NTSB National Transportation Safety Board

Office of Railroad, Pipeline and Hazardous Materials Safety

Pipeline Rupture

Pacific Gas & Electric Company

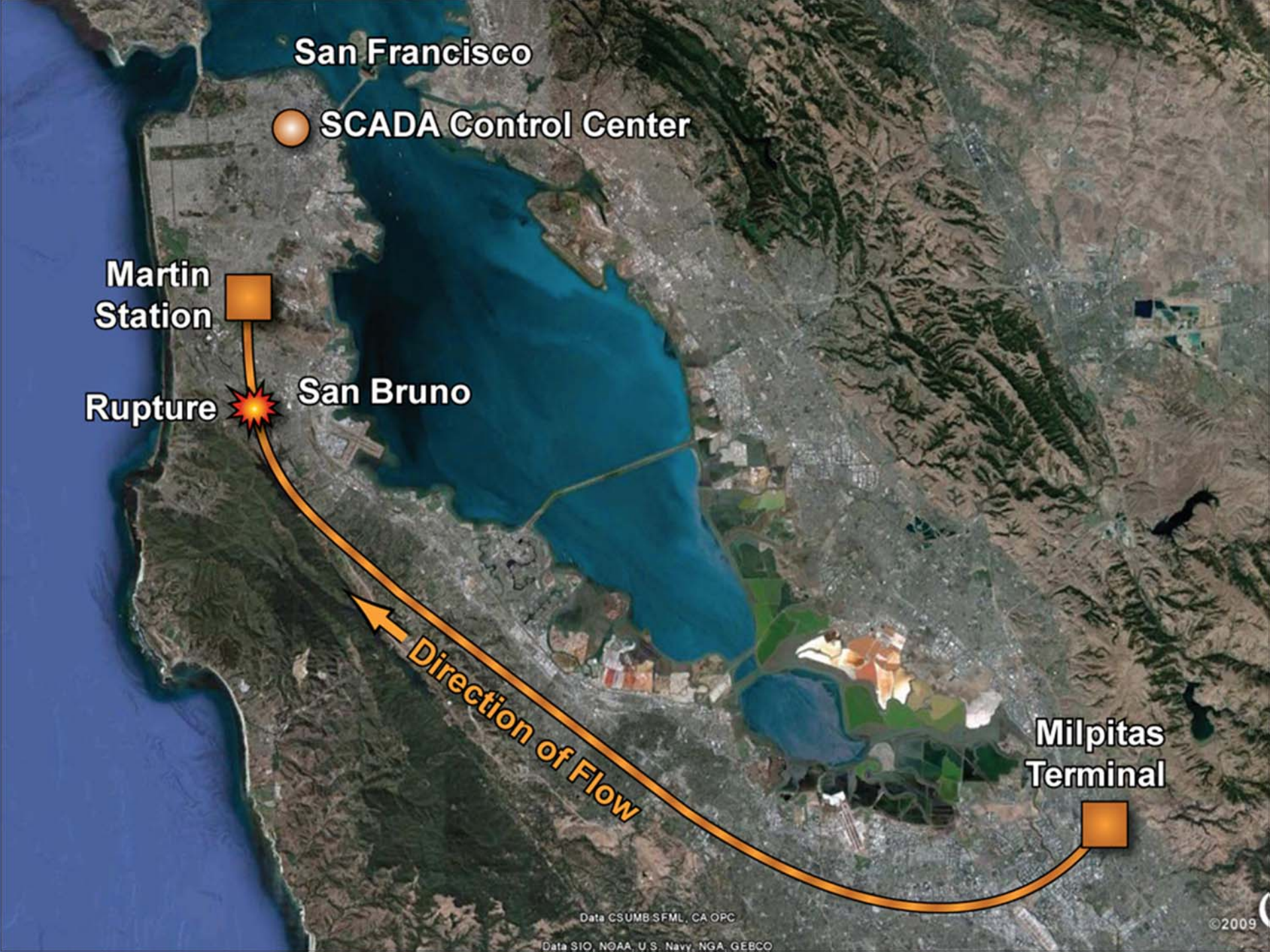
Natural Gas Transmission Line

San Bruno, California

September 9, 2010

Claremont Drive
Earl Avenue
Glenview Drive
RUPTURE
Destroyed (38)
Damaged (70)

Witness Video


San Francisco
SCADA Control Center
Martin Station
Rupture
San Bruno
Direction of Flow
Milpitas Terminal
Data CSUMB SFML, CA OPC
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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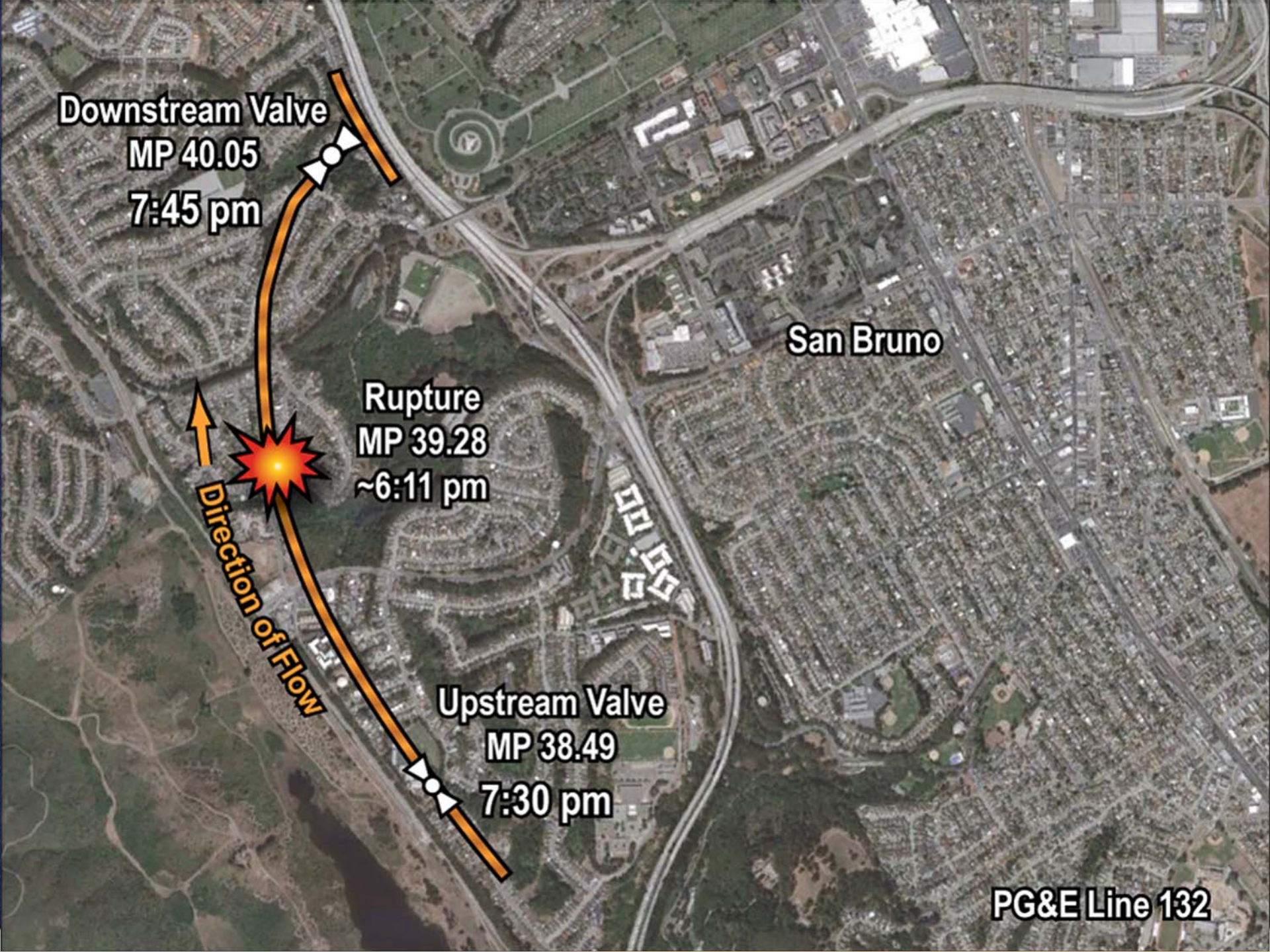
Events Prior to Rupture

- Power supply modules malfunctioned
- Line 132 regulating valve moved to a fully open position
- A pneumatically actuated monitor valve activated
- Steady increase in pressure from 357 psi to 386 psi preceding line rupture at 6:11 pm

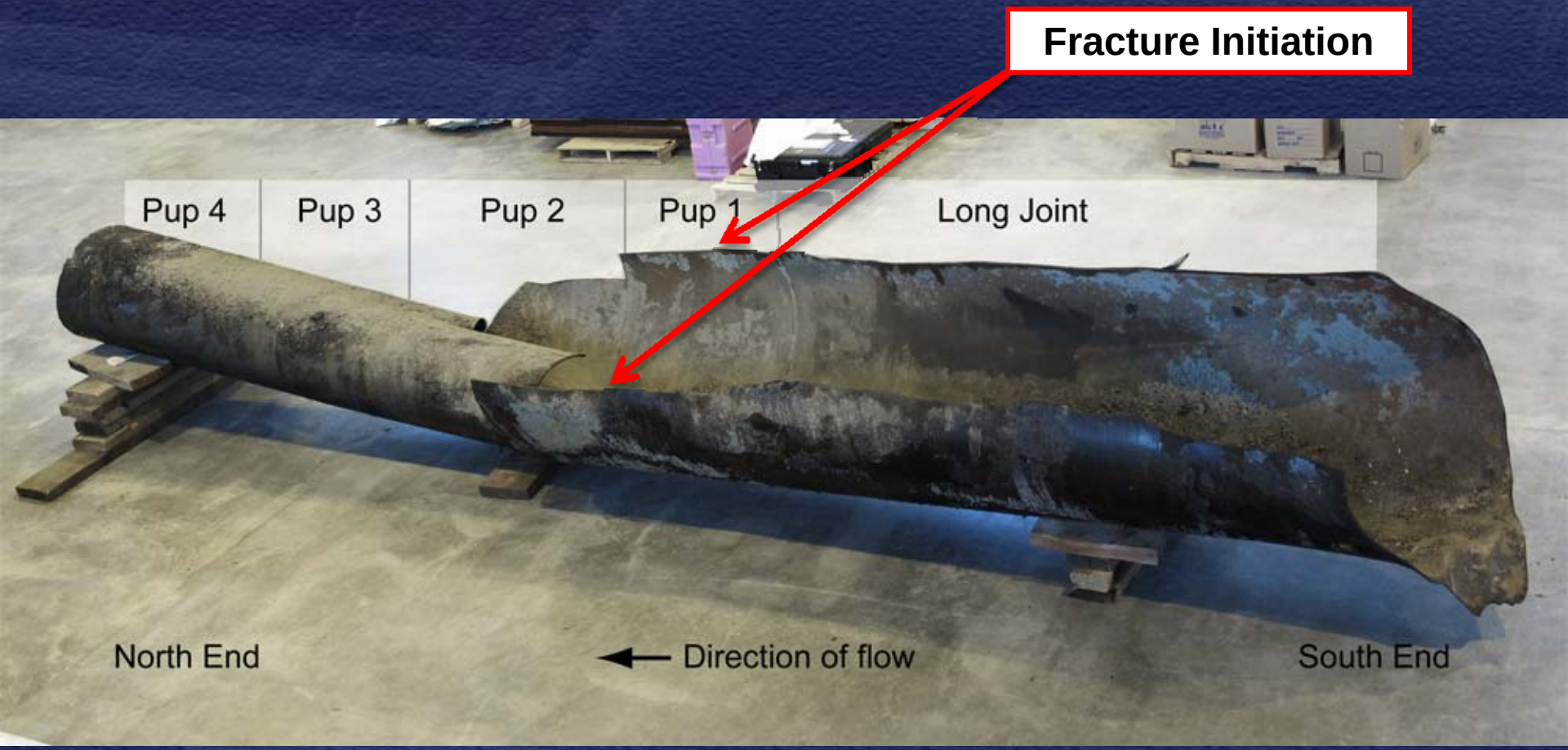
Events After Rupture

- Pressure drop at Martin station
- Two off duty PG&E employees called dispatch center 10 min after rupture
- On-duty PG&E employee dispatched at 6:23 pm
- Isolation crew dispatched 6:41 pm

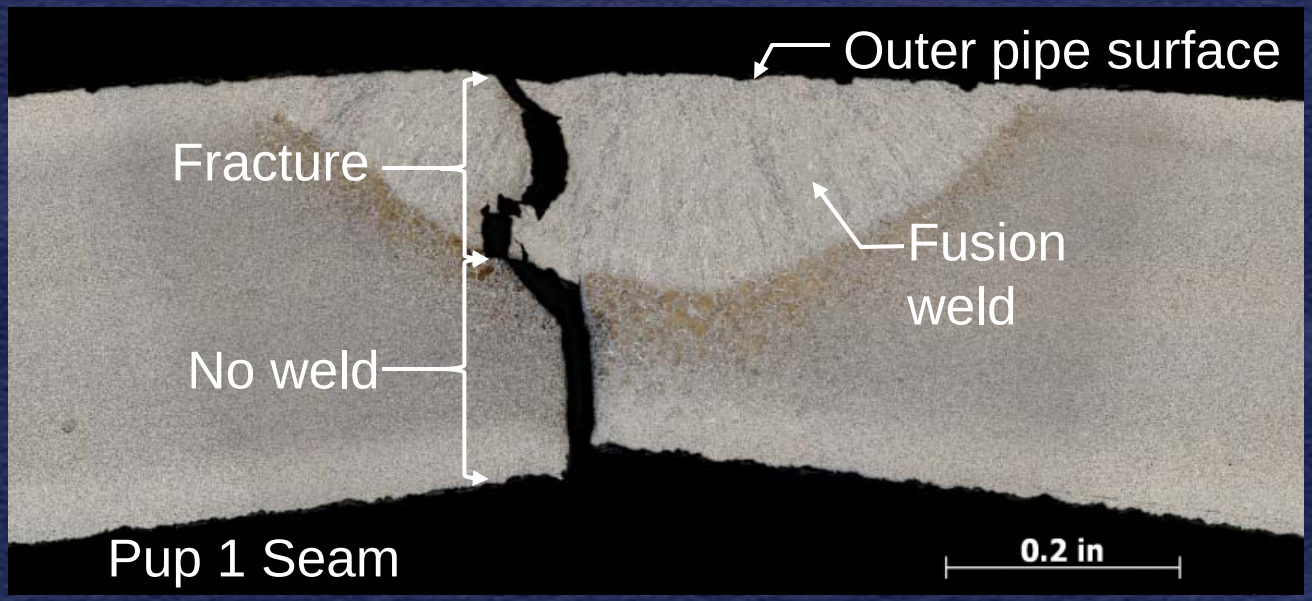

Downstream Valve
MP 40.05
7:45 pm
Rupture
MP 39.28
~6:11 pm
Direction of Flow
Upstream Valve
MP 38.49
7:30 pm
San Bruno
PG&E Line 132

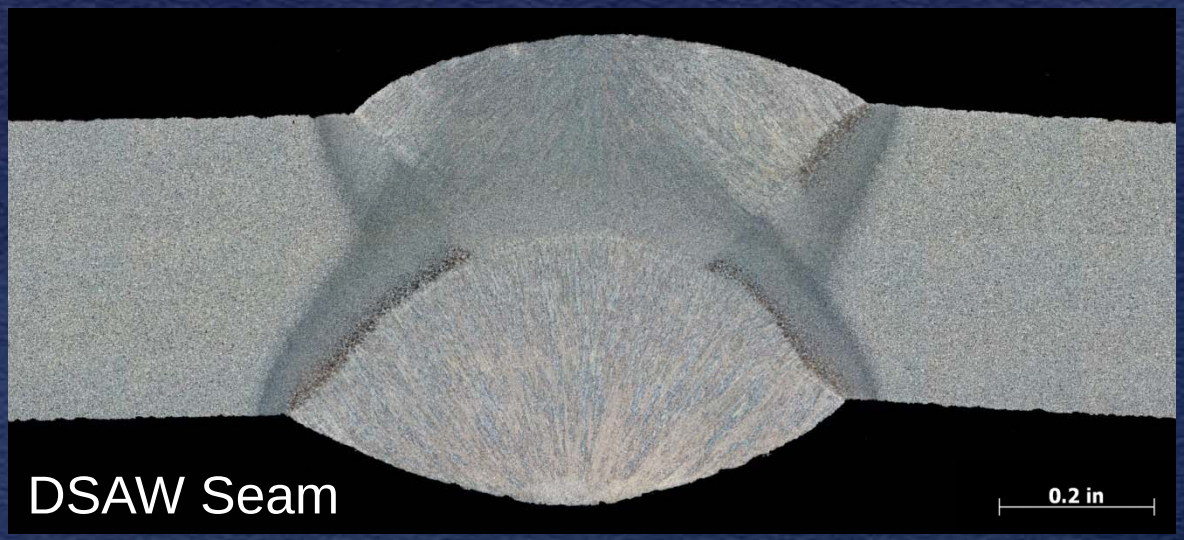
South End
North End

Ruptured Pipe Segment



Cross Section of Pipe Seams





Pipeline Information

- Installed circa 1956
- PG&E documentation indicated 30-inch diameter, seamless, grade X-42 pipe
- Maximum operating pressure was 375 psi
- Maximum allowable operating pressure was 400 psi

PG&E Operations

- Control room response
- Policy regarding use of automatic shutoff valves and remote control valves
- Risk management of the pipeline
- Maximum allowable operating pressure

PG&E SCADA System

- Critical to controlling and maintaining line pressures
- Alarms tell the operator when pressure has exceeded maximum operating pressure
- Critical for early detection of rupture
- Ability to remotely isolate station valves from the control center

Integrity Management Plan

- Ensure safety of gas transmission pipelines
- Identifies high consequence areas
- Potential impact radius

Public Awareness Programs

- Pipeline and Hazardous Materials Safety Administration regulations
- American Petroleum Institute Recommended Practice 1162
- Enhance public safety through increased knowledge

State and Federal Oversight

- California Public Utilities Commission audits of PG&E in 2005 and 2010
- “Grandfather clause”
- Effectiveness of performance based integrity management regulations
- Operator self-assessment

Existing and New Technology

- External corrosion direct assessment
- Inline inspection
- Pressure testing
- Tradeoffs for different inspections
- New technology

Staff

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- Brian Dennis

Parties to the Investigation

- Pipeline and Hazardous Materials Safety Administration
- California Public Utilities Commission
- Pacific Gas & Electric Company
- City of San Bruno
- International Brotherhood of Electrical Workers – Local 1245
- Engineers and Scientists of California-Local 20

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