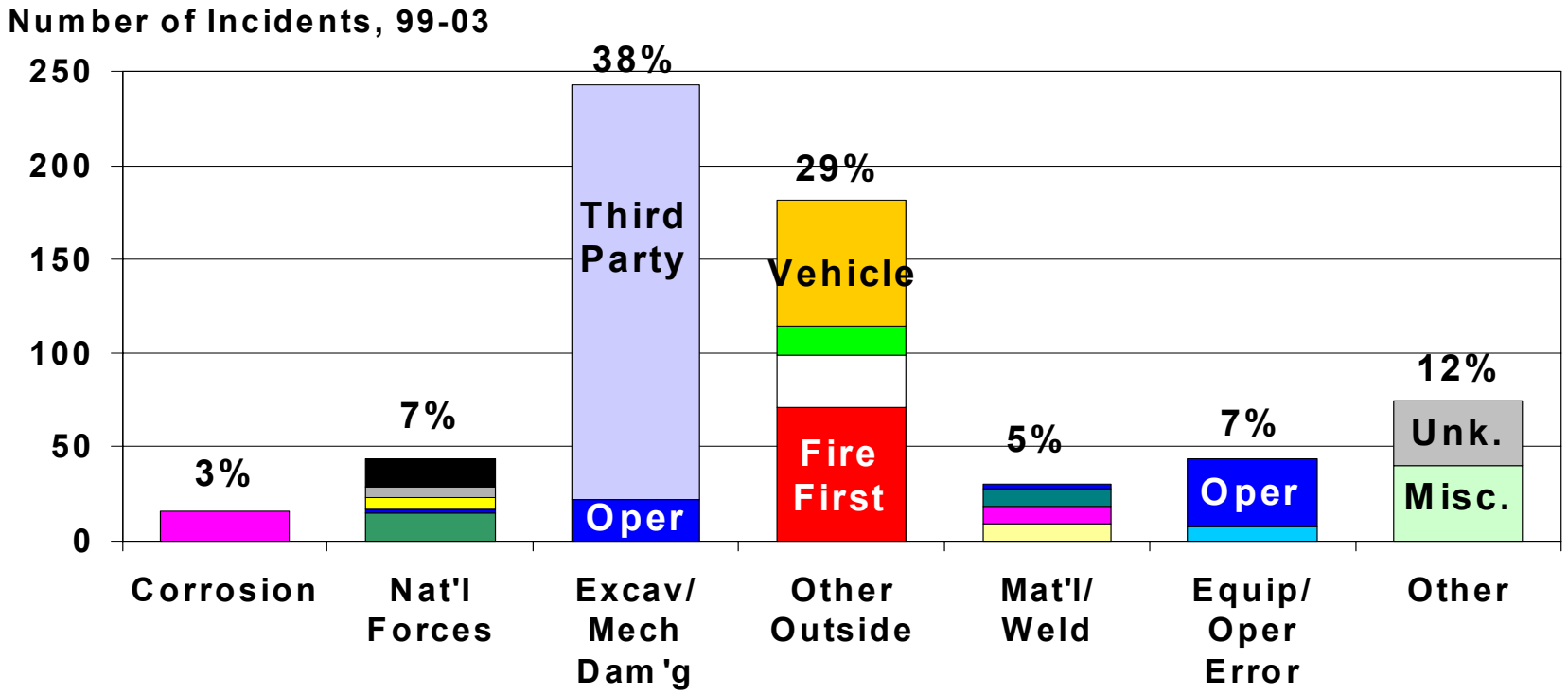
## *From the Old "Big Buckets" to the New "Big Buckets" (i.e., 1st-Level Causes)*



# Excavation Damage Prevention Group Findings

Allegro Energy Consulting

## *And Now, the New "Small Buckets" (i.e., 2nd-Level Causes): Hazards, Actors*



# Excavation Damage Prevention Group Findings

Pipeline safety and excavation damage prevention are intrinsically linked.

Excavation damage is the most significant threat to the safety and integrity of distribution pipelines.

Preventing excavation damage to pipelines is not completely under the control of pipeline operators.

# Excavation Damage Prevention Group Actions

The Group reviewed and scrubbed available state-level outside force leak data (raw and normalized per ticket volume) reported to OPS for 2000 through 2004 on Annual report. (*Leaks repaired caused by 3rd party or excavation damage*)

The Group analyzed the data for comparison purposes between states deemed to have comprehensive damage prevention programs and those with limited programs, those lacking effective enforcement.

# Excavation Damage Prevention Group Action/Review

Available state-level third-party/excavation leak data (raw and normalized)

Damage data for several states with comprehensive damage prevention programs including enforcement

CGA's Best Practices

Operator's Best Practices (AGA)

Incentives to reduce damage

Effective enforcement

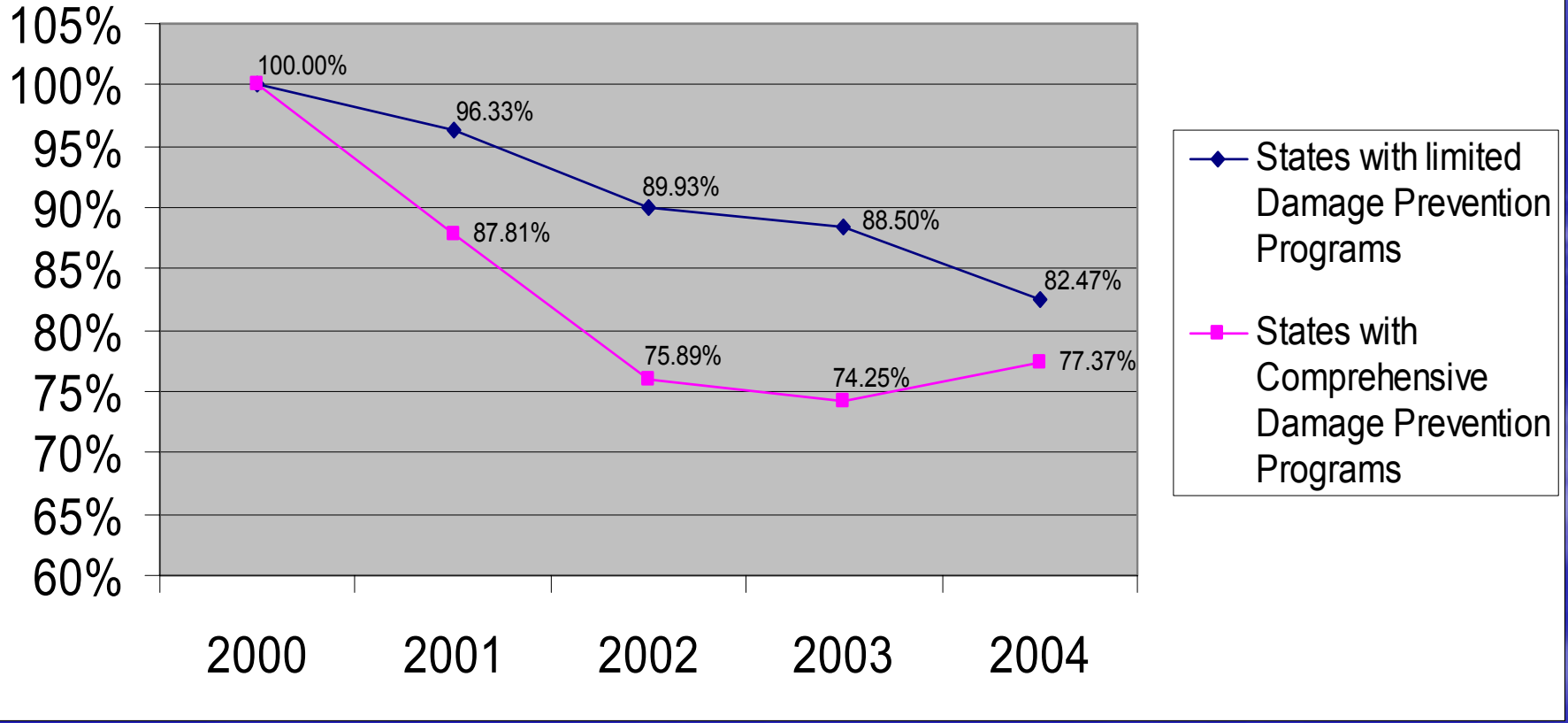
Public Education including "811"

Damage Prevention Program Performance Metrics

Cost/Benefit Analysis

# Excavation Damage Prevention Group Findings

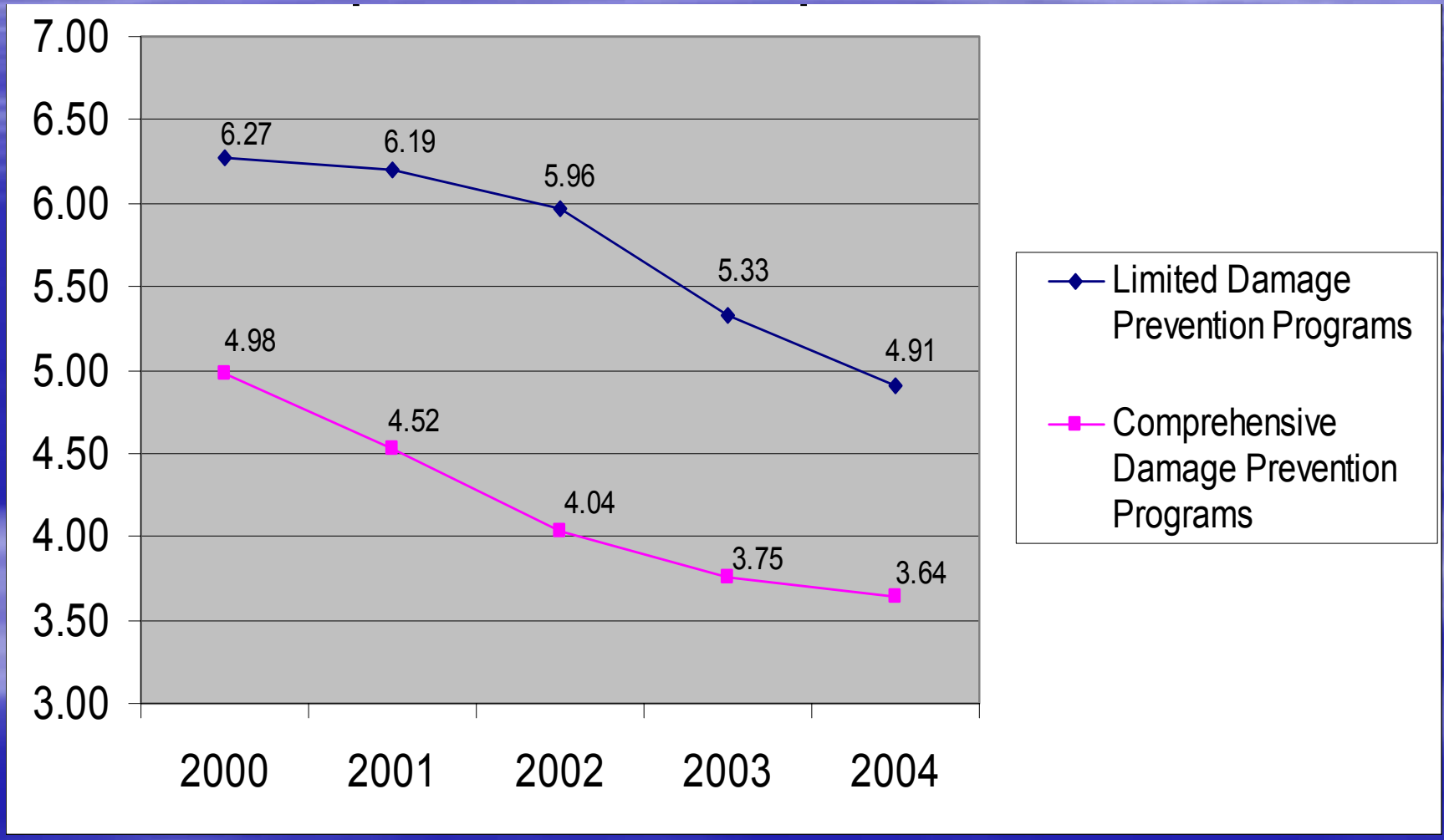
Leaks repaired caused by Third-party (2000-2003) & Excavation (2004)




OPS Distribution Pipeline Systems, Annual Report Data
Based on data for all reporting states, PR & DC

# Excavation Damage Prevention Group Findings

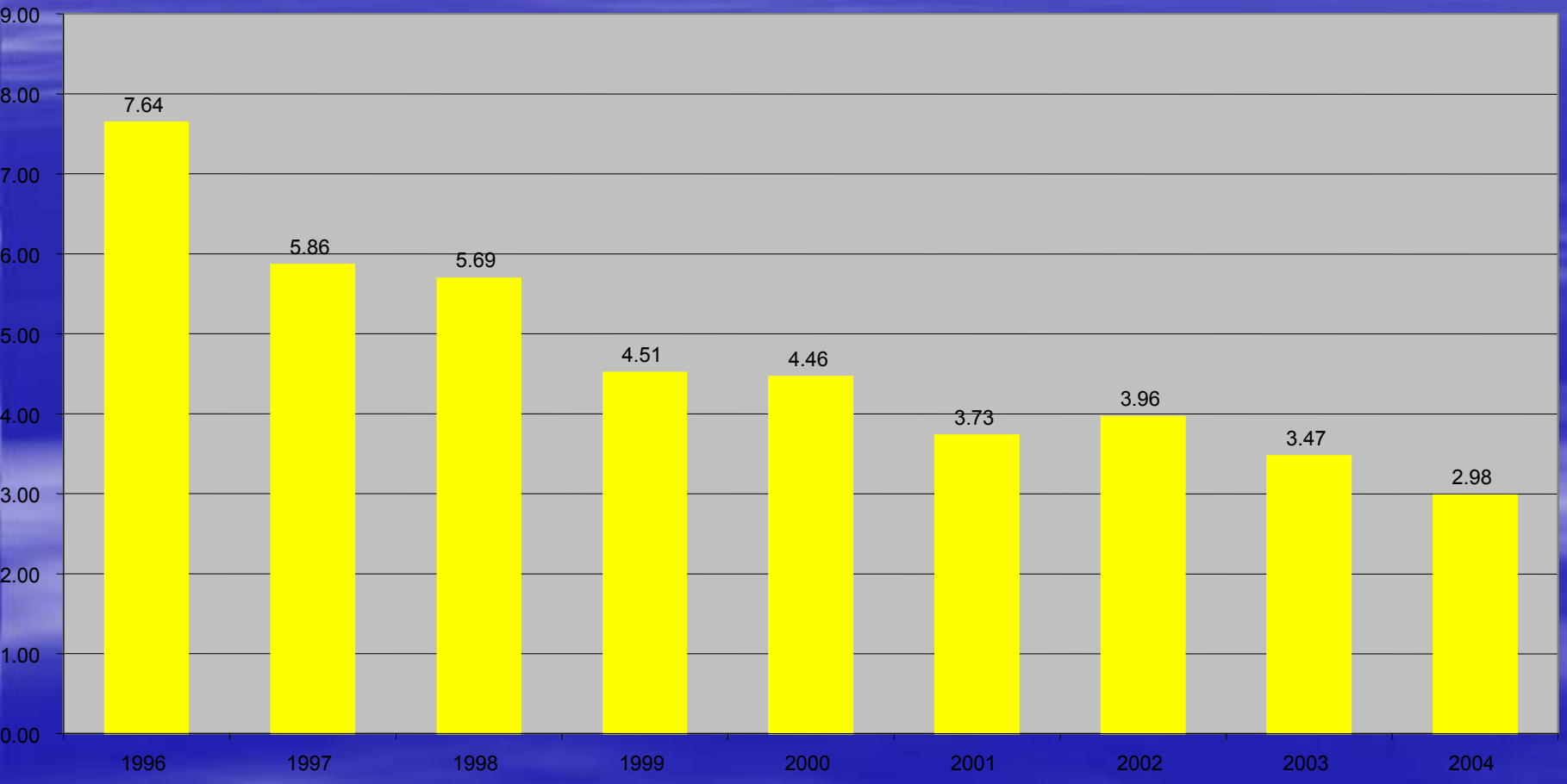
Leaks repaired /1000 tickets by Third-party (2000-2003) & Excavation (2004)




Limited damage prevention programs' ticket data includes 32 states and D.C.

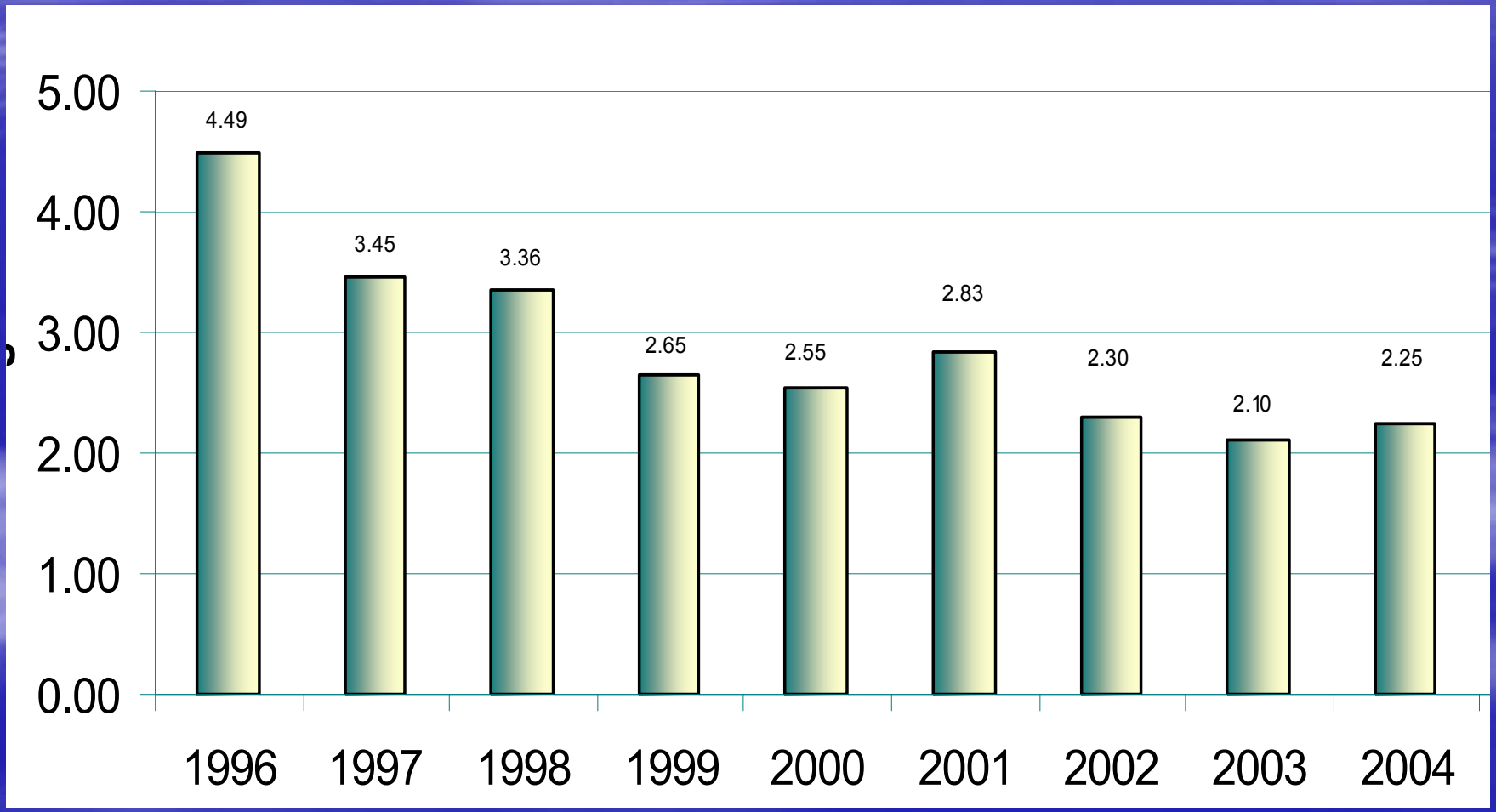
# Excavation Damage Prevention Group Findings

**Minnesota**, Gas Distribution Excavation Damages per 1000 Tickets
Effective Enforcement



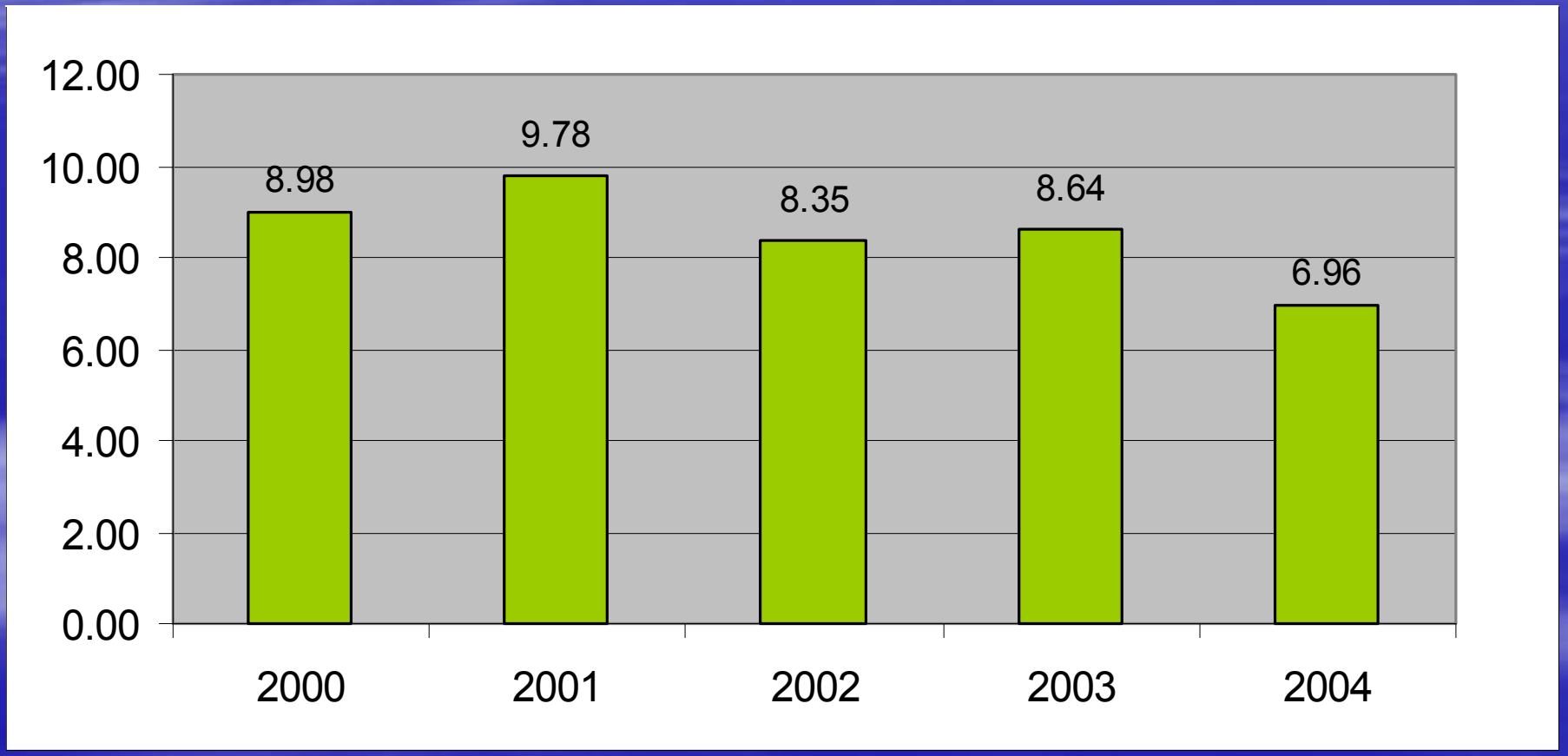
# Excavation Damage Prevention Group Findings

**Virginia,** Gas Distribution Excavation Damages per 1000 Tickets
Effective Enforcement



# Excavation Damage Prevention Group Findings

## Gas Distribution Leaks Repaired per 1000 Tickets
## Third Party (2000-2003) and Excavation (2004)
## Without Effective Enforcement



# Excavation Damage Prevention Group Findings

States with comprehensive damage prevention programs that include effective enforcement have a significantly lower risk of excavation damage and the potential for incidents.

# Excavation Damage Prevention Group Findings

- Elements of a comprehensive damage prevention program:
  - Enhanced communication between operators and excavators
  - Fostering support and partnership of stakeholders (excavators, operators, locators, designers, local government, etc.) in all phases (enforcement, public education, etc.) of the program
  - Operator's use of performance measures regarding persons performing location and pipeline construction
  - Partnership in employee training
  - Partnership in public education
  - Enforcement agency's role as a partner and facilitator to help resolve issues
  - Fair and consistent enforcement of the law to all stakeholders
  - Use of technology to improve all parts of the process
  - Analysis of data to continually evaluate/improve program effectiveness

# Excavation Damage Prevention Group Findings

Operators should implement CGA Best Practices and other practices as appropriate to help reduce damage to their facilities, such as:

- Trend analysis
- Root cause analysis
- Provide accurate location records
- Participation in pre-project/pre-bid meetings
- Marking location of newly “in service” lines at ongoing construction sites
- Effective damage claims program

# Excavation Damage Prevention Group Findings

Suggested additional performance metrics to be given to OPS via the annual report as a measure distribution safety:

- Damages, as defined by the group
- Damage ratio (i.e., damages per 1000 tickets)

OPS should consolidate and integrate the current reporting requirements and those that may be required for distribution integrity management.

# Excavation Damage Prevention Group Findings

"Excavation Damage" is any impact or exposure which, according to the operator's practices, results in a repair or replacement of an underground facility, related appurtenances or supporting material.

"A Ticket" is the receipt of information by the underground facility operator from the notification center regarding onsite meetings, project design or a planned excavation

# Excavation Damage Prevention Group Findings
## Recommended Metrics

Metrics for operator internal use:

- Ratio of ticket 'no show'* to total tickets received
- Failure by notification center
- Damages by cause, facility type (mains, services), and responsible party. Cause categories to include:
  - Failure to call
  - Inaccurate ticket (e.g., wrong address)
  - Failure to mark
  - Failure to mark accurately
  - Failure to wait required time for marking
  - Failure to protect marks
  - Failure to hand dig within tolerance zone
  - Hand digging
  - Failure to properly support and protect facility
  - Others

* "no show" means those tickets that were not responded to by the locators within the allowed time

# Excavation Damage Prevention Group Findings

Federal legislation should be enacted requiring states' pipeline safety agencies to develop and implement effective damage prevention programs consistent with required elements

Draft legislative language is being prepared for OPS Counsel review which would include a provision for Federal grants to states

# Excavation Damage Prevention Group Findings

Incentives should be provided to operators, excavators, and locators for compliance with the damage prevention program requirements.

Specific incentives should be determined by individual stakeholders.

# Excavation Damage Prevention Group Findings

Potential incentives include:

- Accumulate credits for penalty reductions
- Contract incentives/penalties
- Support for implementing new technologies
- Awards and Professional Recognition

# Excavation Damage Prevention Group Findings

Operators should:

Consider use of standby and monitoring for certain 3rd-party excavations.

Work with local authorities (e.g., fire departments) and other to address frequent and willful violators of one-call statutes and safe digging practices.

Develop an effective damage claims program to ensure that damagers at fault are held accountable.

# Excavation Damage Prevention Group Findings

Actively participate in local damage prevention councils and organizations and regional CGAs.

Participate in design/pre-bid meetings.

Consider marking the location of newly “in service” mains and services at active construction sites.

Develop a process for the relocation of pipe, when necessary, to accommodate 3rd-party construction activity.

# Excavation Damage Prevention Group Findings Summary

Excavation damage prevention presents the most significant opportunity for distribution safety enhancement.

States with comprehensive damage prevention programs that include effective enforcement have a substantially lower risk of excavation damage to pipeline facilities and related consequences.

Federal legislation should be enacted to support implementation of effective damage prevention programs at the state level consistent with the required elements.

# Concepts for Consideration

- High level, flexible, federal rule that is cost effective to consumers
- Address small operator concerns with a more prescriptive ruling.

# Concepts for Consideration Cont'd

- Operator issues to be addressed in written plan
  - Knowledge of the system
  - Identify threats
  - Prioritize threats
  - Rank and mitigate risk
  - Measure performance internal and external
  - Evaluate and report on performance and effectiveness

# Concepts for Consideration Cont'd

- Knowledge of the System
  - Awareness of components in LDC's system
  - Example of data
    - Material, pipe specs, valves, regulators, construction information, operating pressure, joining materials, leak history, leak survey records, corrosion reports, soil type, geographic location
    - Operator must have sufficient data to make effective risk control decisions

# Concepts for Consideration Knowledge of the System Cont'd

- Segmentation of pipelines
  - Distribution systems cannot be segmented in the same manner as Transmission systems
  - Operators will determine how to address segmentation issue within a service territory
    - Segmentation by some of these criteria, class location, material type, pressure and \ or by age
    - If system is the same throughout a housing development then the operator may call that a segment

# Concepts for Consideration Cont'd

- Identify threats
  - Corrosion
  - Natural forces
  - Excavation
  - Other Outside Force
  - Material and Welds
  - Equipment
  - Operation
  - Other
- For guidance and comprehensive list, refer to GPTC, AGF study, ASME B31-8S, the incident report (PHMSA 7100.1)

# Concepts for Consideration Cont'd

- Prioritize threats and Rank risks
  - Operator responsibilities
    - **Processes in place to evaluate the system**
    - **Consideration of both the likelihood of an incident and the consequence of an incident occurring**
    - **Factors to consider - system pressure and proximity to business districts**
  - Operators may choose to use any of the following methods or choose to use one of their own that has been proven to work effectively
    - Subject Matter Experts (pins on a map)
    - Algorithm method
    - Risk Models purchased off the shelf or developed in-house

# Concepts for Consideration Cont'd

- Mitigate Risks
  - Due to the diversity of distribution systems it is recognized there is a need to allow an operator to choose the proper methods to control risk in the distribution system. The Risk Control Practice Group documented practices include:
    - Coordinating Committees
    - Educational Outreach Programs
    - Personnel Training Programs
    - Preventive and Mitigative Programs

# Concepts for Consideration Mitigate Risks Cont'd

- Available Guidance for Risk Control Practices
  - Following 49 CFR Part 192 is considered a valid control practice
  - Additional acceptable guidance material
    - ✓ Survey of State Regulation, requirements and innovative practices conducted in 2005
    - ✓ AGF Study Appendix G, Part 3
    - ✓ ASME B31-8S
    - ✓ GPTC Guide (GPTC is working on new guidance material to address Distribution Integrity)
    - ✓ AGA Geop Series

# Concepts for Consideration Mitigate Risks Cont'd

- Leak Management is considered to be a risk control activity. There is a need to standardize leak procedures throughout the industry due to various operator approaches
  - **L** ocate the leak
  - **E** valuate the severity
  - **A** ct appropriately
  - **K** eep records
  - **S** elf-assess to determine if additional actions are necessary to keep system safe

# Concepts for Consideration Mitigate Risks Cont'd

- Locate the leak
  - Distribution operators locate leaks by visual inspection, leak survey equipment, customer notification of a gas odor, and a variety of other means. It involves the use of qualified personnel to perform leak detection activities and the selection of appropriate leak detection equipment. Operators should have internal procedures that delineate the frequency and type of leak surveys to be conducted which are based on environmental conditions, the operators knowledge of the pipeline, and regulatory requirements. It should be noted that operators are required to conduct routine leak survey per 49 CFR Part 192.

# Concepts for Consideration Mitigate Risks Cont'd

- Evaluate it's severity
  - *Leaks that require immediate action (hazardous leaks)*: A leak that represents an existing or probable hazard to persons or property, and requires immediate repair or continuous action until the conditions are no longer hazardous.
  - *Leaks scheduled for repair (potentially hazardous leaks)*: A leak that is recognized as being non-hazardous at the time of detection, but requires scheduled repair.
  - *Monitored leaks (non-hazardous leak)*: A leak that is non-hazardous at the time of detection and can be reasonably expected to remain non-hazardous.
- Operators who have worked out separate classifications with their state regulators follow the state classifications.

# Concepts for Consideration Mitigate Risks Cont'd

- Act appropriately
  - Once a leak has been located and evaluated, an operator takes action to mitigate any risk associated with the leak. This may include temporary or permanent repair, replacement, or other steps that reduce any immediate hazard posed by the leak. This may also include scheduling the line for repair or periodic monitoring in the case of non-hazardous leaks.

# Concepts for Consideration Mitigate Risks Cont'd

- Keep records
  - Operators collect and record data pertinent to a leak to increase their knowledge of the system and its performance. These data are not submitted to the Office of Pipeline Safety or state regulatory agencies but are used by operators as internal performance measures. This includes:
  - Leaks discovered during the year by leak severity and material
  - Leaks repaired or eliminated during the year by leak severity and material type
  - Yearly leak backlog by severity
- Currently, the data DOT collects in the annual report captures all leaks eliminated and repaired during the year by the cause of the leak.

# Concepts for Consideration Mitigate Risks Cont'd

- Self-Assess
  - Operators conduct a self-assessment of their distribution pipeline system by compiling associated performance metrics and by analyzing pertinent information to determine if further risk control practices are needed to enhance the safety of the system. Additional risk control practices can include modifying the cathodic protection system, patrols, procedure reviews, personnel qualifications, pipe and component replacement, public education, etc.

# Concepts for Consideration Mitigate Cont'd

- Pipeline Replacement Program
  - Used as a risk control practice based on risk and enforced relocation projects
  - Efforts would be to address the riskiest sections of pipe (cast iron, bare steel, some plastics prone to failure)

# Concepts for Consideration Mitigate Cont'd

- EFV's
  - Push to mandate the use of EFV's but it is being suggested that the use of these devices be a risk control tool only when determining threats to a distribution system
    - ✓Language and criteria is being developed to support EFV's as a risk control tool

# Concepts for Consideration Cont'd

- Measure performance - National
  - Incidents, fatalities, injuries, property
  - Status of operator implementation of a Distribution Integrity Management Plan
  - Status of operator meeting requirements (criteria) for an effective Leak Management Plan
  - Number of damages per one thousand One-Call tickets
  - Amount of old pipe removed from system
  - Hazardous leak data
  - Number of leaks repaired

# Concepts for Consideration Cont'd

- Measure performance – LDC or State
  - Developed by each company based on variables that can be measured and validated
  - Would include leak information
  - Documented performance on chosen risk control practices
  - Number of low corrosion reads
  - Pipeline patrols completed, condition and adequacy of pressure control equipment

# Concepts for Consideration Cont'd

- Evaluate and report on performance and effectiveness
  - Evaluation of program necessary to determine need for modification to ensure continual improvement
  - Time frame for evaluation of written plan annually. Trends to be tracked over a period of time

# Summary

- Excavation Damage is the number one problem to be addressed
- Decisions made and approach used will be documented by the operator
- Pipe replacement programs based on risk with consideration for encroachment issues
- High level standardization of leak procedures
- Use of EFV's based on risk

# DISTRIBUTION PIPELINE INTEGRITY

- Web Site Location for additional information
  - www.cycla.com/dimp
  - Under Search the Database, click on Meetings
  - Under Meeting Types, choose Public Meeting and under Meeting Status choose All, then click on Search
  - Click on OPS Public Meeting, Dallas, TX 9/21/05
  - Reference docket number 19854