



**NTSB** National Transportation Safety Board

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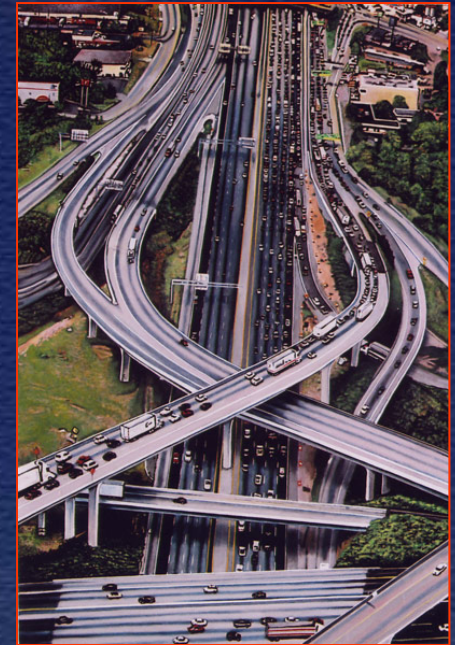
## **Pipeline Safety: A Perspective from the NTSB**

Lessons Learned from PG&E  
Natural Gas Transmission Pipeline  
Rupture and Fire

Robert L. Sumwalt  
NTSB Board Member



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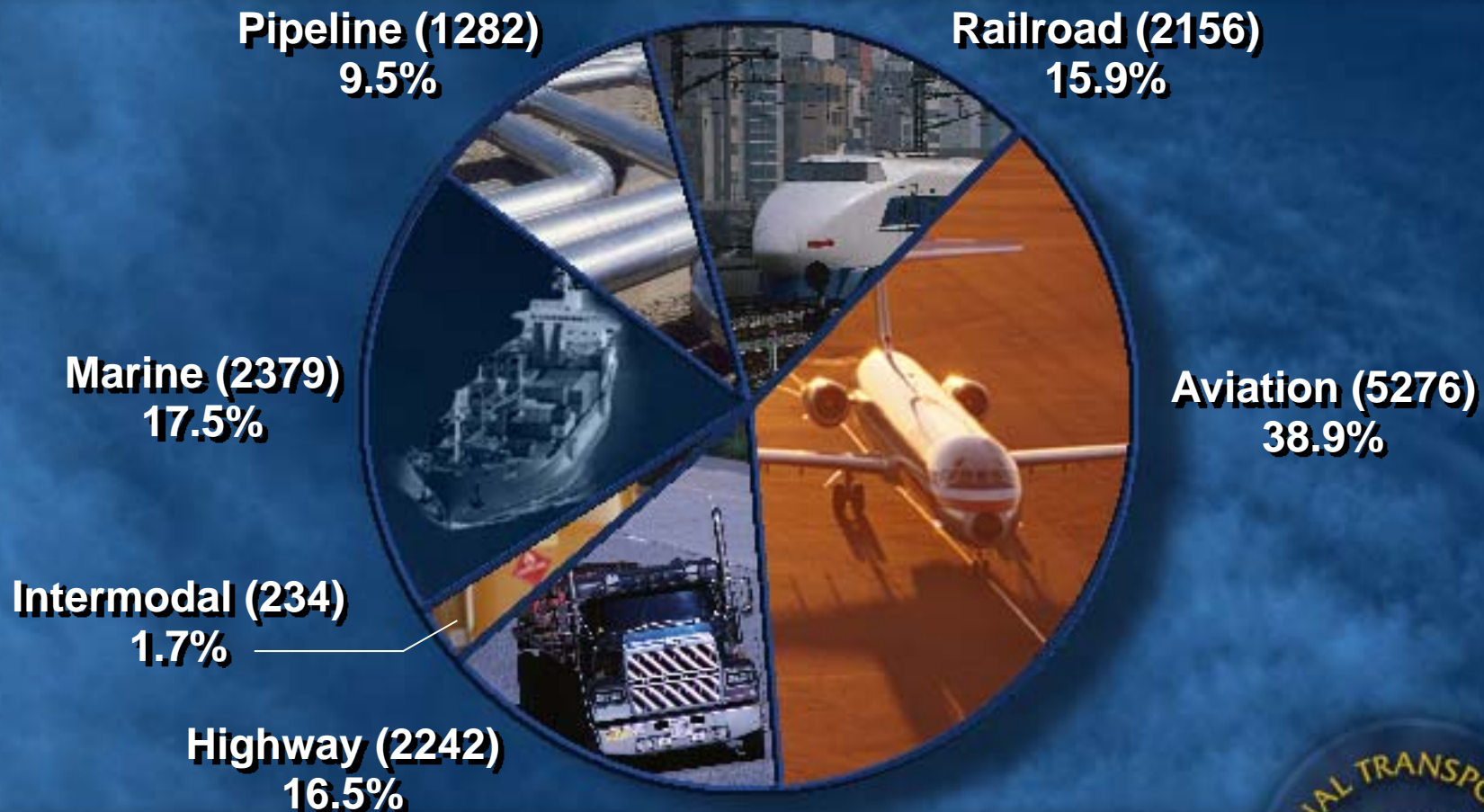


# The Board

- Five Presidentially appointed Board Members
  - Nominated by the President, confirmed by the Senate
  - Serve for five year terms



# 13,569 Safety Recommendations issued since 1967



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NATIONAL TRANSPORTATION SAFETY BOARD

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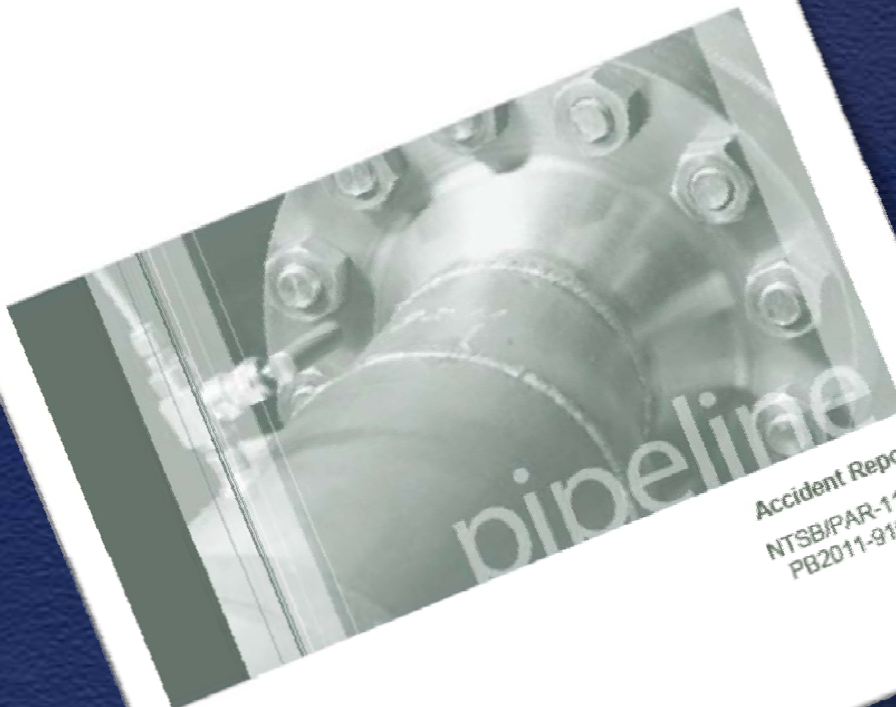
News @ NTSB

NTSB I uploaded a @YouTube video <http://t.co/0BwbuKss>

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Pacific Gas and Electric Company  
Natural Gas Transmission Pipeline Rupture and Fire  
San Bruno, California  
September 9, 2010



Accident Report  
NTSB/PAR-11/01  
PB2011-916501



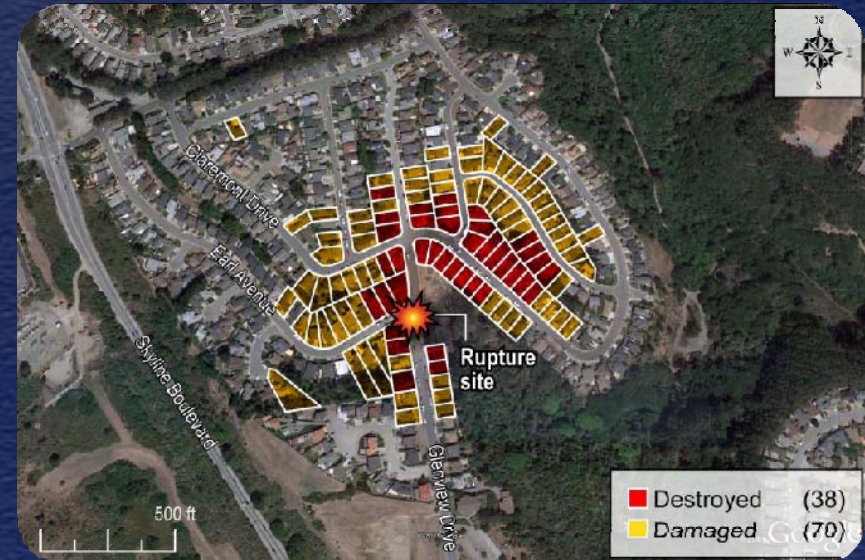
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# Fatalities, Injuries, Physical Damage

- 8 fatalities
- 10 serious injuries
- 48 minor injuries
  
- 108 houses affected
  - 38 homes destroyed
  - 17 homes severe-to-moderate damage
  - 53 minor damage





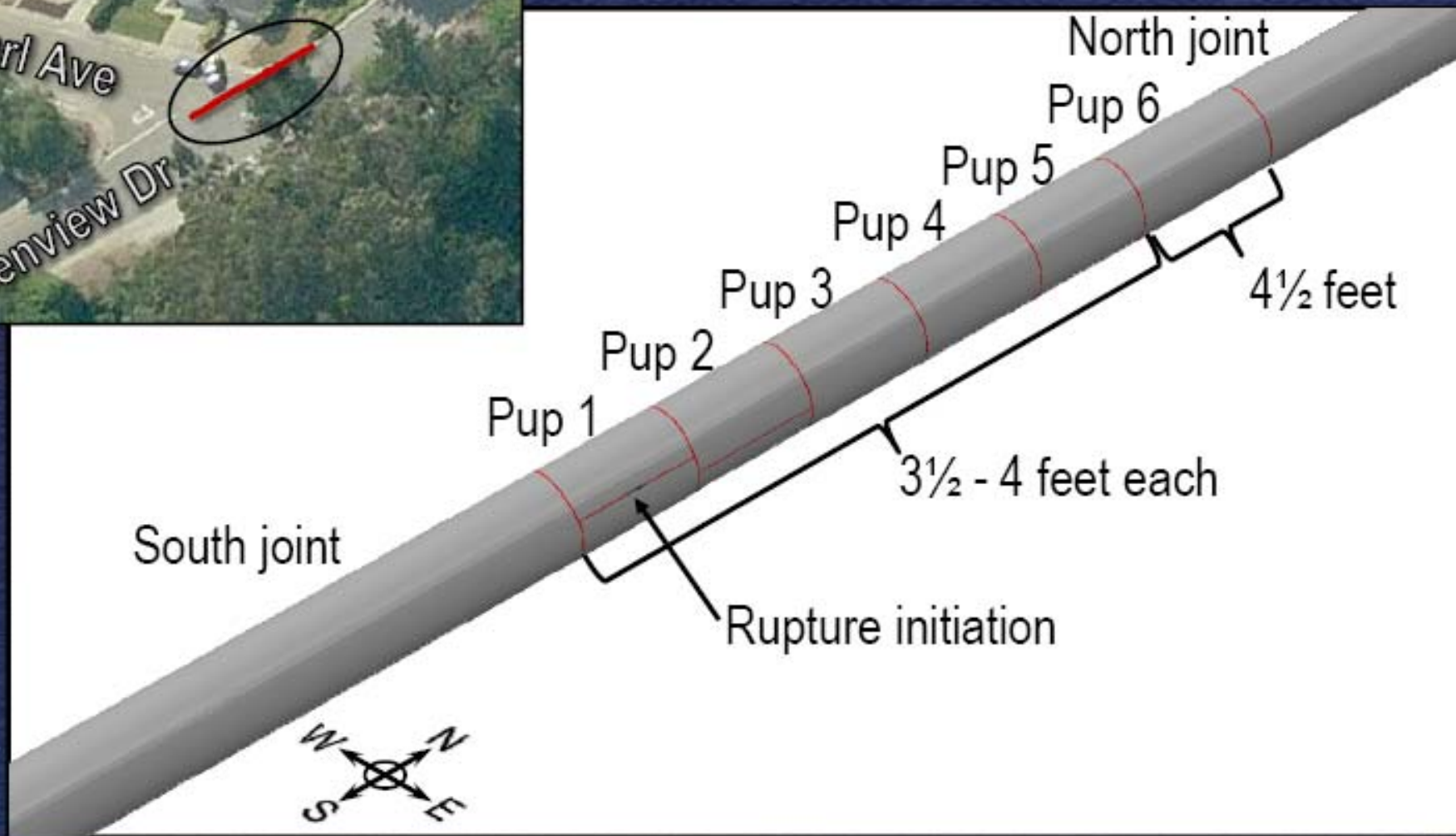


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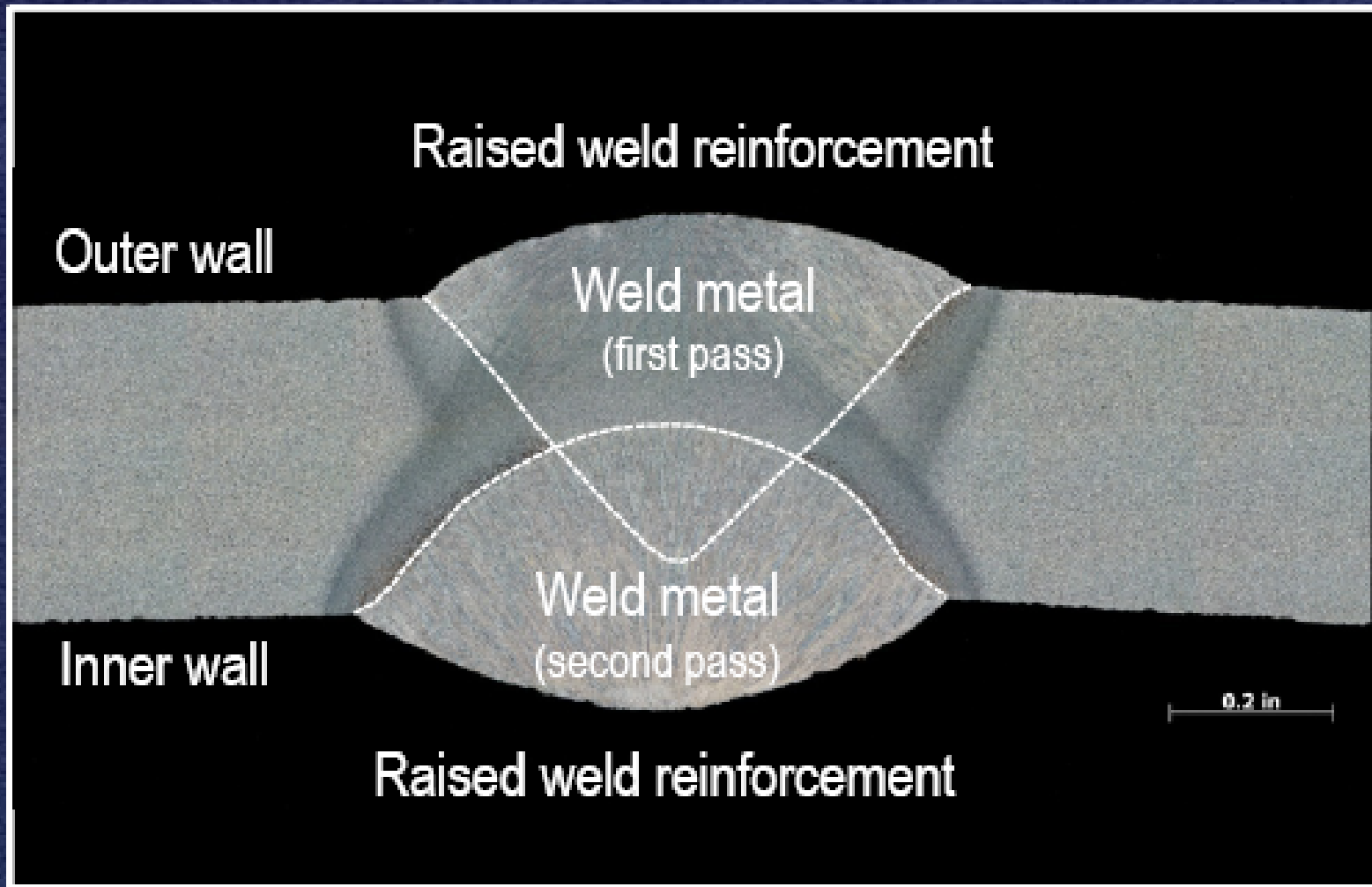




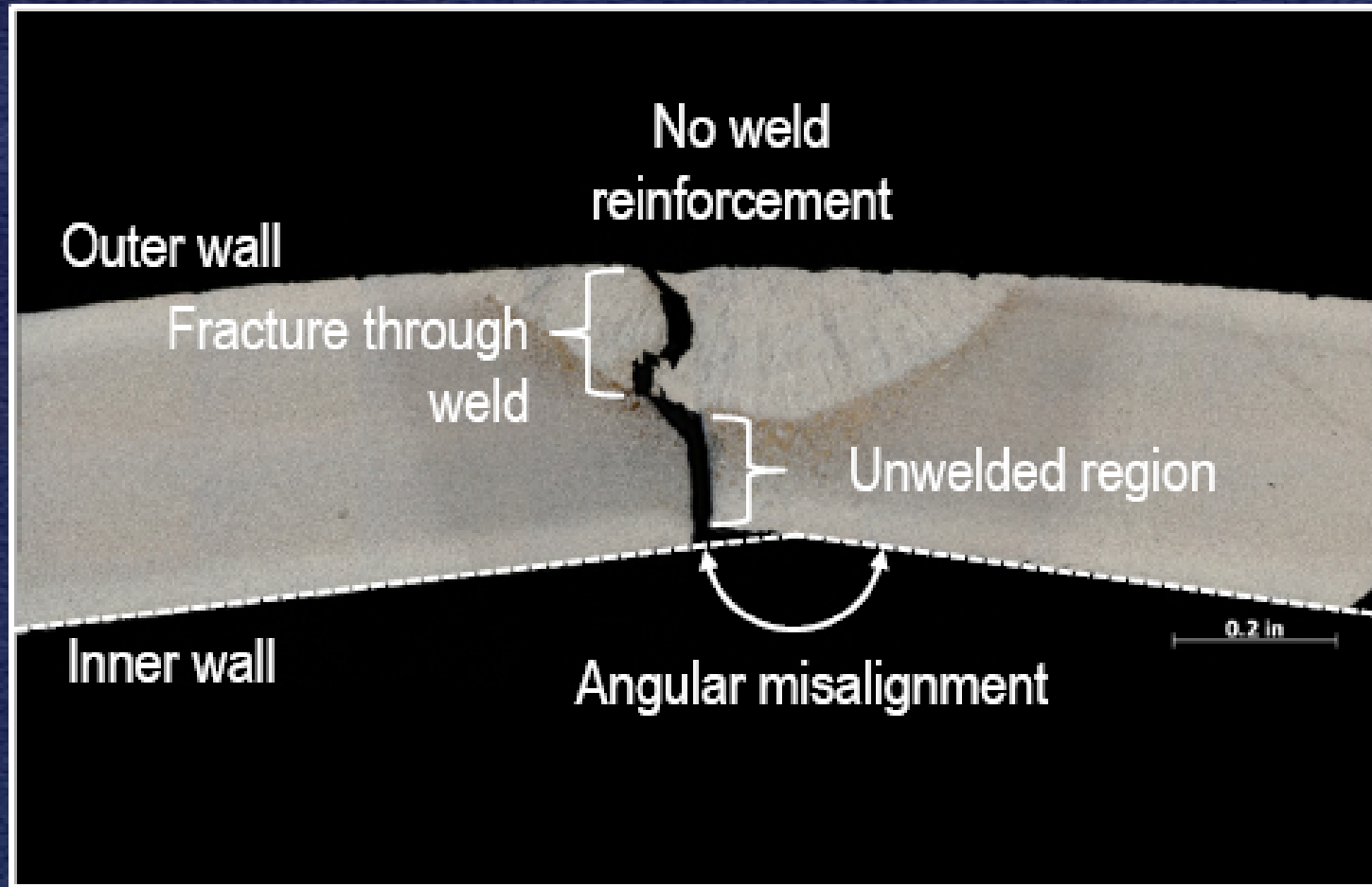
# Construction of the Pipe



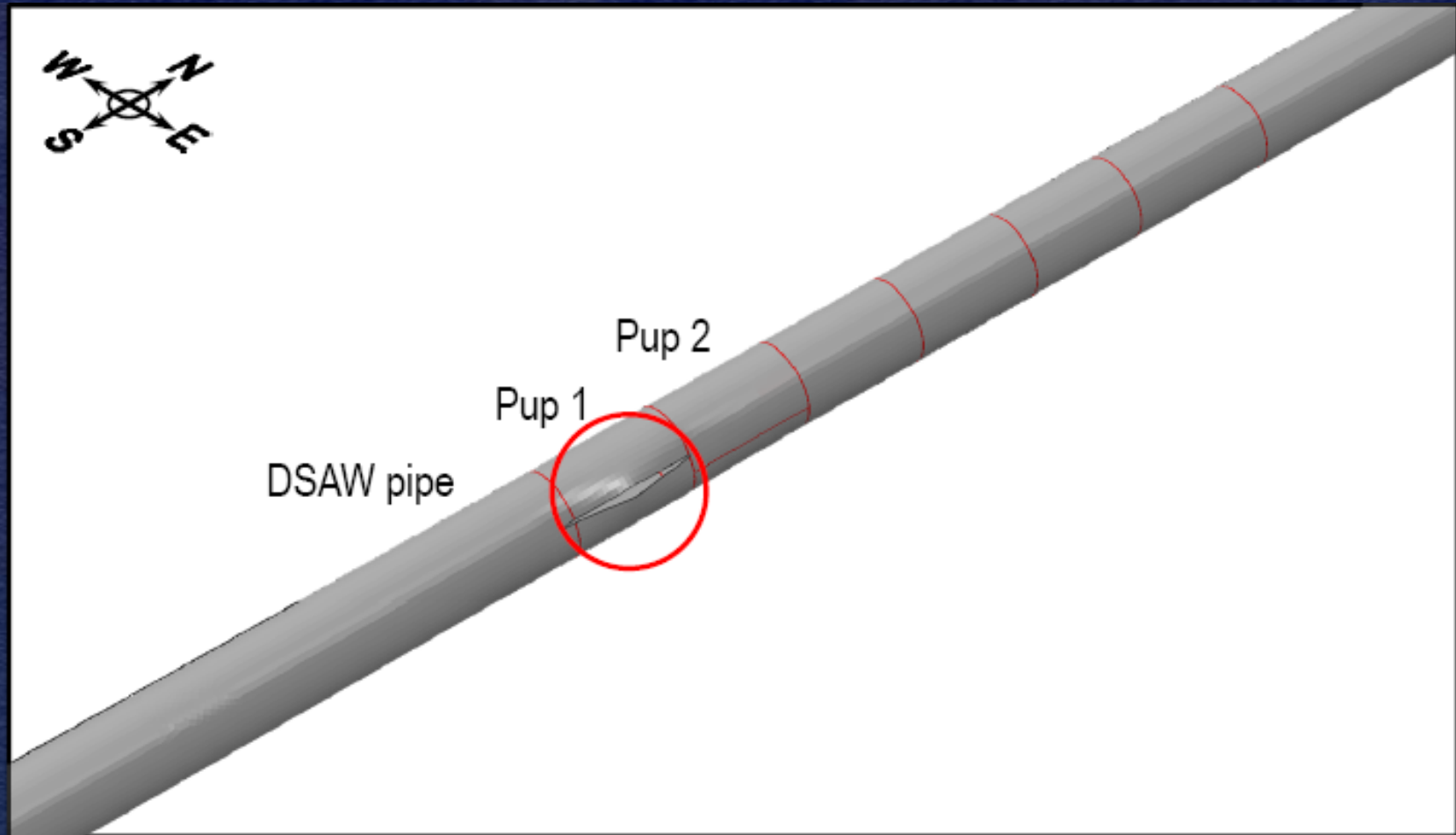
# Typical DSAW Seam Weld



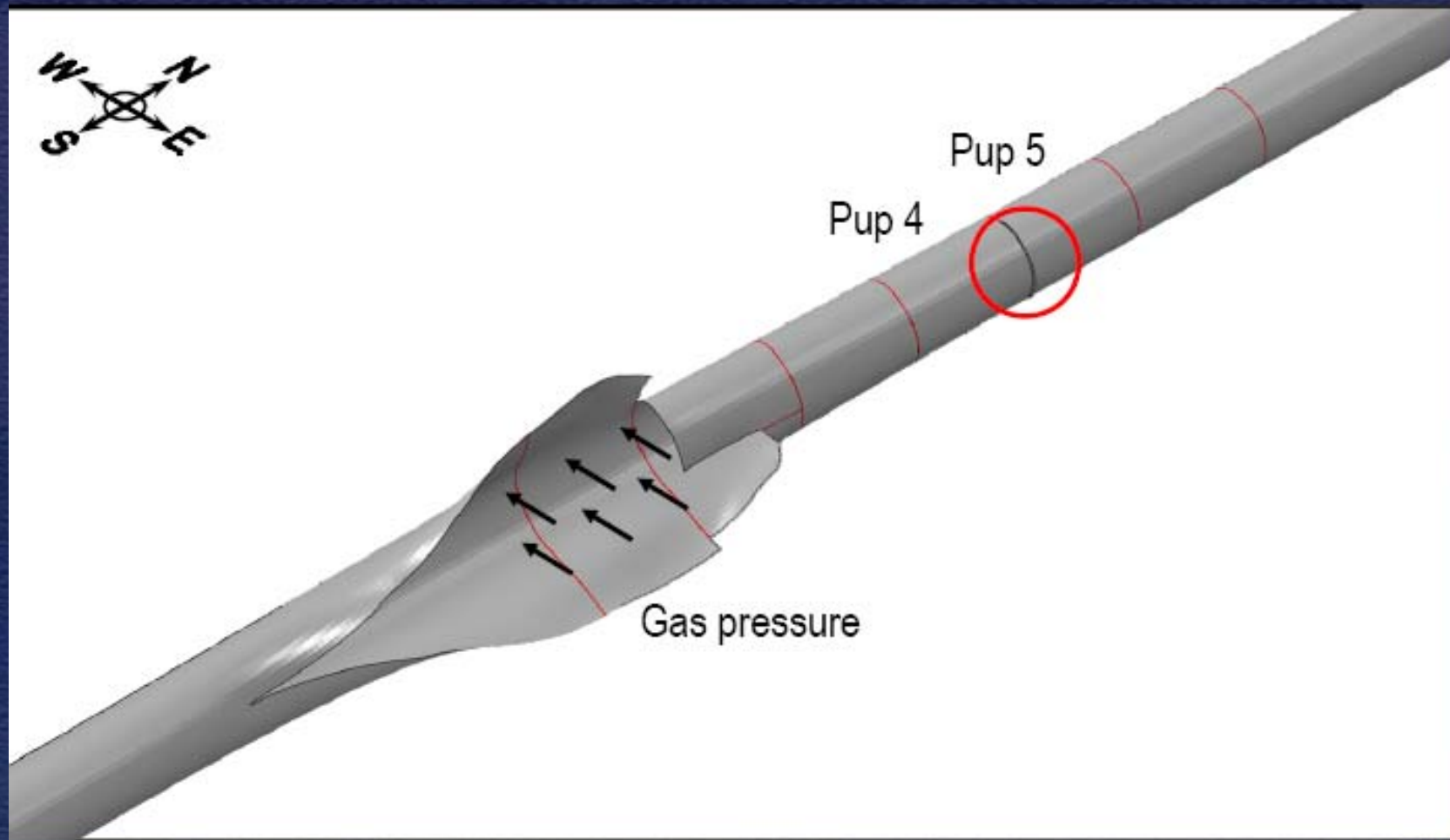
# Incomplete Pup 1 Seam Weld



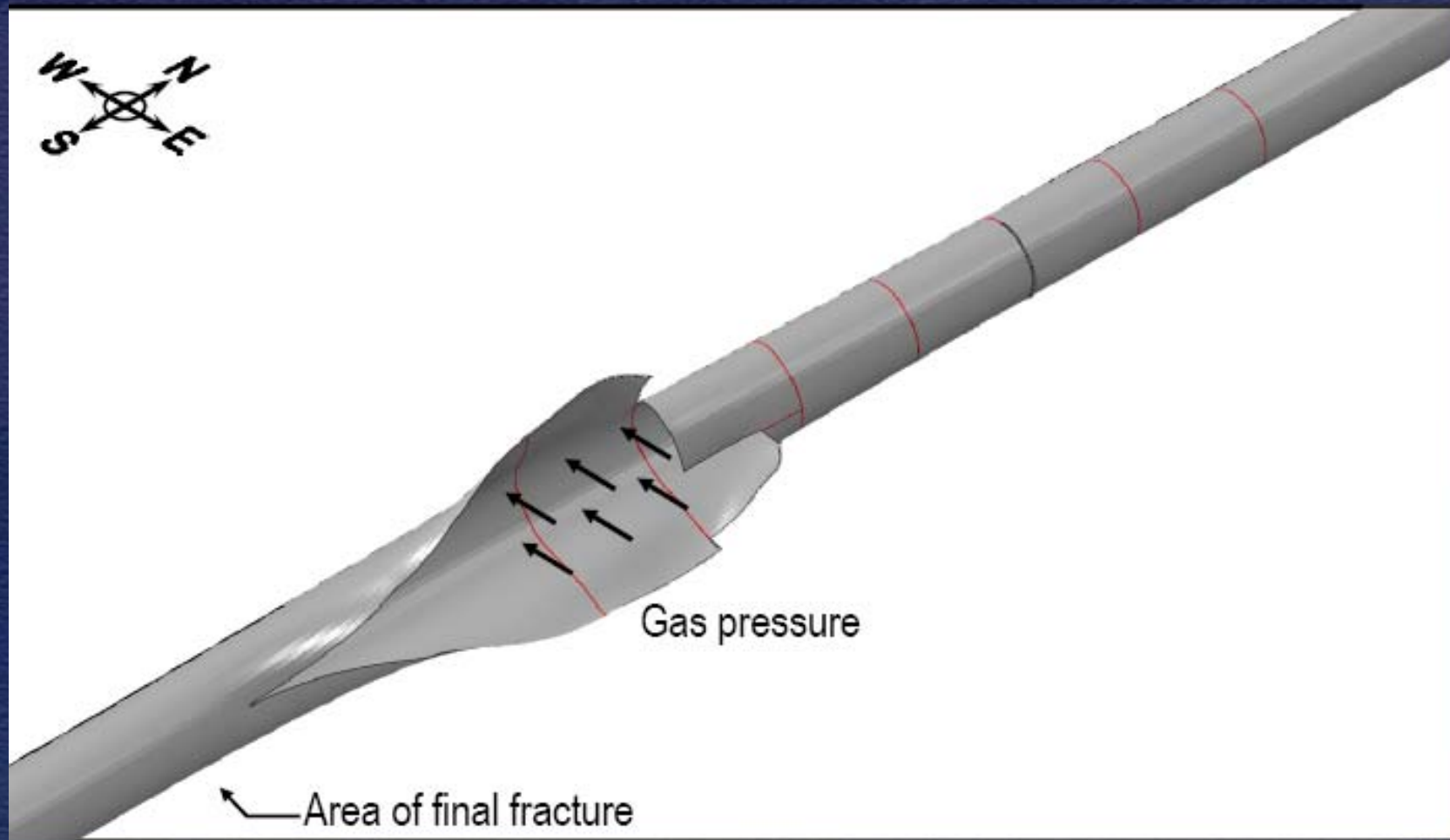
# Rupture Sequence



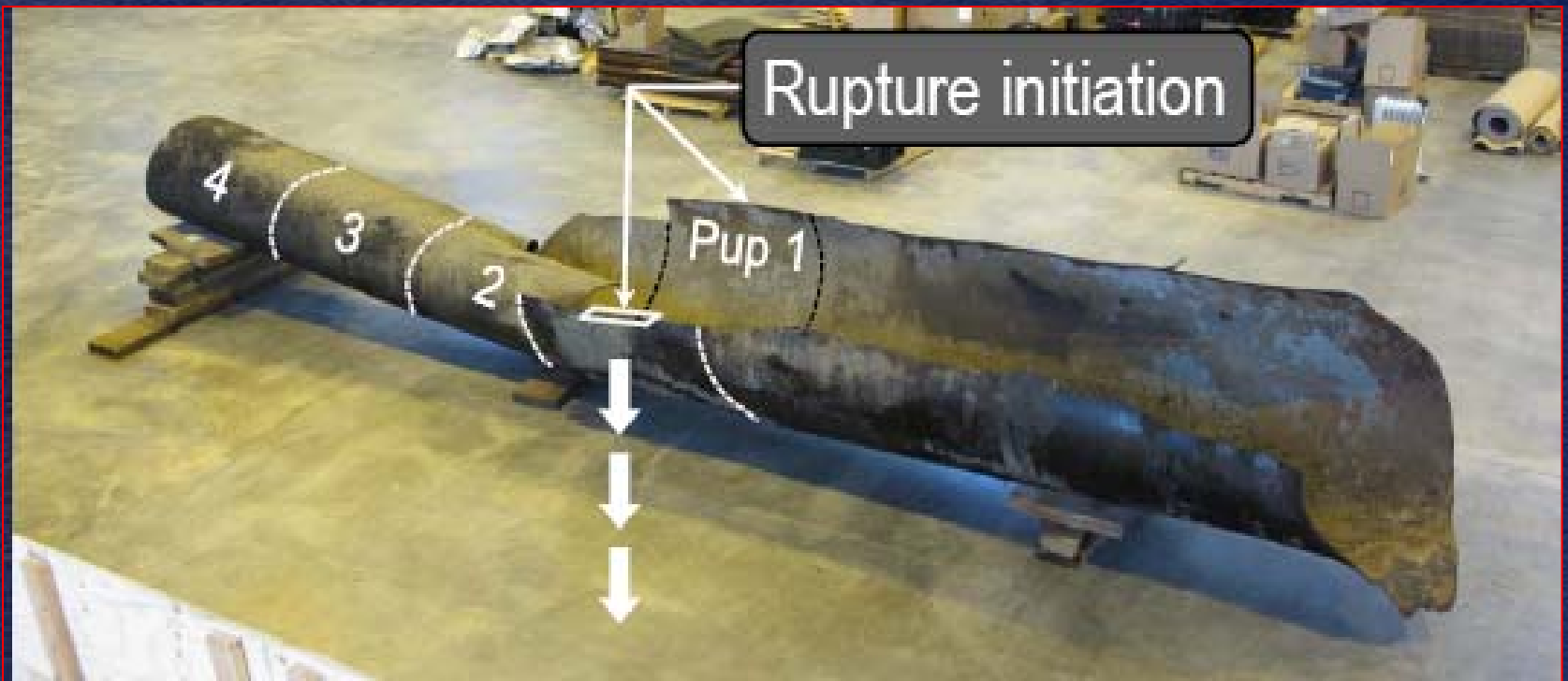
# Rupture Sequence



# Rupture Sequence









# Summary of PG&E Practices

- “The accident pipe segment did not meet any known pipeline specifications.”
- “Construction and quality control measures for the 1956 relocation project were inadequate in that they did not identify visible defects.”
- “The integrity management program, including self-assessment of that program, was ineffective.”
- “Emergency response to the pipeline rupture was slow, and isolation and shutdown of gas flow were unacceptably delayed.”

# Summary of PG&E Practices

- “The post-accident drug and alcohol testing program had multiple deficiencies.”
- “SCADA staff roles and duties were poorly defined.”
- “SCADA work clearance procedures were inadequate.”
- “Critical components at the Milpitas Terminal were susceptible to single-point failures.”
- “The public awareness program, including self-assessment, was deficient and ineffective.”

# NTSB's Probable Cause

## Pacific Gas and Electric Company's:

- (1) inadequate quality assurance and quality control in 1956 during its Line 132 relocation project, which allowed the installation of a substandard and poorly welded pipe section with a visible seam weld flaw that, over time grew to a critical size, causing the pipeline to rupture during a pressure increase stemming from poorly planned electrical work at the Milpitas Terminal; and
- (2) inadequate pipeline integrity management program, which failed to detect and repair or remove the defective pipe section.

# Contributing to the Accident

- California Public Utilities Commission's (CPUC) and the U.S. DOT's exemptions of existing pipelines from the regulatory requirement for pressure testing, which likely would have detected the installation defects.
- CPUC's failure to detect the inadequacies of PG&E's pipeline integrity management program.

# Contributing to the Severity of the Accident

- the lack of either automatic shutoff valves or remote control valves on the line
- PG&E's flawed emergency response procedures and delay in isolating the rupture to stop the flow of gas.

# Organizational Accidents:

- Result largely from actions/inactions of companies/organizations.
- Have multiple contributing causes, involve people at numerous levels within the system, and are characterized by a pervasive lack of proactive measures to ensure adoption and compliance with a safety culture.
- Are catastrophic events with substantial loss of life, property, and environment; they also require complex organizational changes in order to avoid them in the future.





# Safety Recommendations

- 39 Safety Recommendations
  - PHMSA (16)
  - PG&E (12)
  - CPUC (5)
  - U.S. Secretary of Transportation (4)
  - INGAA and AGA (1)
  - Governor of California (1)

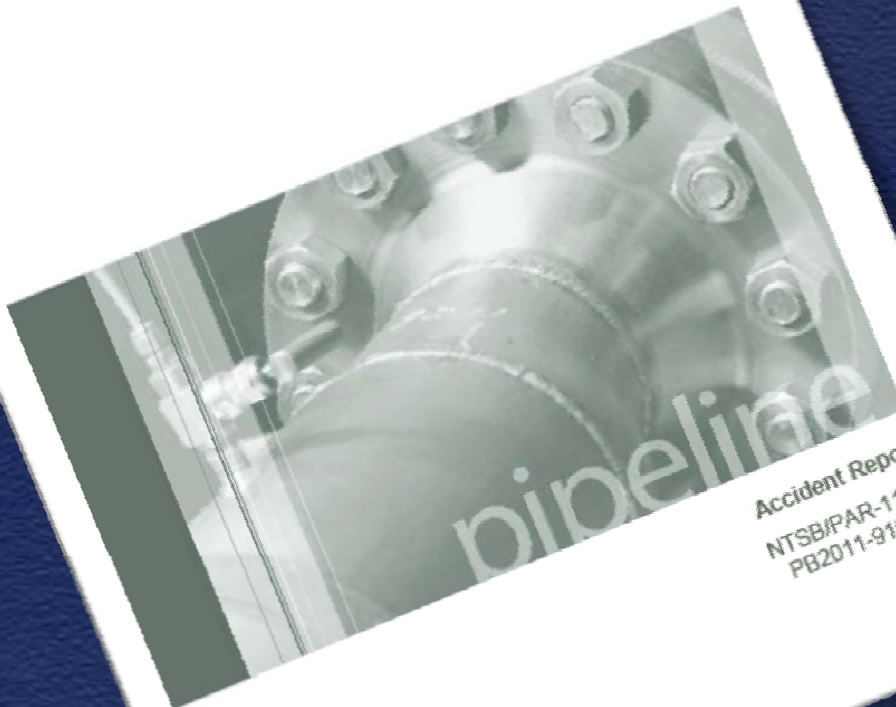
# To PHMSA

- Require that automatic shutoff valves or remote control valves in high consequence areas and in class 3 and 4 locations be installed and spaced at intervals that consider the factors listed in 49 CFR 192.935.
- Delete the grandfather clause and require that all gas transmission pipelines constructed before 1970 be subjected to a hydrostatic pressure test that incorporates a spike test.
- Require that all natural gas transmission pipelines be configured so as to accommodate in-line inspection tools, with priority given to older pipelines.

# To INGAA and AGA

- Report to the NTSB on your progress to develop and introduce advanced inline inspection platforms for use in gas transmission pipelines not currently accessible to existing inline inspection platforms, including a timeline for implementation of these advanced platforms.

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**Could this accident happen in  
your organization?**

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# What is Leadership?

“Leadership is about influence.  
Nothing more. Nothing less.”

- John Maxwell



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