

Earth Quake Research Affiliates May 11, 2007

Imported Water Supply Infrastructure – Mitigation Strategy

**Shane Chapman, Assistant Group Manager Water System
Operations, Metropolitan Water District of Southern California**

Metropolitan Water District of Southern California

Metropolitan Water District of Southern California –

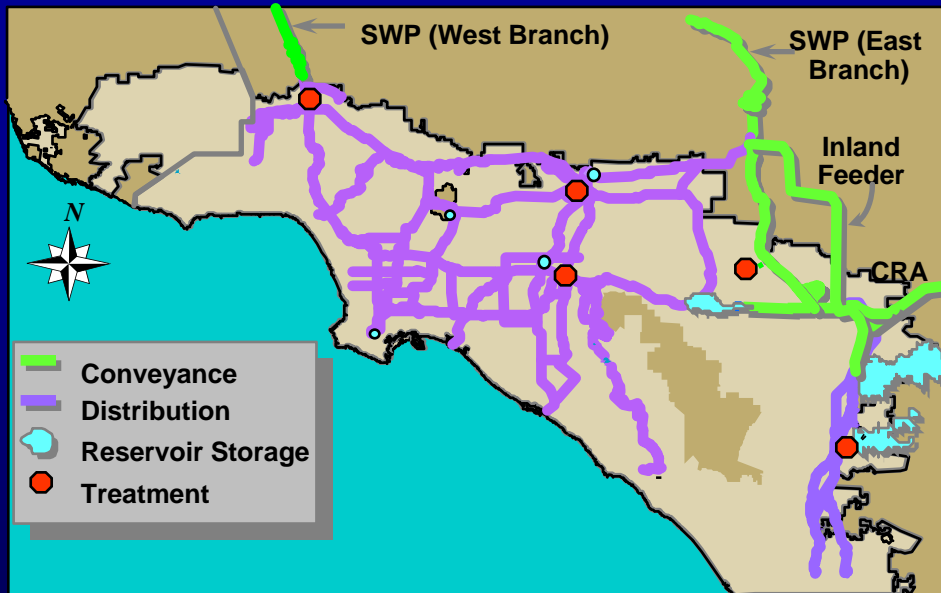


- Special district of State Legislature formed in 1928
- 6 counties - 5,200 square miles
- Wholesales imported water to 26 member agencies
- 37 Member Board of Directors
- 18 million people
- Projected population growth: ~220,000 people / year
- Regional economy: \$800+ billion
- Meets about half of total demand for water in region

Where Southern California Gets its Water



Imported Water Delivery System



■ Colorado River Aqueduct (242 miles)

- ✓ Five pump plants
- ✓ 64 miles of canal
- ✓ 92 miles of Tunnel
- ✓ 83 miles of conduit & siphon
- ✓ 330 miles of High Voltage Transmission

■ Five Treatment Plants

- ✓ 2,652 MGD total design capacity
- ✓ Ozone and conventional treatment processes

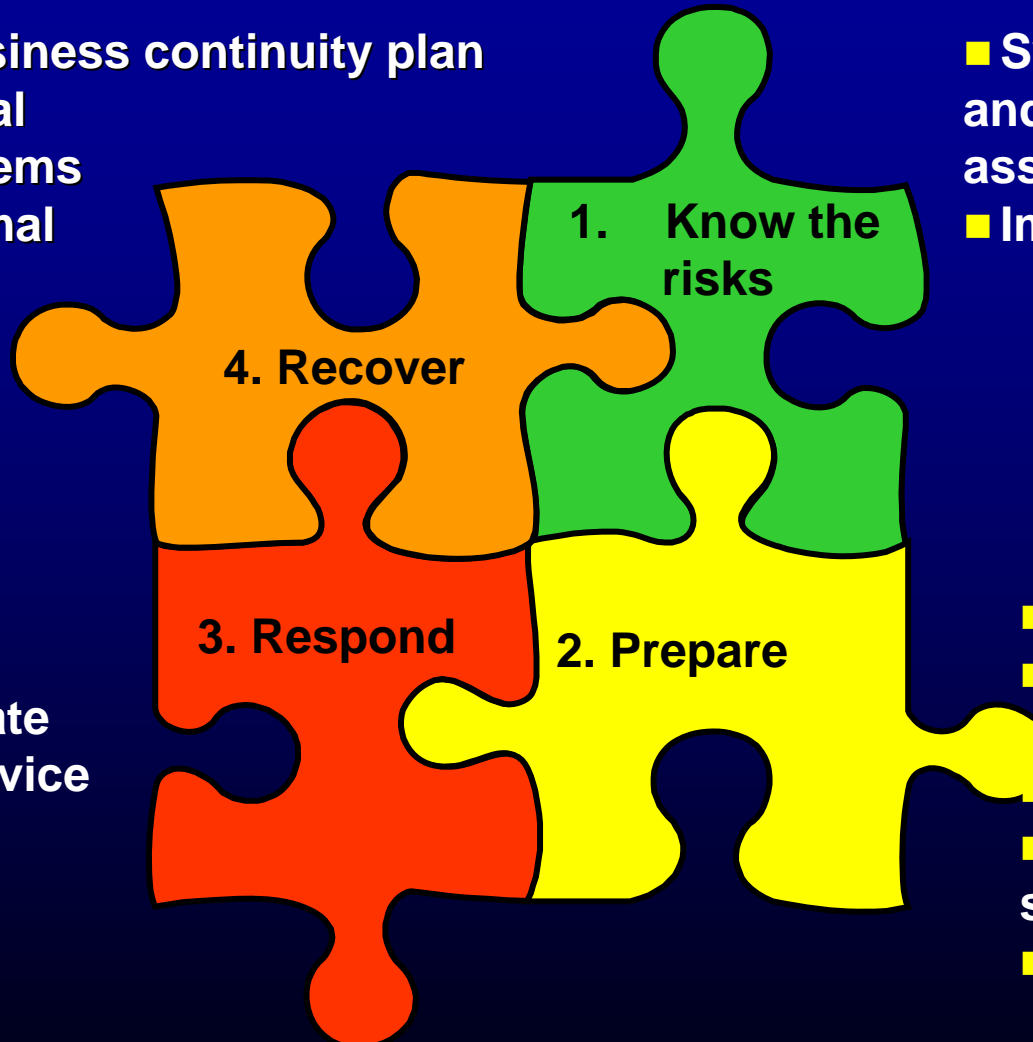
■ Distribution and storage

- ✓ Seven surface reservoirs
- ✓ 770 miles of pipeline
- ✓ 16 small hydro-electric plants
- ✓ Several hundred structures and meters

Imported Water Supply Infrastructure Mitigation Strategy

- Implement business continuity plan
- Recover critical business systems
- Return to normal operations

- Activate
- Communicate
- Restore service

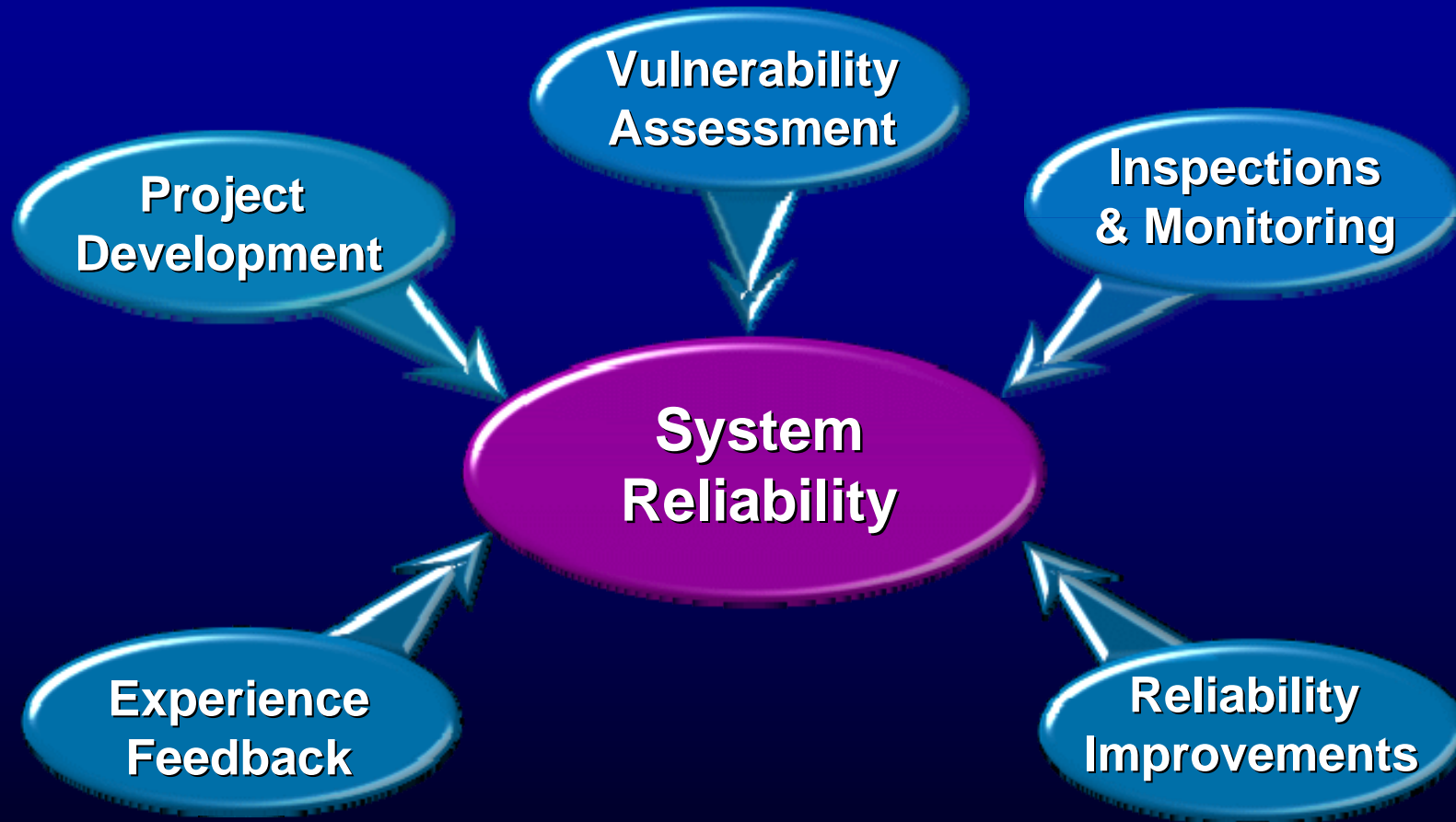


- System reliability and vulnerability assessments
- Implement projects

- Plan
- Organize
- Equip
- Train
- Communications systems
- Relationships

Mitigation Strategy Element

System Reliability Planning



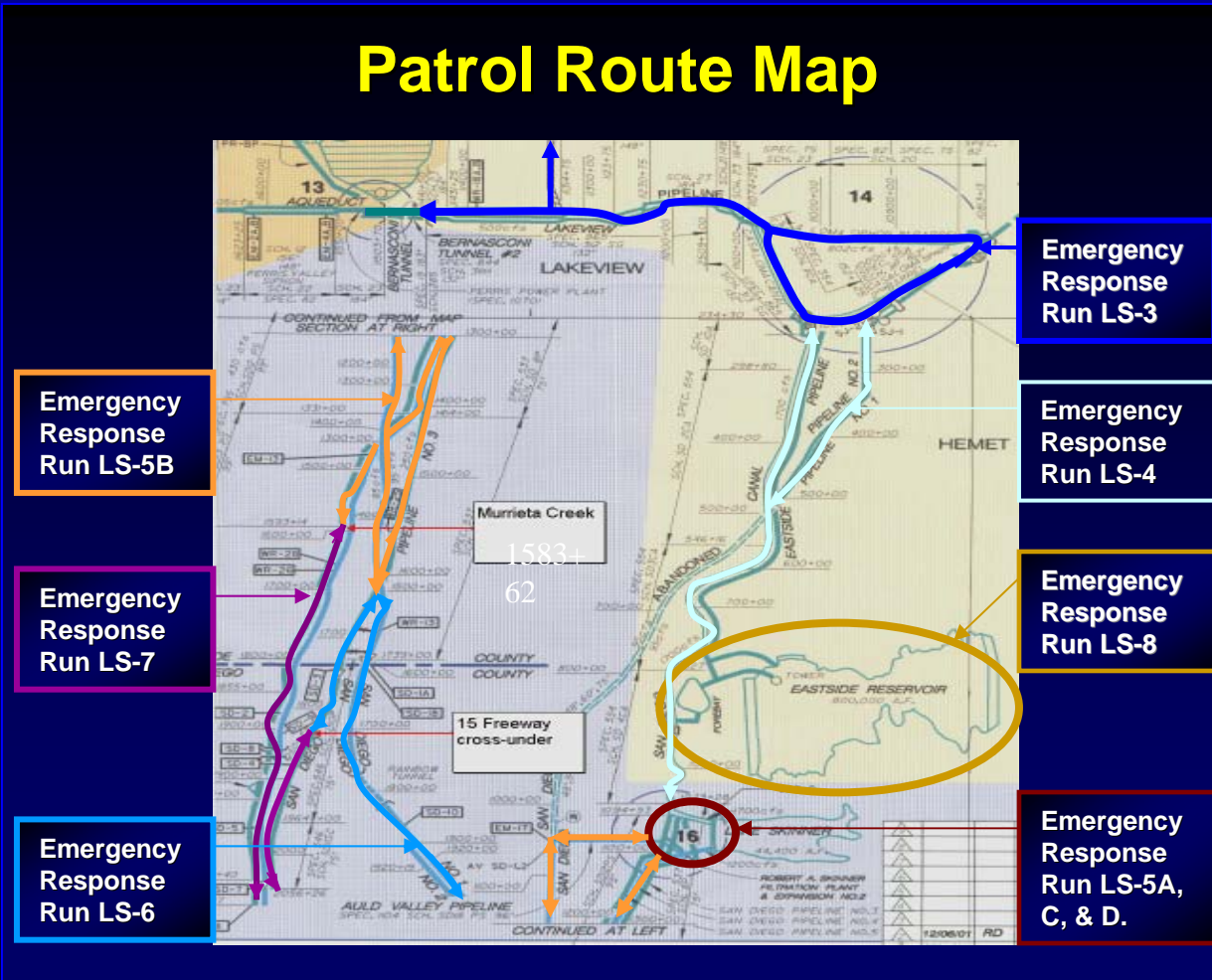
Mitigation Strategy Element

Emergency Response Plan

Patrol Route Map

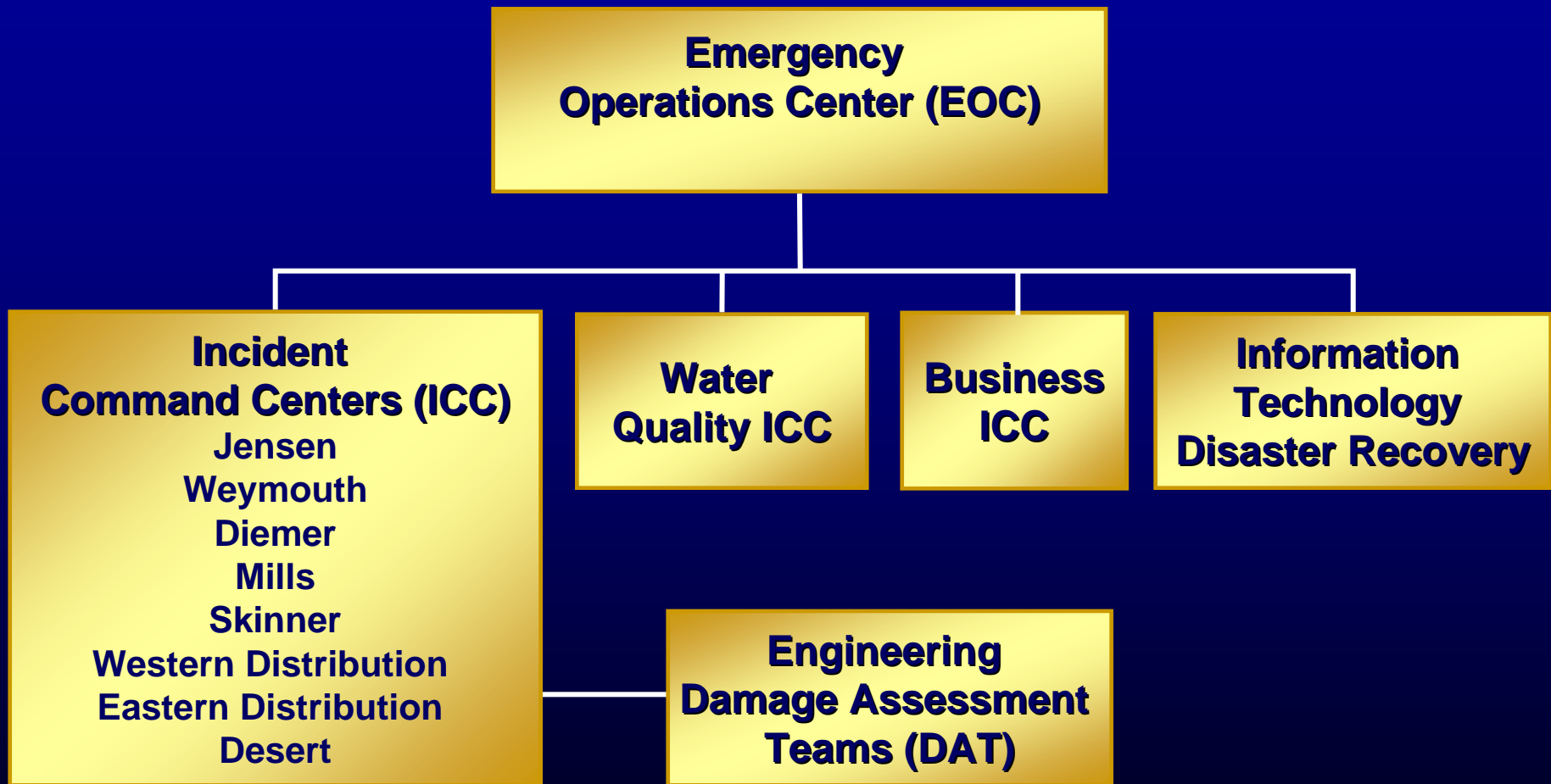
■ How to respond to an emergency

- Roles and responsibilities
- Equipment
- Material
- Communications
- Training
- Exercises



Mitigation Strategy Element

Emergency Response Organization



Mitigation Strategy Element

Maintain Construction Capacity

- Heavy equipment
- Structural concrete
- Pipe repair
- Other



- San Dimas Canyon flooding January 2005

Mitigation Strategy Element

Maintain Shop Capacity

- Machining
- Fabrication
- Coating
- Stockpile material
- Routine and emergency work for DWR and member agencies



Mitigation Strategy Element

Test and Train

- Training – skills, experience, confidence, trust, relationships
- 2006 Training
 - Focus on Incident Command System (ICS)
 - 2,506 hours of training
 - 1,164 employees participated
 - 77 exercises conducted



Tabletop

Functional

Full Scale

Mitigation Strategy Element

Maintain Multiple Communications Systems



Landline Phones

2-Way Radios



Cellular Phones

Satellite Phones



Mitigation Strategy Element

Maintaining Relationships

- **Member agency response system (MARS)**
 - Quarterly meetings of member agency emergency response coordinators
 - Monthly radio tests
- **State Office of Emergency Services (OES)**
 - California Utilities Emergency Association (CUEA)
- **Contractors**
- **Department of Water Resources**
- **Water Agency Response Network**
 - Mutual aid agreement

Mitigation Strategy Summary

■ Invest in reliability

- System reliability planning
- Design standards and construction methods
- Storage

■ Prepare

- Emergency response planning
- Emergency response organization
- Maintain construction and shop capacity
- Test and train
- Maintain multiple communications systems and relationships

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Emergency Management

Pipeline Repair Planning Scenario

- **Two simultaneous pipeline breaks**
 - 8 - 12 ft dia. x 60 ft long pre-stressed pipe, in an open area
 - 8 - 12 ft dia. x 40 ft long pre-stressed pipe, in traffic area



Response Resources Strategy

| Scenario | Oversee | Project Management | Design | Construct |
|---|---------|--------------------|---------------------|---------------------|
| Single Random Event | MWD | MWD | MWD | MWD |
| Moderate Event (M6.5-M6.75) 2 to 4 pipeline breaks* | MWD | MWD | MWD and Consultant | MWD and Contractors |
| Extreme Event (>M7.5) 5 or more pipeline breaks** | MWD | MWD and Consultant | MWD and Consultants | MWD and Contractors |

* Mobilize consultants and contractors from existing capital projects to respond to more than 2 pipeline breaks

** May also involve mutual assistance from outside agencies

Status



- Concrete Liner Complete
- Siphons Cleared
- Grouting and Patching Complete
- Cofferdams Being Removed
- Cost Estimate \$2.5 – \$3.0 M
- Start-up
 - February 11: 200 - 300 cfs
 - February 12: 400 cfs
 - February 13: 500 cfs*

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* New rated capacity until more permanent repairs are implemented

Gorman Creek Channel Failure January 2007



**Back in service less than 30
days – California
Department of Water
Resources and
Contractor**

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At the Time of Failure



- 5% Grade
- 750 cfs
- 32 fps
- History of Turbulent Flow
- Operating 4 hours
- 1000' Lining Damage
- Channel had operated at this rate of flow for three days in 2006 without incident

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Emergency Management

Three Fundamental Elements of Readiness

