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# Natural Gas System Performance

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# Topics

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- » Overview of Southern California Gas Company
- » Northridge Earthquake Experiences
  - Gas System
  - Customers/Behind the Meter
  - Recovery Efforts
- » Advancements Resulting from Northridge
- » Ongoing Efforts to Further Reduce Risks
- » Summary

# Southern California Gas Company

- » Nation's largest natural gas distribution utility
- » 21.1 million consumers
- » 5.8 million gas meters
- » 136 Bcf of gas storage capacity-4 fields
- » 3,750 miles of transmission pipeline
- » ~99,000 miles of main and services





# Gas System Performance

## Northridge Earthquake

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- » 35 transmission leaks/failures (25 in one line- girth welds) - 3 fires
- » 154 Distribution steel (80 mains, 74 services)
- » 27 plastic distribution - socket fusion joints
- » 6,461 Meter set assembly leaks
- » 15,021 leaks beyond meter
- » 536 additional distribution leaks found that were corrosion related
- » Overall supply disruption not an issue due to system flexibility and multiple receipt points

# Major Weld Failure- 22" Pre-1930

No damage to 2 – 30" Late 1950 vintage lines in same street

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Photograph by M. Rymer



Photos by Gene Blevins, C.F.P.A.

# Customer Related

## Northridge Earthquake

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- » 51 natural gas related fires (non-mobile home)
  - 20 water heater related
- » Leak breakdown
  - 6,994 appliance connectors (2,526 non-strapped water heaters)
  - 3,602 appliances
  - 2,460 house lines
  - 1,004 yard lines
- » 172 mobile homes destroyed by fire
  - Lack of seismic bracing damaged pipe and MSA (up to 3')
- » Customer Orders to restore service - 151,000
  - 88% shut off their own service - no damage
- » EQ Valves - 841 triggered, 162 had damage

# Recovery Effort

## Northridge Earthquake

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- » 3,400 involved in recovery efforts (maximum level for 5 days)
  - Support from PG&E, SDG&E, SW Gas, Long Beach Gas and contractors (~460)
- » Transmission lines recovered in 4 days
- » 82% of customers restored in 2-3 weeks
  - Safety and unrepaired damage limited access
- » 15 Staging sites
- » Major Logistic Challenge
  - Food, housing, order generation, toilets, materials, other
- » Total cost ~\$40 million



# Steps Taken from Lessons Learned

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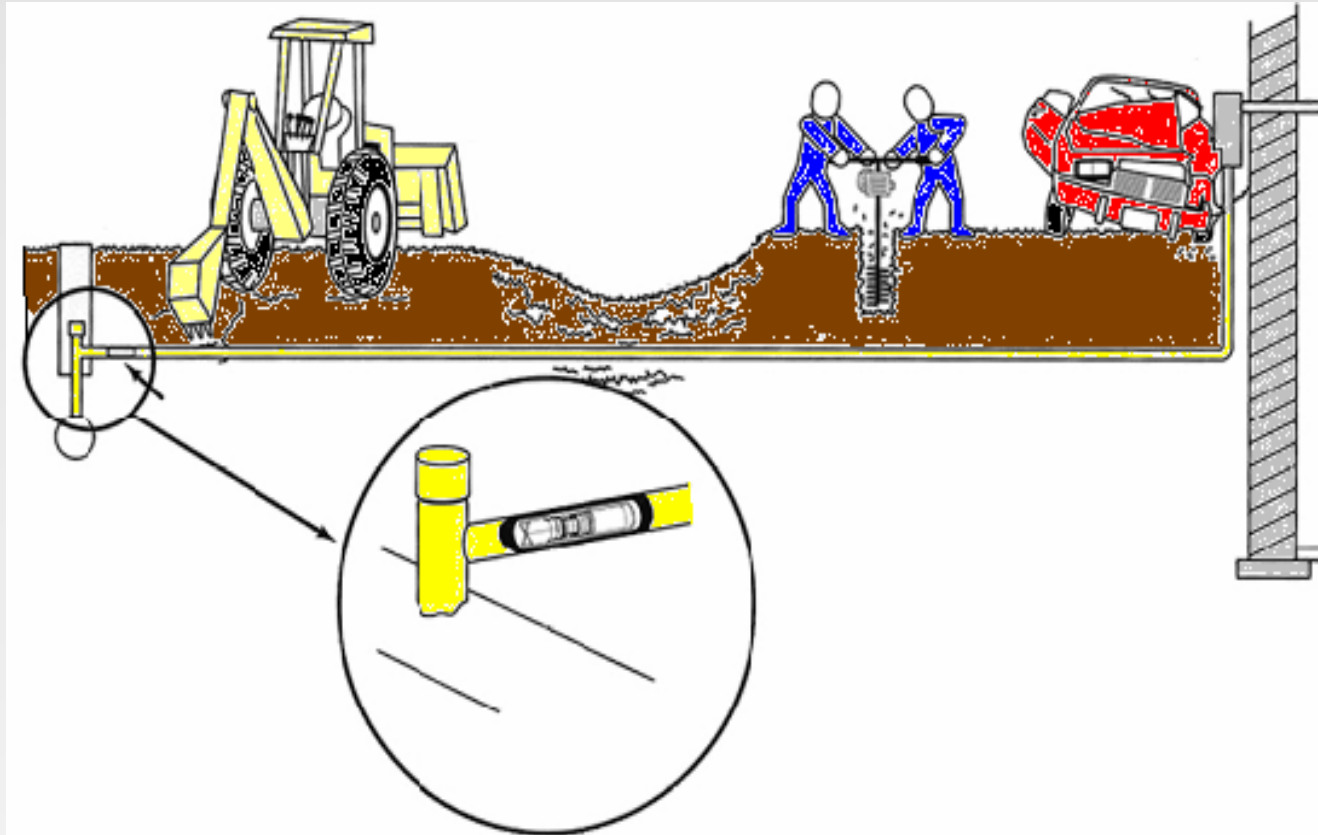
- » Significant system studies, and implementation of new seismic design criteria- including above ground facilities
- » Began replacing smaller/older supply lines which weren't a priority
- » Supported Legislation requiring water heater straps, and encourage manufacturers to remove legs
- » Trailer MSAs now placed 4' away
  - New seismic requirements
- » Assistance Agreements put in place
  - Inter-utility and key contracts
- » Emergency Material on hand - strategically placed
- » Emergency Exercises - some with other groups

# Other Ongoing Efforts

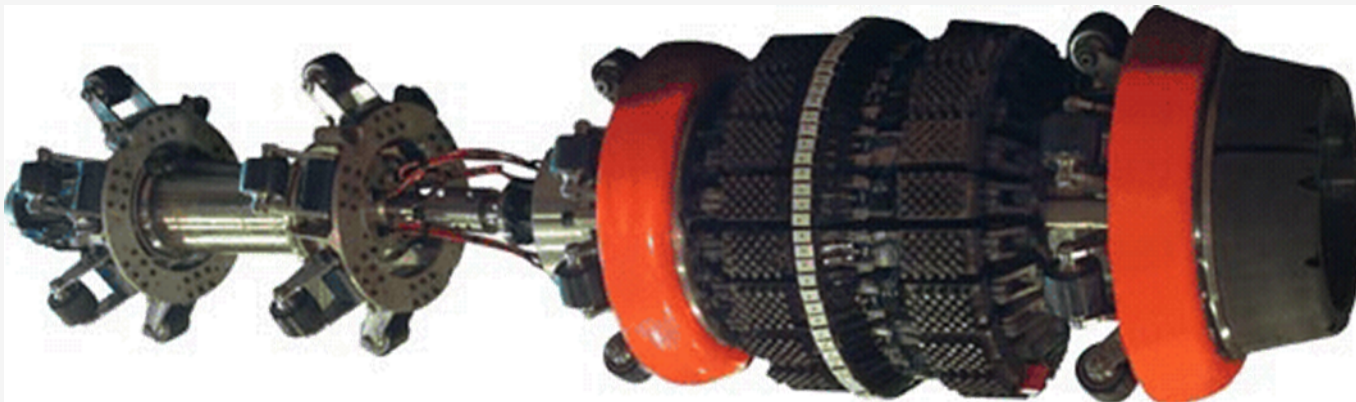
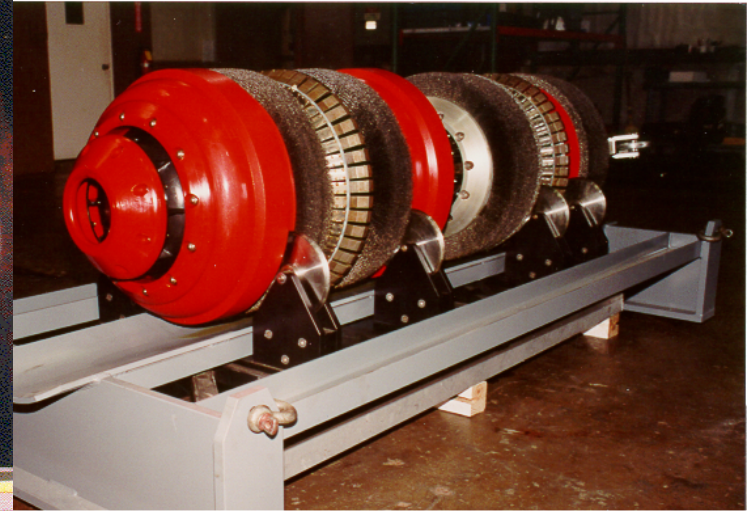
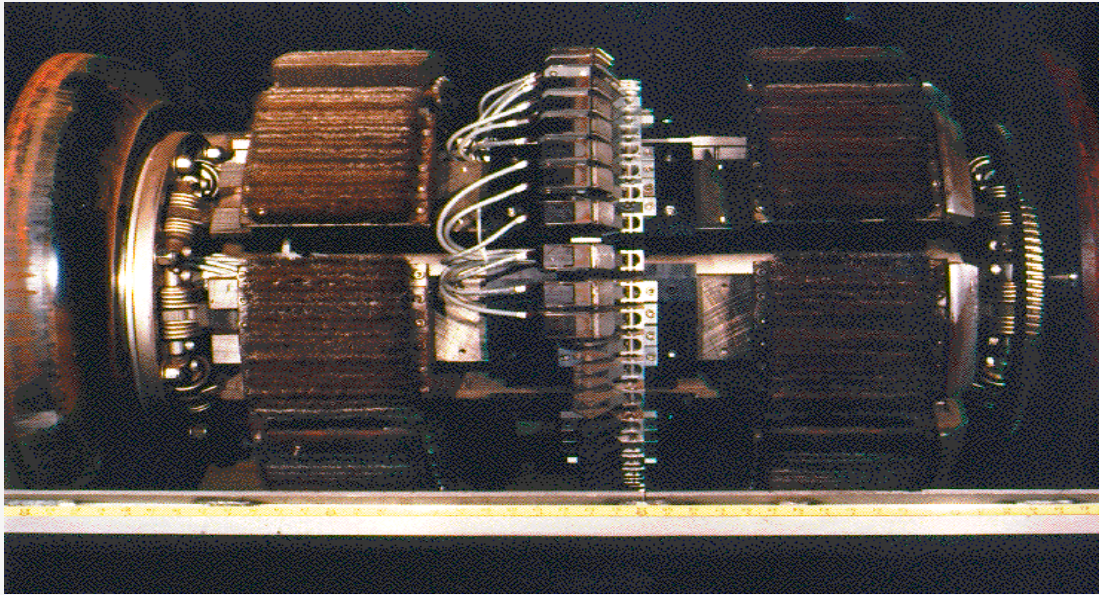
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- » Some Cities including LA have mandated use of earthquake valves
- » Since 2009 Excess Flow Valves are required by federal law for all new single fed residences
- » Due to San Bruno incident, CA establishing more stringent safety requirements to
  - More effectively assess and replace higher pressure lines (internal inspection)
  - Ensure proper safety design across faults
  - Put in place more automatic and remote shut off valves
  - Overall focus on safety and risk management
  - Better Deal with third party excavators

# A Preventative Measure: Excess Flow Valves (EFV)



# Inspection Pig- Magnetic Flux Leakage



# General Public Recommendations

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- » Customers should know how to turn off their gas in case of emergency
  - Turn off only if signs of leaks and it is safe to do so
  - Information on [www.socalgas.com/safety](http://www.socalgas.com/safety)
  - Call us if there is a suspected gas emergency
  - Be aware that in normal yard work you can damage a line
- » Excavators must notify us before excavating/digging
  - Undetected damage could cause failures in the future due to earthquake or normal operation



# Closing Remarks

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- » Many improvements better prepare us for a major earthquake - we can withstand a major event without major supply disruption
- » Some gas facilities will be damaged, and service outages will result
  - Communication system is critical
- » Continual Training and Learning from real and simulated events are critical
  - No major event in 20 years - how to get focus
  - Turnover always a concern
- » The speed of communication requires us to be much better prepared to deal with media, agencies inquiries, etc.