Overview of LADWP and Impacts to LADWP Power System

Impacts

- 1.4 million customers lost power for 38-minutes
- Within 24-hours, 93% of customers had power
- All areas restored within 2-days
Impacts – What happened?

- Primary damage at Sylmar Converter Station, Sylmar and Olive Switching Stations and Rinaldi and Receiving Station J (Northridge)
- In general, a lot of porcelain insulator failures in stations near the epicenter.
- Lessons learned from 1971 Sylmar Earthquake helped – ANCHORAGE DETAILING!
Emergency Response – What we did.

- Emergency Response Plan
- Operating and Maintenance – *Turn the lights back on.*
- Engineering – *Inspections, prepare Damage Survey Reports, prepare cost estimates*
- Resources allocated based on priority that included *proximity* to epicenter, and *importance* starting with generation and transmission, then *voltage* (the higher the voltage station, the higher the priority)
What we learned. What we did.

- Partner and share experiences with other utilities, equipment manufactures, and experts and develop an industry standard – End result, “IEEE 693 - Recommended Practice for Seismic Design of Substations”

- Seismic Upgrades – Since 1994, LADWP has invested over $300 million in facility and equipment upgrades. Some of this was partially funded by FEMA’s Hazard Mitigation Grant Program

- Revised our LADWP Seismic Design Criteria to update it based on our experiences from Northridge.
What’s next to make our system stronger?

- Out of sight, out of mind? Budget cuts and competing priorities make it difficult to keep seismic upgrades in the forefront. After 20 years without a major quake, other mandates seem more compelling.
- Construction Paradigm – “When in doubt, make it stout.” For each dollar we spend during construction, $0.15 is material. Making it bigger does not cost much.
- System Evaluation – Find seismic weak links in the system. Evaluate for time and cost to replace. Possibly go above and beyond accepted codes and standards. LADWP does this with:
  - Transformer bushings and foundations
  - Disconnect Switches, surge arresters, circuit breakers, and Current Voltage Transformers (CVTs) are Sine Beat tested above IEEE 693 requirements
  - Selectively using composite polymer insulators