

Earthquake Scenario Committee

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*Progress Report and
Recommendations to the
Alaska Seismic Hazards Safety Commission*

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Mission Statement

The Earthquake Scenario Committee will develop, regularly report progress on, and present to the Commission plans for funding and conducting scientifically credible earthquake planning scenarios in areas of high earthquake risk in Alaska as a basis for mitigation and preparedness planning.

Types of earthquake scenarios

Planning scenario

A collaborative process resulting in a document that describes in detail a credible earthquake event, its physical effects, likely impacts to people and infrastructure, and estimated losses. A planning scenario will provide the information necessary to prevent casualties, reduce property losses, and efficiently respond to earthquake emergencies.

Response scenario

A collaborative process that begins with a hypothetical event, ideally the outcome of a planning scenario, and develops plans and procedures to respond to the likely impacts. A response scenario may include an earthquake-response exercise in which these plans and procedures are tested and practiced.

Elements of an earthquake planning scenario

1. Description of the earthquake source event
2. Description of the probable seismic, geologic, and induced effects
3. Description of engineering effects
4. Casualty and loss estimations
5. Recommendations for mitigation and preparedness

1. Description of the earthquake source event

- Location and geometry of fault
- Past earthquakes (historic and paleoseismic)
- Rupture area, sense and amount of displacement (moment magnitude)
- Nature and amount of surface displacement, if any
- Time of year, and time of day of earthquake occurrence
- Probabilistic estimate of warm versus cold conditions
- Likelihood of occurrence

2. Description of the probable seismic, geologic, and induced effects

- Duration and dominant period of shaking
- Spectral and peak ground accelerations
- Directivity
- Distribution of ground motions/intensities
- Earthquake-induced landslides and snow avalanches
- Liquefaction and sensitive-clay failures
- Tsunamis
- Induced effects: Fire, flooding, hazardous materials release

4. Casualty and loss estimation

- Description of methodology (HAZUS, VRISKMAP, other)
- Economic losses resulting from impacts to facilities and systems
- Deaths and injuries
- Indirect business and socioeconomic losses (e.g., business continuity, failures)

5. Recommendations for mitigation and preparedness

- Land-use planning
- Building code revision
- Seismic retrofit
- Facilities management
- Emergency response planning

Resources Needed

- Seismic & geologic data on earthquake sources
- Detailed geologic map of affected area showing seismic soil types
- Subsurface geologic and geophysical data (e.g., shear wave velocities) if available
- Site response map if available
- Tsunami inundation map if coastal
- Infrastructure data: Inventory of facilities and their vulnerabilities based on age, structure type, and materials used
- Population & demographic data for affected region
- Engineering analysis of scenario impacts on facilities, performed on classes of structures (not necessarily individual structures)
- Loss estimation software (e.g., HAZUS, VRISKMAP)
- Qualified personnel to run loss estimation
- Scenario manager and point contact person

Possible Sources of Support

- State CIP funding (DNR or DHS&EM)
- EERI funding and participation
- Local governments (in-kind and monetary)
- USGS/NEHRP funding
- Private sector (in-kind), ideally through partnerships like CREW
- Volunteers

Recommendations to Commission

1. Select and prioritize target scenario events (urban vs. rural)

URBAN AREAS

- **Castle Mountain fault** – Mat-Su Valley, Municipality of Anchorage
- **Fairbanks seismic zone** – Fairbanks, North Pole, military bases, UAF
- **Cook Inlet blind thrust faults** – Anchorage, Kenai, Tyonek, Cook Inlet oil & gas facilities
- **Prince William Sound subduction zone** – Anchorage, Kenai Pen., PWS; oil terminal, Cook Inlet oil & gas, Alaska RR, Port of Seward
- **Benioff Zone (slab) beneath Anchorage** – Anchorage, Kenai Pen., Mat-Su; Cook Inlet oil & gas, Alaska RR, highways

Recommendations to Commission

1. Select and prioritize target scenario events (cont'd)

RURAL AREAS

- **Fairweather fault** – Sitka, Yakutat, Pelican, Elfin Cove; fisheries
- **Narrow Cape fault** – Kodiak Island, USCG base, Narrow Cape facilities; fisheries
- **Western Denali fault** – Parks Highway, Denali Borough, Alaska RR, and Denali NP
- **Rude River fault** – Cordova & Valdez; oil terminal, fisheries
- **Johnstone Bay fault** – Seward, Chenega Bay; Alaska RR, Port of Seward
- **Yakataga seismic gap** – Yakutat Borough, Cordova, Valdez?; tsunami
- **Aleutians 1938 zone plus Shumagin gap** – Aleutians East, SW AK Peninsula; fisheries, local & exported tsunamis
- **Northern Alaska Range foothills thrust belt** – Delta Jct., Denali Borough, Dot Lake, Tok; TAPS, Alaska RR, Parks Hwy, Rich Hwy

Recommendations to Commission (continued)

2. Research what mitigation efforts have resulted from previous scenarios (e.g., Hayward fault, Seattle fault)
3. Develop scenario budget request for state funding
4. Pursue potential funding sources
5. Coordinate with DHS&EM to assist in scenario planning
6. Contact potential sources of in-kind and volunteer support
7. Develop private sector partnership like CREW (Cascadia Region Earthquake Workgroup)

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