

**PG&E**

**Earthquake Recovery Partnering  
Opportunities**

**Lessly Field**

Pacific Gas and Electric Company

ABAG

December 3, 2008



# Today's Presentation

- PG&E's regulatory obligations
- Bay Area system overview
- Emergency Planning Activities
- Recovery Partnership Opportunities

# Earthquake Risk Management (California Policy Requirements \*)

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- Policy to manage earthquake risks
- Program to understand hazards and system vulnerabilities
- Plan to implement risk management options
- Dedicated staff
- Dedicated budget
- Accountability

*\* California Seismic Safety Commission/CPUC Safety Br.*

# Policy on Acceptable Level of Earthquake Risk \*

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Each utility shall withstand earthquakes to:

- Provide protection of life
- Limit damage to property, and
- Provide for resumption of utility service in a reasonable and timely manner

*\* California Seismic Safety Commission/CPUC Safety Branch  
California Earthquake Loss Reduction Plan, 1997*

# Corporate Real Estate

- Mitigation completed on 73% of PG&E buildings
- 19% of those are critical facilities that have been upgraded to Immediate Occupancy
- The program is scheduled to be completed in 2014
- Policy for leased/ procured buildings to meet seismic performance standards



# Gas Transmission

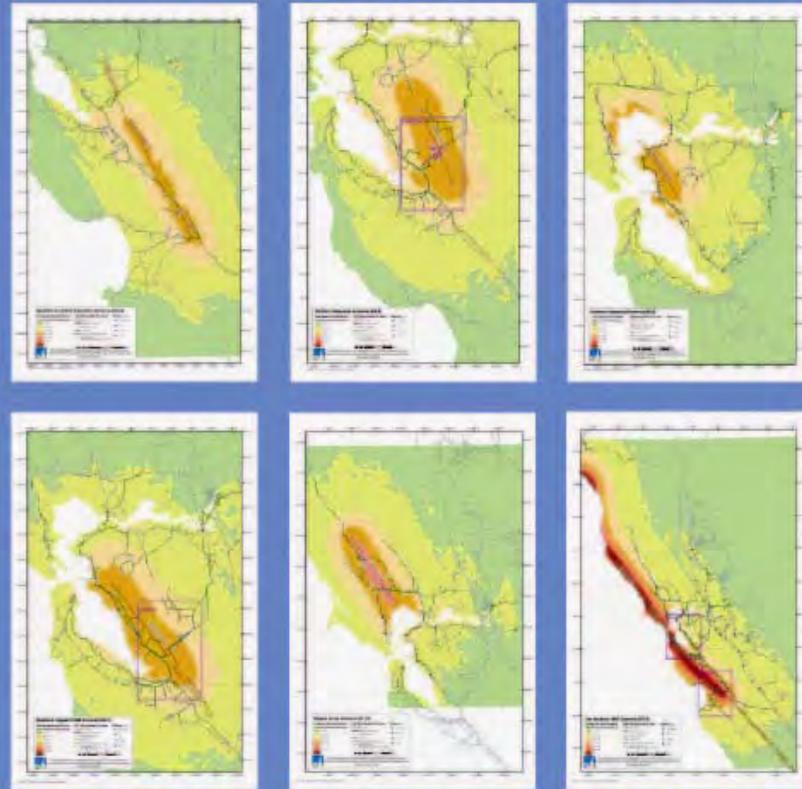
- **Risk management vs. pipeline integrity management (49 CFR Part 192)**
- **Gas Transmission Earthquake Plan and Response Procedure activated after earthquakes for prioritizing inspections.**
- **ERM study on Delta levee crossings**



Purpose of the Plan:  
To enhance emergency  
response following a M6 or  
greater earthquake in the  
Bay Area , particularly  
*when there is no  
Internet*

Uses the USGS earthquake  
scenarios to prioritize  
emergency response  
activities  
(i.e. which pipes are most  
likely damaged?)

## Gas Transmission Earthquake Plan and Response Procedure



PREPARED BY:  
Gas Asset Strategy  
Gas System Integrity  
Geosciences Department  
October 2006

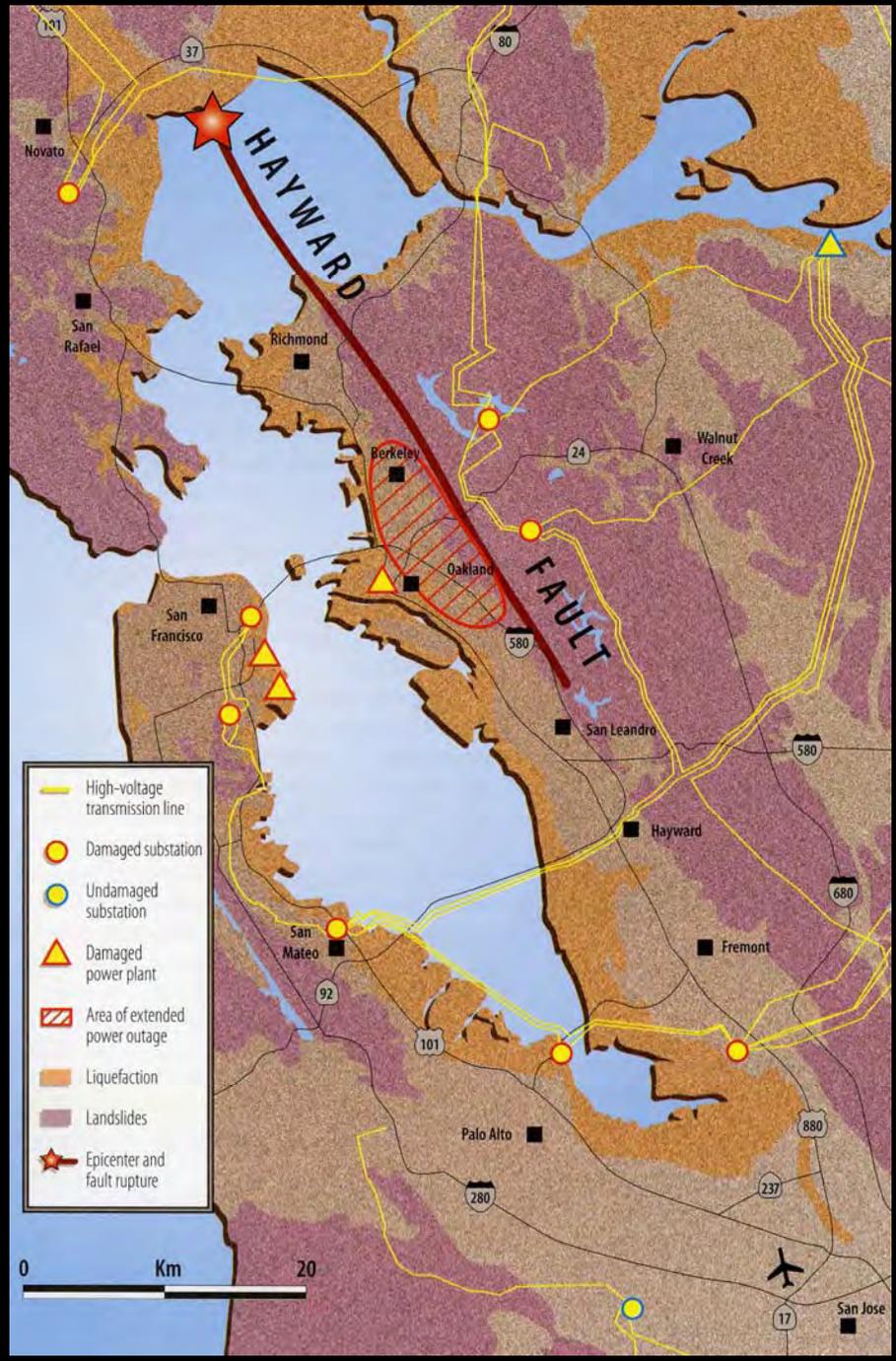




# Gas Distribution

- The Gas Pipeline Replacement Program (GPRP) is to replace 2,259 miles (~10% of steel system) of “high risk” distribution main by end 2014.
- 89% of distribution main with high seismic risk has been replaced









# Substations

- Mitigation completed on 83% of substation buildings
- The program is scheduled to be completed in 2010
- Equipment anchorage completed 72% of substations
- Installation of seismically qualified equipment (bushings, circuit breakers, switches)
- SERA – System Earthquake Risk Assessment used to develop a network mitigation strategy



# PEER Lifelines Program

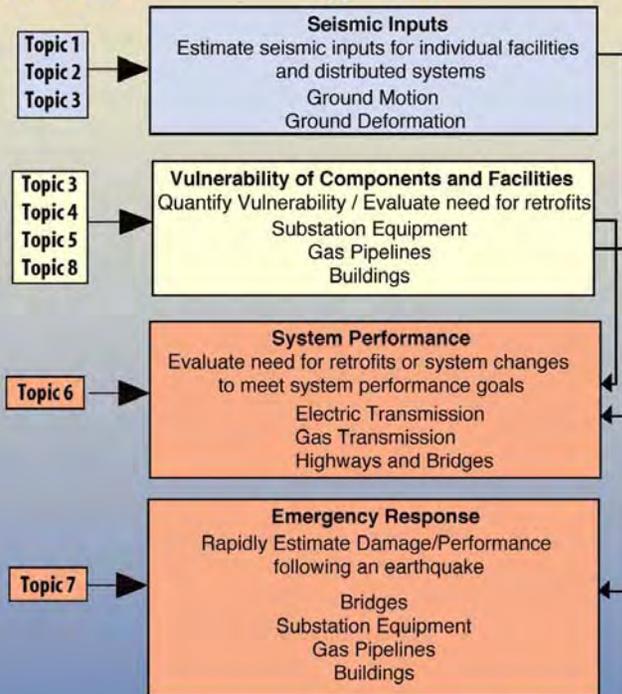
Providing data, models, and methods needed to improve the earthquake reliability and safety of lifelines systems.

## Implementation of Research Results

A key feature of the Lifelines Program is that the research results are implemented rapidly by the sponsors of the research.

### Research

### Application



<http://peer.berkeley.edu/lifelines>



PEER is administered under the National Science Foundation's Engineering Research Centers Program and is headquartered at UC Berkeley. PEER is funded by NSF, the state governments of California and Washington, and private industry and businesses.

# Substation Equipment Testing

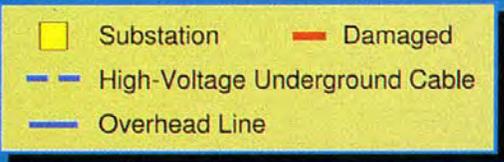


at PEER facilities



# Electric Transmission System

*Greater Oakland Area – Assessed Locations of Moderate to Heavy Damage from Northern Hayward Earthquake*



# Emergency Management Organization

- **National Incident Management (NIMS)/Incident Command System (ICS) is being adopted as PG&E's all-hazard incident management structure.**
- **Conducted corporate-wide M7 Hayward earthquake exercise in 2008.**
- **Enterprise Risk Management (ERM) focus on emergency response and business continuity.**



# Emergency Response Tools

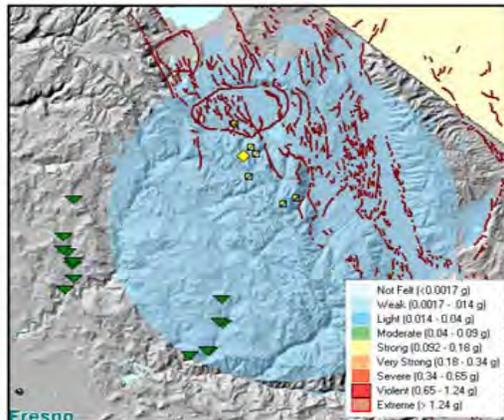


## Report for 08/04/2008 M<sub>L</sub>3.7 earthquake near Round Valley, CA

REPORT VERSION 02 – THIS EVENT HAS BEEN REVIEWED BY A PG&E SEISMOLOGIST

### Earthquake Details:

Magnitude:	3.7 M <sub>L</sub>
Date-Time:	08/15/2008, 01:03 PM (PDT) 20:03:24 (UTC)
USGS Event ID:	40221570
Location Coordinates:	-118.734, 37.335
Depth:	11.9 mi (19.1 km)
Closest City:	Round Valley, CA
Closest PG&E Dam:	Courtright Dam



Hydro dams (green triangles) within 50 miles of the M<sub>L</sub> 3.7 Round Valley earthquake. The ShakeMap shows ground motion accelerations and the brown lines represent known active faults.

### Emergency Contacts:

Name	Location	LAN ID	Company Phone	Cell Phone/Pager
Charles Ahlgren	SFGO	CSA2	(415) 973-1523	(415) 350-0465
Robert White	SFGO	RKW5	(415) 973-0544	(510) 405-4137
Paul Linderman	HELMS	PDL2	(550) 865-2394	(559) 284-8113



## Report for 08/04/2008 M<sub>L</sub>3.7 earthquake near Round Valley, CA

### Potential Impacts to Hydro Facilities Located within 50 miles:

(Ground Motion Exceeding 0.10 g in **BOLD**, Ground Motion Exceeding Design Value in **RED**)

Dam	Dam Type	Epicentral Dist. (mi.)	PGA (g)	Design Value (g)
<a href="#">Courtright</a>	Rockfill Concrete Face with partial u/s blanket	20.6	0.0017 – 0.014	0.18
<a href="#">Lake Wishon</a>	Rock Fill Conc. Face	25.4	0.0017 – 0.014	0.18
<a href="#">Balch Diversion</a>	Conc. Arch	31.8	0.0017 – 0.014	0.18
<a href="#">Balch Afterbay</a>	Conc. Arch	34.3	0.0017 – 0.014	0.18
<a href="#">Crane Valley</a>	Earth & Rock	41.6	NO REPORT	0.18
<a href="#">Manzanita Lake</a>	Conc. Arch	44.1	NO REPORT	0.17
<a href="#">Kerkhoff</a>	w/Gravity Abut. Conc. Arch	45.5	NO REPORT	0.18

### Identified Earthquake Related Hazards by Facility:

Dam	Earthquake PFMA	EAP Hazard Notification Link
<a href="#">Courtright</a>	<b>PFM 5</b> – Significant seismic event generates a seiche wave leading to overtopping of the dam. <b>PFM 6</b> – During a major seismic event, the upstream concrete face slabs are relatively displaced leading to increased leakage, causing rockfill erosion.	<a href="#">CourtrightEAP</a>
<a href="#">Lake Wishon</a>	<b>PFM 6</b> – Seismic event generates a major seiche wave leading to overtopping of the parapet and dam leading to erosion in the rockfill slope. <b>PFM 7</b> – During a major seismic event, the upstream face slabs are relatively displaced leading to increased leakage, causing rockfill erosion.	<a href="#">WishonEAP</a>
<a href="#">Crane Valley</a>	<b>PFM 8</b> – Earthquake induced liquefaction of foundation alluvium leads to downstream slope failure. <b>PFM 3</b> – Liquefaction of old (1901) dam section at Main Dam (Sta. 3+50 - 6+07) leads to upstream slope failure	<a href="#">CraneEAP</a>

### Report Reviewed By:

Name	Title	LAN ID	Company Phone	Cell Phone
Katie Wooddell	Seismologist	KXWL	(415) 973-6299	(510) 295-3099
Marcia McLaren	Sr. Seismologist	MKM2	(415) 973-0543	(415) 515-4263

Geosciences will continue to monitor the seismic activity in this area and provide updates as conditions change. If you have any specific interest in the areas affected by this earthquake, please let us know and we will provide additional information.

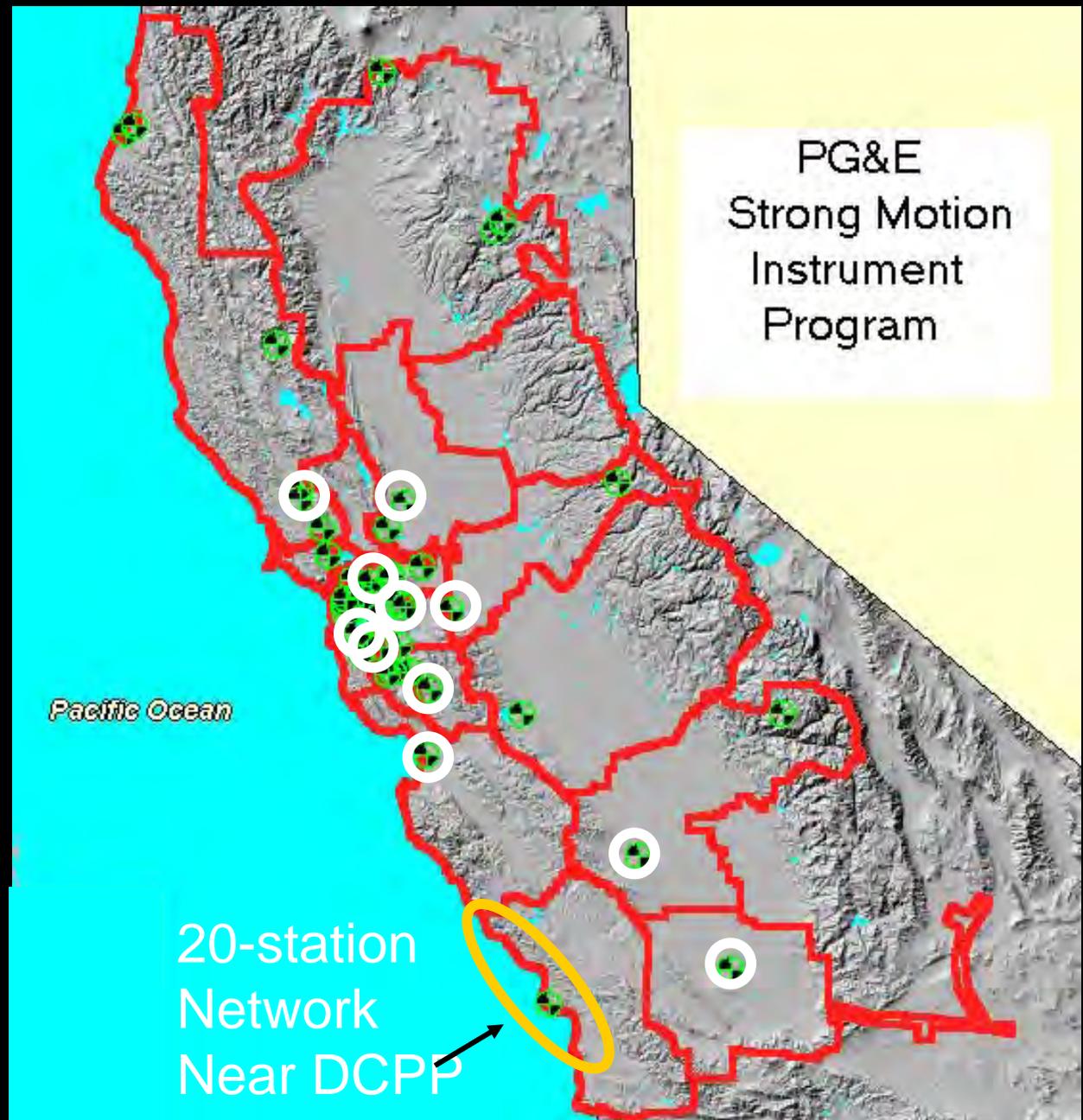
### Additional Links:

Dam Info: <http://daminfo/>  
 Geosciences: <http://geosciences/>  
 Map Guide: <http://geosciences/MapGuide>  
 Google Earth: <http://www.earthquake.usgs.gov/eqcenter/shakemap/nc/shake40221570/#download>

\*Click on the XML link under the "GIS Data" header.  
 \*This file will open in Google Earth™ and can be saved as a Google Map or saved to My Places.

**~75 Strong motion instruments**

**Hydro dams  
Substations  
Buildings  
Powerplants...**



# Partnership/MOU Opportunities

- Gas and Electric Utility Seat at Alameda, CCSF and Santa Clara County Emergency Operations Center
- Utility recovery-specific drills with all stakeholder utilities
- Pre-designated staging and camp areas
- Route, access and heliport support
- Practice sharing GIS used during emergencies by local OES and utilities



*Thank You!*

**“Soft Story Structures”  
Potential Collapse Hazard Buildings  
San Francisco**

