

Sensor-Based Leak Detection

by Ed Farmer

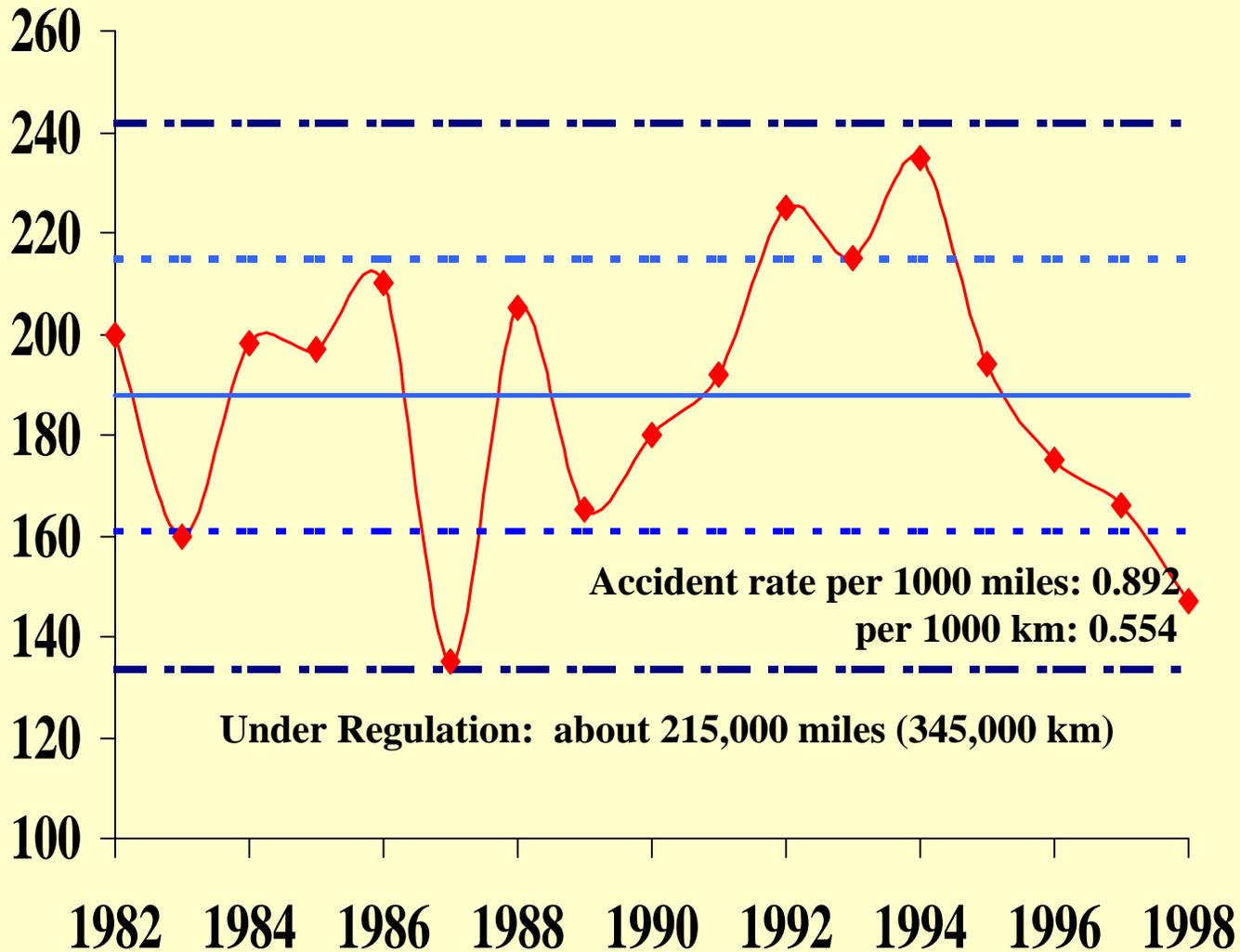
EFA Technologies, Inc.

MMS Arctic Pipelines Technology Workshop

Anchorage - Alaska

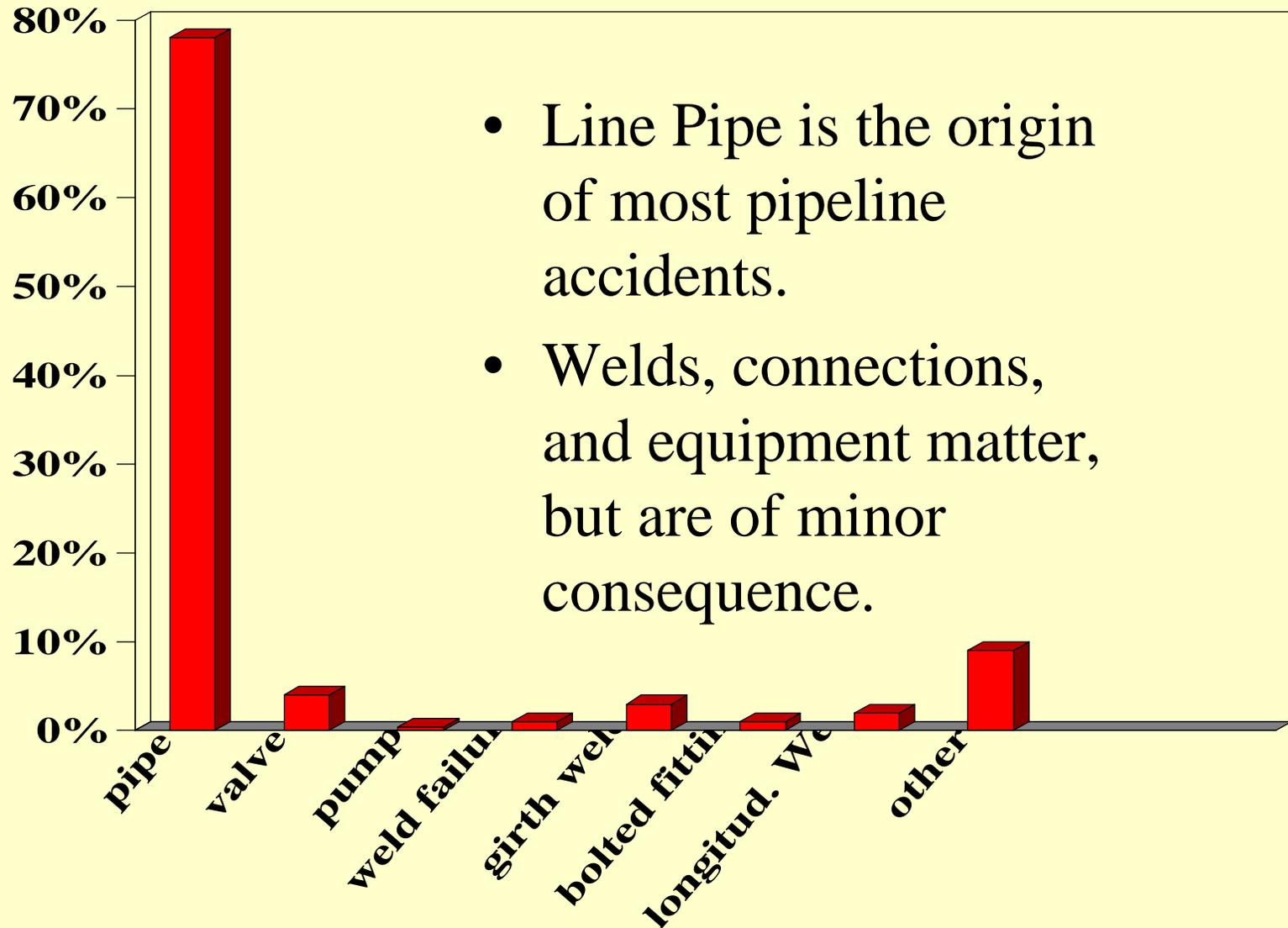
November 1999

Accident Frequency



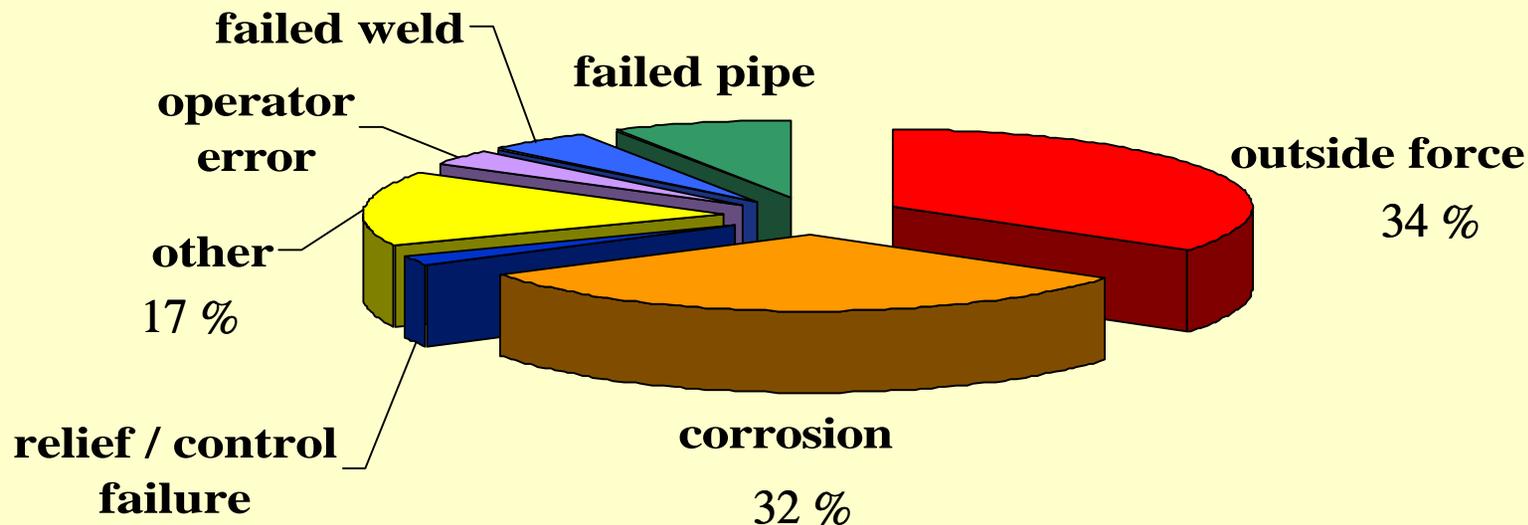
From 1982 through 1998, a period of 17 years, the pipeline accident rate shows *no statistically significant trends.*

Pipeline - What failed?



- Line Pipe is the origin of most pipeline accidents.
- Welds, connections, and equipment matter, but are of minor consequence.

What Caused the Failure?



- 83 percent of accidents come from three causes:
 - **Outside Force**
 - **Corrosion**
 - **Other**
- Most “other” are beyond the operator’s control

Methodology

- Periodic Testing
 - Smart Pigging
 - Hydrotesting
 - Static Monitoring
 - Tracer Testing
- Continuous Monitoring
 - External (e.g., hydrocarbon monitors)
 - Reconciliation (e.g., Mass Balance)
 - Event Detection (e.g., **PPA**)

Which System Fits Your Operation?

- ✓ Performance -- Sensitivity and speed?
- ✓ Infrastructure -- Required measurements and communication
- ✓ Special Instruments / other requirements
- ✓ Reliability and stability of equipment?
- ✓ Nuisance alarms?
- ✓ Support -- Understandable / maintainable?

Implementation Issues

- ✓ Viable and Appropriate Technology
- ✓ Sound, Stable Implementation
- ✓ Understandable, Maintainable Equipment
- ✓ Support System / Periodic Retraining
- ✓ Manageable Ownership Costs and Responsibilities

Broadscope Plan

- ✓ Periodic Smart Pigging
- ✓ Occasional Static Monitoring
- ✓ Continuous Events
- ✓ Continuous Reconciliation

Life Cycle Issues

- ✓ Equipment Maintenance and Updating
- ✓ Instrument Maintenance and Updating
- ✓ Periodic Calibration
- ✓ Down Time Effecting Operation
- ✓ Operator / Engineering Training

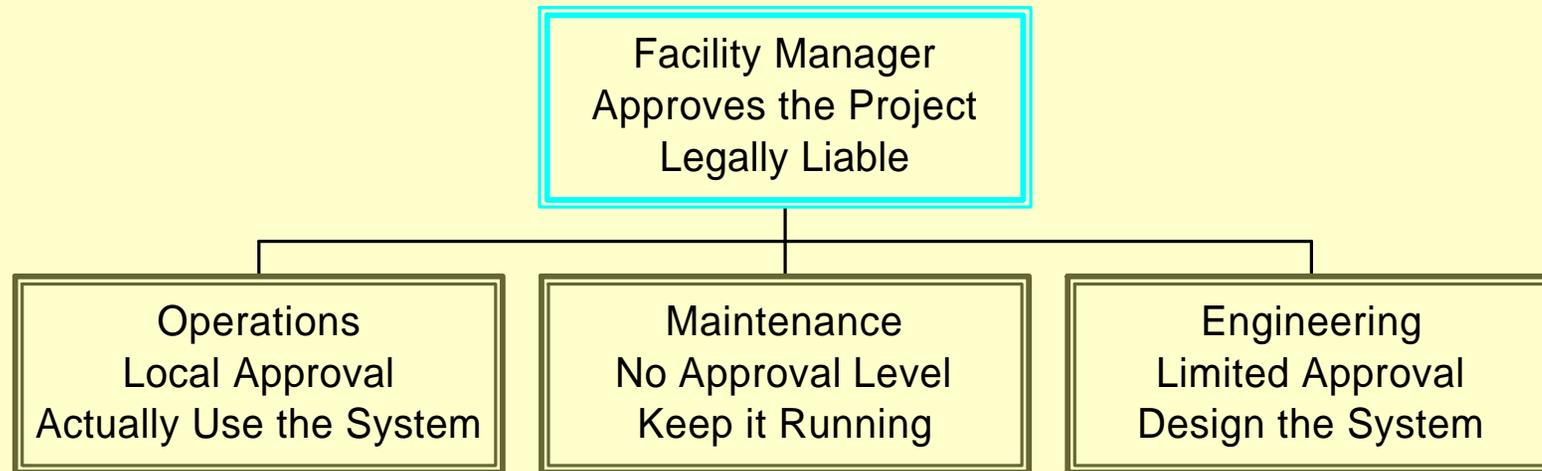
So ...

- ✓ Evaluate Your Facility.
- ✓ Choose Appropriate Technology.
- ✓ Select a Competent Implementation.
- ✓ Maintain Management Focus and Emphasis

Detection Sensitivity is Context Dependent

- Any leak detection method is limited to what it can “see”.
- Instruments must be able to respond to the change caused by a leak
- Communication with field instruments must be stable

Who is Responsible Anyway?



Operators frequently have a different viewpoint than engineers.

Success depends on a match between maintenance capability and maintenance requirements.

Defines the hazards and selects methodology. A good design matches operation requirements and is maintainable.

Management Issues

- Company must remain competitive and profitable.
- Primary goals are constrained by laws.
- Environmental responsibility is legislated - manager is criminally liable for accidents.
 - Company pays for cleanup
 - Company pays fines
 - Company pays legal fees
 - Company pays public relations firm to repair image.
 - Company stock drops out the bottom.

In the End -
What Matters is the *Perception*
of Risk

