
Source: EPA


Source: Joe Sieder/AP


EERI / Rachel Davidson

# Earthquake Reconnaissance Field Safety

**Learning from Earthquake Program**
Earthquake Engineering Research Institute




NISEE / UC Berkeley

## Reconnaissance 1955


## Every Earthquake Will be Different


EERI / Wells, NV


EERI / Christchurch

## Carefully Evaluate the Risk You are Assuming



## Risks and Hazards:

- Damaged infrastructure
- Possibility of aftershocks
- Unfamiliar surroundings
- Unstable structures
- Falling or tripping hazards
- Falling material
- Hazardous materials

## Risks and hazards continued:

- Exposure to smoke and dust
- Exposure to fire
- Electrical hazards
- Fatigue
- Adverse weather
- Stress
- Dehydration




## Medical Insurance

- Basic Medical Insurance Required
- Medical Evacuation Insurance
  - New NSF requirement
  - Check your Credit Cards
  - Check your personal medical insurance

## Investigate Needed Vaccinations

•Make sure your basic shots are up to date (tetanus)

•Most vaccinations take a few days to a few weeks to be effective, but they typically remain in effect for a few years. Be ready.

•Other Resources:

- World Health Organization: http://www.who.int/ith/vaccines/en/
- CDC Travel Information: http://wwwnc.cdc.gov/travel



## Documentation

•Have up-to-date documentation including:

•Medical Evacuation Insurance

- •Passport
- •Visas
- •Certificate of Vaccination

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## Food and Water

- In areas where food and water have been seriously disrupted, plan to bring your own supplies.
  - Take water purification system or water purification tablets
  - Have a water bottle to carry with you
  - Bring non-perishable food items and simple meal supplies (i.e. oatmeal, dried food, granola bars, etc.)
- It is very easy to get dehydrated. Make sure you travel with water.




## Suggested Field Safety Supplies

- Hard hat
- Vest
- Leather work gloves
- Dust mask*
- Boots/heaved-soled shoes
- Flashlight
- Pocket knife
- Whistle
- Other supplies as necessary


*only offers protection against airborne particulates. Will not filter harmful materials such as carbon monoxide or other hazardous materials.

## Be Aware of Weather Conditions




## Locations and Conditions Vary Widely


Rural


Urban

## There will be Unfamiliar Surroundings

- Traffic signs and other landmarks may nor be standing or could be inundated
- Traditional road maps may not be valid




## Wear Appropriate Shoes and Clothing for the Terrain

## Do not attempt reconnaissance where active efforts are engaged in firefighting or search and rescue.




## Assume Infrastructure Compromised

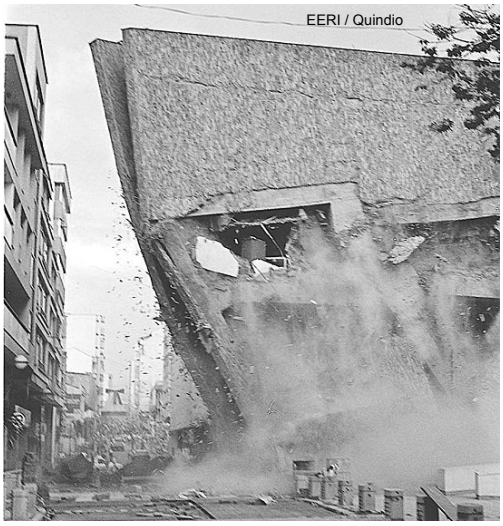
## Assume There Could be Aftershocks

•Heighten awareness of your surroundings

•Unstable structures could include bridges, overpasses, high rises, and water towers

•After an earthquaake of magnitude 5 or larger in California, the USGS posts the probability of strong aftershocks at its website:

http://earthquakes.usgs.gov/






## Manage Your Risk

- Walk Carefully. Common trip hazards include:
  - Downed wire
  - Holes
  - Uneven sidewalks and roads
  - Protruding rebar
- Watch for overhead hazards, particularly dangling live wires

## Manage Your Risk

- Always wear your hard hat
- Always wear boots or hard soled shoes
- Carry a flashlight at all times
- If you have a working cell phone. Carry it with you.




## Manage Your Risk

- Stay in teams
- Make sure fellow team members know your whereabouts to extent practicable
- ALWAYS carry proper identification

## Manage Your Risk

- Never drive and conduct field reconnaissance at the same time
- Do not travel alone. Leave the day's itinerary with other team members.



## Political Environment

- Take accounts of political instability seriously. And if necessary, do not travel to those areas.
- Work closely with in-country colleagues.

## Be Aware of Potential Aftershocks that can Trigger Landslides or Rockfalls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## Carefully Consider Entering Damaged Buildings

- Gather as much information as possible from a safe vantage point
- From outside, visually survey a building or other structure
- Walk around the outside of building before entering to look for signs of instability
- Does it appear to be in imminent danger?


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## Guidelines for Classifying Damaged Buildings as Unstable

- Unsafe buildings have at least one of the following characteristics:
  - May collapse or partially collapse under its own weight
  - Likely to collapse in strong aftershock
  - Ongoing (progressive) lean
  - Ongoing creep or structural deterioration
  - So heavily damaged its stability cannot be determined



## Recommended Days to Wait Before Emergency Entry of Buildings posted UNSAFE, but Stable

| Mainshock Magnitude | Entry for 2 hrs | Entry for 8 hrs | Entry for 24 hrs |
|---|---|---|---|
| *M* = 6.5 or greater | 1 day | 3 days | 8 days |
| *M* =6.0 or greater, but less than 6.5 | 1 day | 2 days | 4 days |
| *M* less than 6.0 | 1 day | 1 day | 2 days |

*From ATC TechBrief#2*

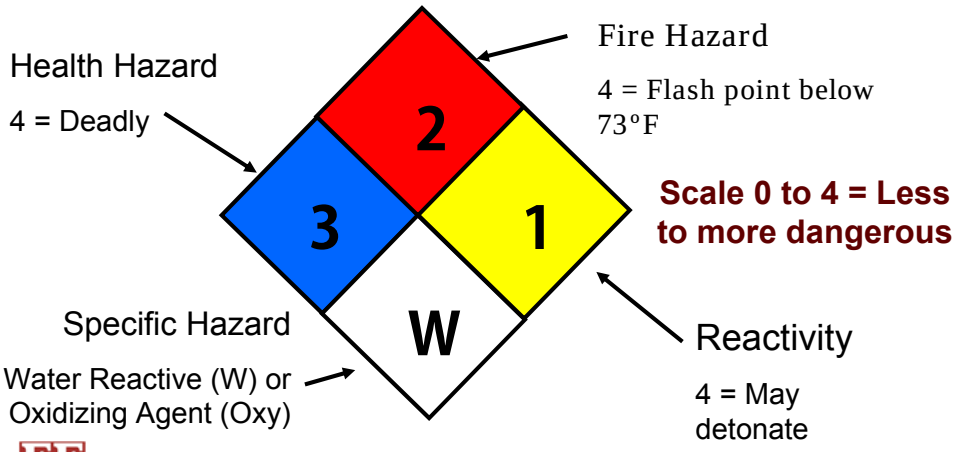
## Even in Structurally Sound Buildings, Nonstructural Damage Can Pose a Significant Hazard



## Nonstructural Hazards Include

- Hanging light fixtures
- Broken water pipes
- Precariously balanced furnishings or equipment

## Be Aware of Potential for Hazardous Materials. If you Smell or See Chemicals, Do Not Enter.






## Sources of Hazardous Materials Releases Include:

- Many large facilities such as hospitals, labs, universities, manufacturing plants, and warehouses
- Underground pipelines, railroad cars, trucking companies
- Downed power line transformers

## Know Your Limits

- Reconnaissance can be stressful
- Long days lead to fatigue, increasing chance of injury and illness
- It is easy to get dehydrated in the field; always carry water
- Try to insure sufficient time for rest



## YOU are ultimately responsible for your own personal safety and security

- EERI bears no responsibility for the safety of investigators serving on investigation teams.
- Each investigator is expected to be aware of the dangers inherent in field investigations and act in accordance with their own personal risk threshold.

# Credits

Material adapted from:

- FEMA Urban Search and Rescue Training Module on Safety for the Structural Collapse Technician
- ATC TechBrief #2

Photos from:

- EERI slide and photo collections
- NISEE, UC Berkeley
- IIEES, Tehran, Iran