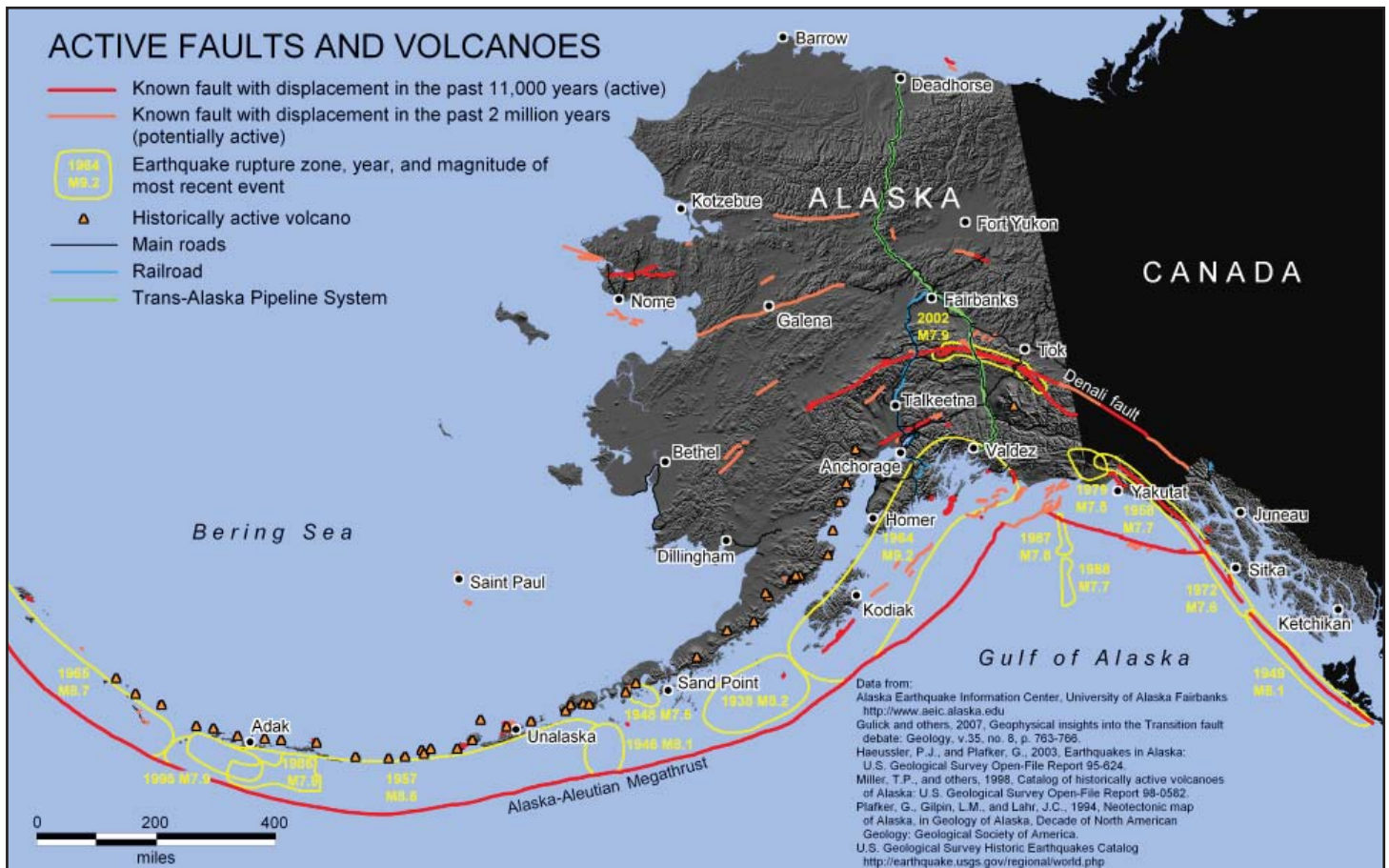


Alaska Seismic Hazards Safety Commission

Report to the Governor and State Legislature
April 4, 2008



Alaska's active faults, major historic earthquake rupture zones, and volcanoes.

ALASKA SEISMIC HAZARDS SAFETY COMMISSION
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EXECUTIVE SUMMARY

This third report to the Governor and Legislature from the Alaska Seismic Hazards Safety Commission (ASHSC) reiterates the priority issues and goals of the Commission and identifies its 2007 accomplishments. The report updates the history and status of the Commission, identifies the current membership, lists the accomplishments to date, describes various committee functions, and updates the Commission's recommendations to improve seismic safety in Alaska.

The Commission operates under the powers and duties prescribed by its enacting legislation (see attachment) and is guided by its Charter (see attachment) which provides a clear understanding of its roles and expectations, empowered Commission members, and provided operating guidelines.

During the past year the Commission has requested numerous agencies to give presentations describing their approaches to seismic risk mitigation. These briefings have provided the members of the Commission with opportunities to gain an understanding of current programs and various approaches to seismic risk mitigation, identify areas of concern, and to focus initial mitigation efforts in these areas. These briefings are available for viewing on the Commission website.

The Commission's efforts in 2007 have reinforced its belief that seismic risk mitigation issues can be addressed in an economical way that will result in improving the quality of life and public safety in Alaska. The Commission continues to address the following policy recommendations:

- Structural stability of critical facilities
- Earthquake insurance necessity and availability
- Approaches to seismic risk mitigation in future construction
- Response and recovery practices to mitigate future seismic risk
- Hazard identification and public education

These policy recommendations are currently being addressed through the following standing committees:

- Insurance
- Schools
- Earthquake Scenarios
- Education and Outreach
- Hazards Identification
- Response, Recovery, and Loss Estimation
- Post-earthquake Planning
- Partnership

The 2007 activities of these committees are described in more detail in subsequent paragraphs.

Our basic public-policy goal areas remain unchanged from the 2006 Commission report:

- Education
- Guidance
- Assistance
- Implementation

INTRODUCTION

The Alaska Seismic Hazards Safety Commission (“the Commission”) is charged by statute (AS 44.37.067) to recommend goals and priorities for seismic hazard mitigation to the public and private sectors; recommend policies to the governor and the legislature, including needed research, mapping, and monitoring programs; review the practices for recovery and reconstruction after a major earthquake; recommend improvements to mitigate losses from similar future events; and to gather, analyze, and disseminate information of general interest on seismic hazard mitigation, among other duties to reduce the state’s vulnerability to earthquakes. The Commission consists of eleven members appointed by the Governor from the public and private sectors for three-year terms. It is administered by the Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS).

Commission members include: A representative from the University of Alaska, three representatives from local government; a representative from the Department of Natural Resources; a representative of the Department of Military and Veterans’ Affairs; a representative from an appropriate federal agency; a representative of the insurance industry; and three members of the public who are experts in the fields of geology, seismology, hydrology, geotechnical engineering, structural engineering, emergency services, or planning. Six members constitute a quorum. The Commission membership elects its own chair and vice-chair. There is no executive director, although DGGS provides administrative, travel, and publication support.

History and status of the Commission

In 2002, the 22nd Alaska Legislature passed, and the Governor signed into law, House Bill 53 establishing the Alaska Seismic Hazards Safety Commission with nine members. The legislation originally placed the Commission in the Office of the Governor, but in January 2003, Governor Frank Murkowski issued Executive Order Number 105 transferring the Commission to the Department of Natural Resources. Governor Murkowski appointed nine members to the Commission in 2005.

In 2005, the House of Representatives passed House Bill 83 (HB 83) to extend the Commission to June 30, 2008, add tsunami risks to its purview, and provide two additional Commission members representing local government. In 2006, the Senate passed a substitute version of HB 83 including the addition of two local government members but lacking specific mention of tsunamis in the Commission’s powers and duties. The Senate bill extended the Commission through June 30, 2012. The House concurred with the Senate version and Governor Murkowski signed the bill into law at a Commission meeting on June 16, 2006. Although the current statute does not specifically include tsunami hazards in the Commission’s powers and duties, the definitions in AS 44.37.069 include tsunami inundation as a seismic hazard. Consequently the Commission addresses tsunamis in its discussions and recommendations.

The Commission first met on October 28, 2005, at which time it elected a Chair and Vice Chair, listened to briefings from the California Seismic Safety Commission and various state and local agencies in

Alaska with responsibilities in earthquake-risk mitigation, and began developing goals and priorities for its activities. There were twelve meetings of the Commission through December 2006, six of which were via teleconference. In 2007, the Commission held nine meetings, seven of which were via teleconference. The Commission published its first report to the governor and legislature on April 18, 2006, and its second report on March 16, 2007. A Commission website posts basic information about its mission, earthquake risk in Alaska, meeting agendas, minutes, presentations, and appropriate links. The website address is:

http://www.dggs.dnr.state.ak.us/seismic_hazards_safety_commission.htm

In 2007, Governor Sarah Palin appointed two members to fill vacancies, and reappointed a third whose term had expired. All eleven positions are currently occupied.

Membership

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John L. Aho	Chair, Public member	CH2M HILL 301 W. Northern Lights Blvd. #601 Anchorage, Alaska 99503 Phone (907) 230-2432 Email: John.Aho@ch2m.com
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EARTHQUAKE RISK IN ALASKA

Scientists have long recognized that Alaska has more earthquakes than any other region of the United States and is, in fact, one of the most seismically active areas of the world (see fig. 1). The second largest earthquake ever recorded shook the heart of southern Alaska on March 27th, 1964, with a magnitude of 9.2. The 1964 earthquake was slightly larger than the magnitude 9.0 Sumatra-Andaman Islands earthquake that devastated northern Sumatra in December 2004 and generated a tsunami that

killed more than 280,000 people. The largest on-land earthquake in North America in almost 150 years occurred on the Denali fault in central Alaska on November 3, 2002.

Thousands of earthquakes were recorded in 2007, including an unusual sequence of events northeast of the Brooks Range (see fig. 2) and a major earthquake in the Andreanof Islands region (see fig. 3):

The Alaska Earthquake Information Center (AEIC) recorded an unusual sequence of earthquakes northeast of Brooks Range in April 2007. The sequence started with a few minor events (magnitude 3+) on April 8th. The largest earthquake (M5.0, large red star) occurred on April 28 at 5:20 UTC (April 27, 9:20 pm ADT). As of the end of April, AEIC had located 75 events in the area (white circles). Four events had magnitudes greater than 4.3 (red stars). A few events were felt in Kaktovik, 37 miles (60 km) NE of the earthquake source area. Because of sparse seismic network coverage in the area (the nearest station is 152 miles away), accuracy of the earthquake locations is poor, especially for the smaller events recorded by very few stations.

Seismicity in this region is characterized by a diffuse zone of activity extending from northeast Brooks Range across the coastal plain and onto the Beaufort Sea Shelf. In 2006, five magnitude 4+ earthquakes occurred in this general area, with the largest event of M4.6 on February 20, 2006. Focal mechanisms (indicated by the red and white “beach ball”) obtained from the waveform modeling for the 2006 and 2007 events are consistent with left-lateral strike-slip motion along this NE-trending zone of seismicity, indicating that the northeast Brooks Range is moving northward relative to the lowland to the west.

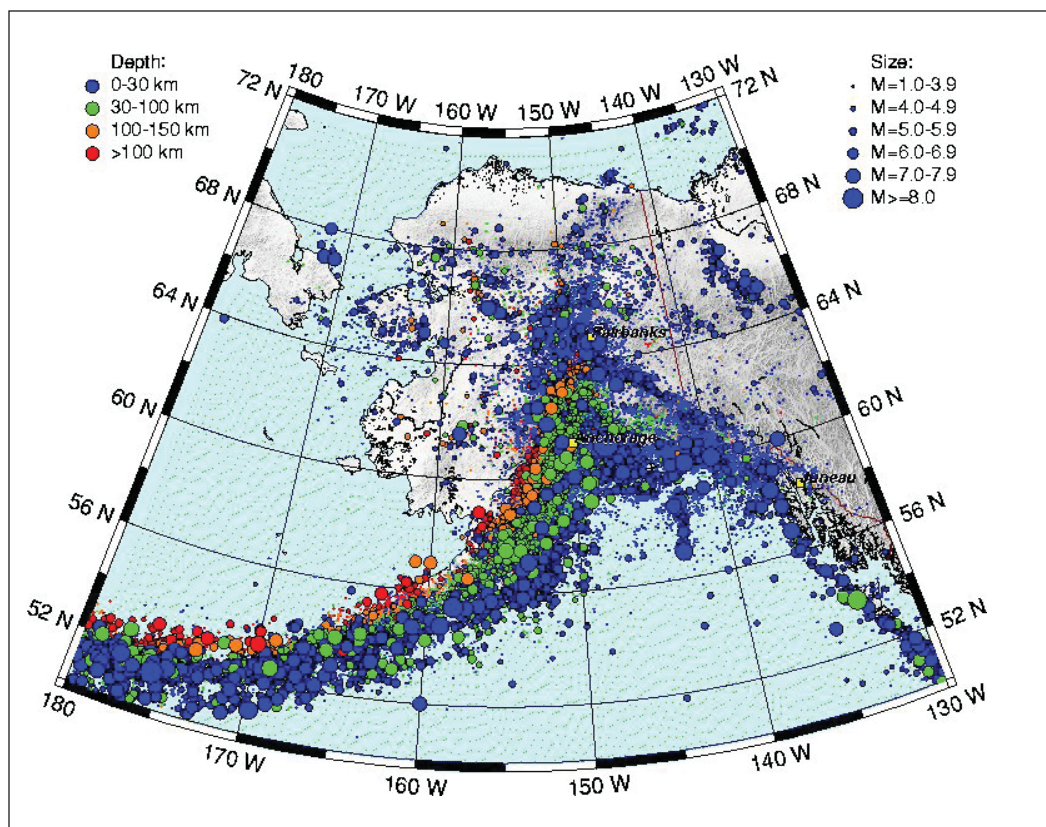


Figure 1. All recorded earthquakes in Alaska from 1898 to the present. Symbol size indicates earthquake magnitude and color indicates depth.

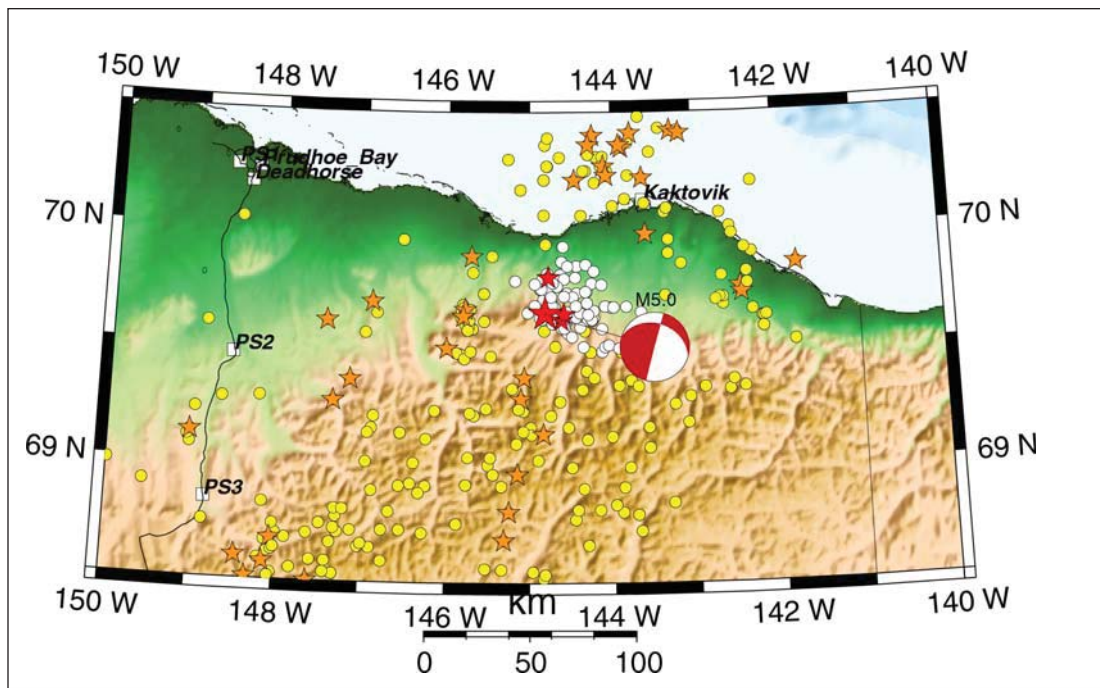


Figure 2. April 2007 earthquakes northeast of Brooks Range. Yellow circles - background seismicity; orange stars - past M4+ events; white circles - April 2007 events; red stars - M4+ April 2007 events. Beach ball indicates focal mechanism of the largest event.

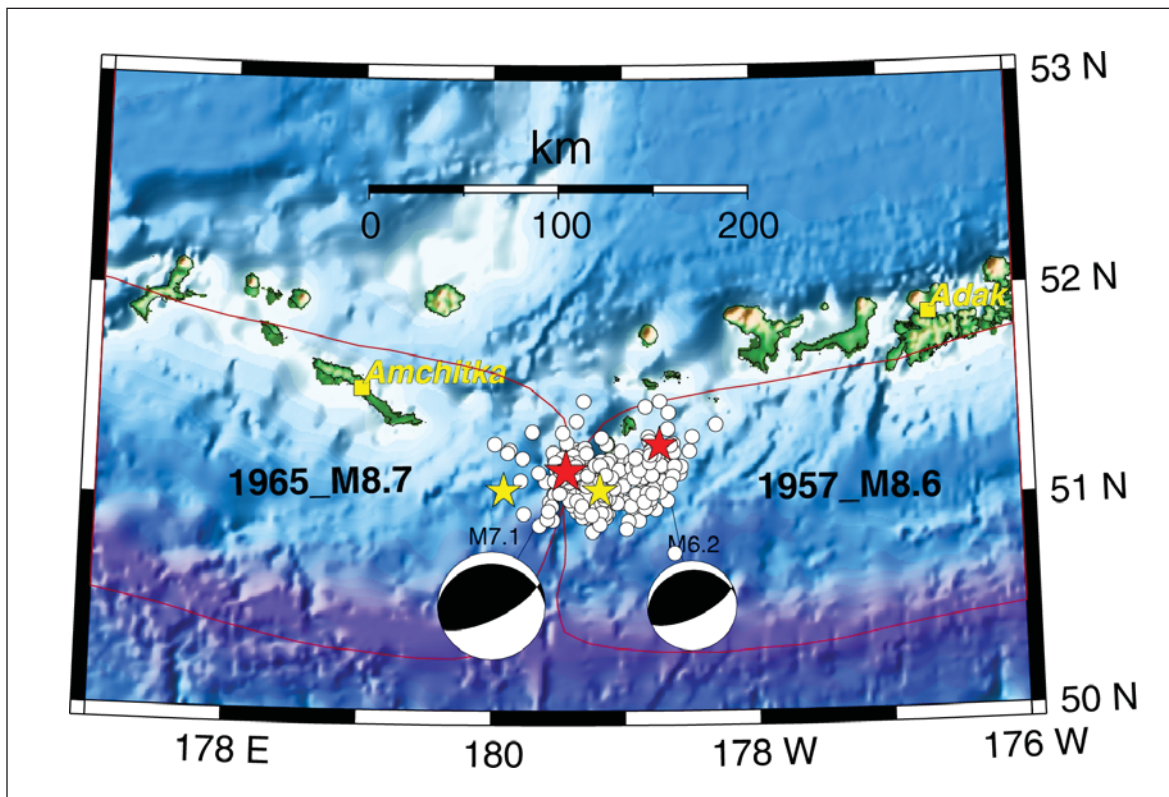


Figure 3. December 19, 2007, M7.1 Andreanof Islands earthquake and aftershocks. Beach balls depict focal mechanisms of the two largest events.

A major earthquake, magnitude 7.1, occurred in the Andreanof Islands region of the Aleutian Islands on December 19, 2007 at 12:30 am AKST (9:30 UTC) (largest red star on fig. 3). The epicenter was 116 kilometers (73 miles) ESE of Amchitka and 209 km (130 miles) WSW of Adak. It was felt strongly on Adak, but did not cause damage. The AEIC located more than 100 aftershocks through December 21 with magnitudes 2.5 and greater (white circles). Of these, ten had magnitudes 5.0 or greater. The largest aftershock (M6.2) occurred on December 20 at 10:24 pm AKST (December 21, 7:24 am UTC). More aftershocks are expected.

The M7.1 earthquake occurred in the area separating the rupture zones of the 1965 M8.7 Rat Islands earthquake to the west and the 1957 M8.6 Andreanof Islands earthquake to the east (approximate extent of the rupture zones is shown in red). The most significant recent earthquakes in the area, M6.6 July 8, 2006 and M6.7 August 2, 2007, occurred to the east and west of the M7.1 event, respectively (yellow stars on fig. 3). The westernmost area of the 1957 fault zone reruptured repeatedly in the 1986 M7.9 and 1996 M7.9 earthquakes. The eastern portion of the 1965 fault zone reruptured recently in a M7.7 earthquake on November 17, 2003.

All these events occurred along the megathrust boundary between the subducting Pacific and overriding North American plates. Within the past ten years, the region shown on the map had an average of two magnitude 6 or greater events per year. The Alaska-Aleutian megathrust, where the two plates are moving directly into one another, is one of the world's most active seismic zones (see fig. 4).

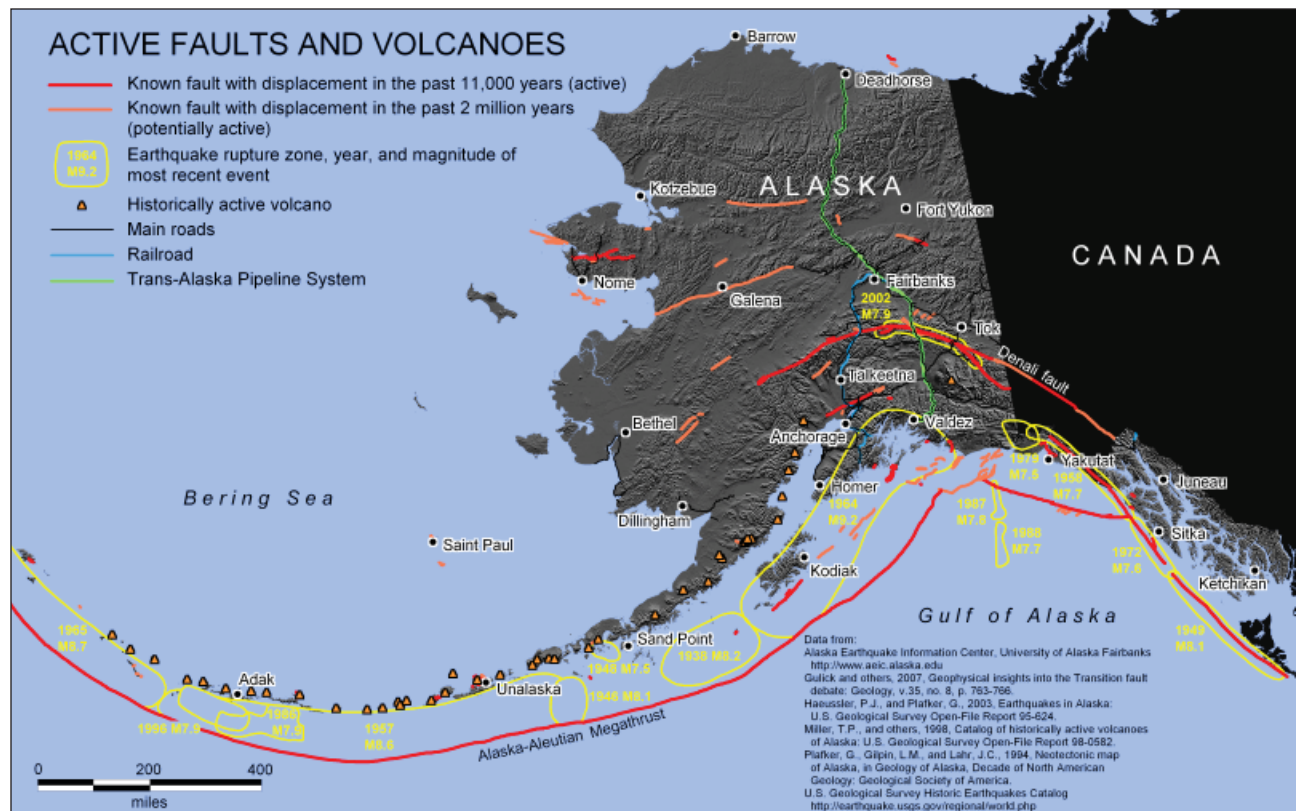


Figure 4. Alaska's active faults, rupture zones, and volcanoes.

Some additional earthquake statistics for Alaska

- Eleven percent of the world's recorded earthquakes have occurred in Alaska.
- Alaska has more frequent earthquakes than the entire rest of the United States.
- Three of the eight largest earthquakes in the world were in Alaska.
- Seven of the ten largest earthquakes in the United States were in Alaska.

Since 1900, Alaska has had an average of:

- One "great" earthquake (magnitude 8) or larger earthquake every 13 years
- One magnitude 7 to 8 earthquake every year.
- Six magnitude 6 to 7 earthquakes per year.
- Forty-five magnitude 5 to 6 earthquakes per year.
- Three hundred twenty magnitude 4 to 5 earthquakes per year.
- About 1,000 earthquakes recorded in the state each month.

It is not possible to predict the time and location of the next big earthquake, but the active geology of Alaska guarantees that major damaging earthquakes will continue to occur. Scientists have estimated where large earthquakes are most likely to occur, and the probable levels of ground shaking to be expected throughout the state. With this information, as well as information on soil properties and landslide potential, it is possible to estimate earthquake risks in any given area. It is also possible to estimate the potential for earthquakes to generate tsunamis, and to model the extent to which tsunamis will inundate coastal areas.

The Federal Emergency Management Agency¹ estimates that with the present infrastructure and policies, Alaska will have the second highest average annualized earthquake-loss ratio (ratio of average annual losses to infrastructure) in the country. Reducing those losses requires public commitment to earthquake-conscious siting, design, and construction. The Seismic Hazards Safety Commission is committed to addressing these issues. Earthquake-risk mitigation measures developed by similar boards in other states have prevented hundreds of millions of dollars in losses and significant reductions in casualties when compared to other seismically active areas of the world that do not implement effective mitigation measures.

COMMISSION ACCOMPLISHMENTS IN 2007

General

- Held seven telephonic and two face-to-face meetings of the Commission.
- Held a joint meeting with the Local Emergency Planning Committee Association (LEPCA) and gave a Commission activity update to the State Emergency Response Commission (SERC)
- Expanded the Commission website to include Commission presentations and briefings
- Heard briefings on seismic risk reduction and current research from eight individuals representing external organizations
- Developed and published second annual report to governor and legislature in March 2007
- Completed the Charter outlining Commission vision, mission, and values for signature by all members (see attachment)

¹HAZUS 99 Estimated Annualized Earthquake Losses for the United States, Federal Emergency Management Agency Report 366, September 2000.

- Developed two new standing committees: Post-earthquake Planning and Partnership
- Continued work associated with the existing six standing committees: Insurance, Schools, Earthquake Scenario, Education and Outreach, Hazards Identification, and Response, Recovery and Loss Estimation
- Added two new members as replacement for members whose terms had expired
- Commissioner Rod Combellick was appointed as a member to a United States Geological Survey (USGS) steering committee addressing earthquake scenario training

Policy Recommendations

- Assess the structural stability of critical facilities
- Address the importance of earthquake insurance
- Address approaches to seismic risk mitigation in future building construction
- Address response and recovery practices to mitigate future seismic risk
- Address hazard identification and public education

The following Standing Committees are now functional with chairpersons named and members assigned

- Insurance
- Schools
- Earthquake Scenario
- Education and Outreach
- Hazards Identification
- Response, Recovery, and Loss Estimation
- Post Earthquake Planning
- Partnership

ONGOING COMMISSION ACTIVITIES

Insurance Committee

A 1985 Federal Emergency Management Agency (FEMA) document titled “Earthquake Insurance: A Public Policy Dilemma” examined the issues and problems associated with the availability and procurement of earthquake insurance. This dilemma has touched residents of Alaska with the announcement that the number two carrier, with slightly more than 21% of the Alaska earthquake insurance market, recently announced that it is withdrawing its optional earthquake coverage nationwide. Many previously insured Alaska residents are now without property earthquake insurance. The need for residential earthquake insurance has been shown from many past earthquakes (see fig. 5).



Figure 5. *Shaking damage to residential facilities from the 1989 Loma Prieta, California, earthquake.*

In the effort to address the loss of earthquake insurance carriers in the State the ASHSC Insurance Committee is currently examining the following approaches to addressing the problem:

- Adopting and enforcing cost effective, universal building codes for new structures as well as rehabilitation of existing structures
- Coordinated disaster planning between insurance companies and local, state and federal governments
- Enactment of properly constructed state catastrophe funds and pools
- Public awareness and participation by Alaskans who prepare and insure themselves as distinguished from sole dependence on government programs
- Provide incentives for mitigation efforts
- Creation of federal natural disaster legislation supporting insurers and re-insurers to help stabilize the market

The Committee is also currently examining the potential for holding a workshop to include earthquake experts, insurance carriers, and stakeholders at which current issues related to earthquake insurance can be addressed.

Schools Committee

The Commission considers the safety of children in Alaska’s schools during a major seismic event of paramount importance. The Schools Committee has concentrated their initial efforts on the identification of potentially at-risk school facilities and is currently developing tasks for future consideration. The committee’s goals include mitigating the potential for damage as shown in figure 6. The Committee’s approach will also include extensive interaction with stakeholder’s groups.



Figure 6. *Earthquake shaking damage to West Anchorage High School from the 1964 great Alaska earthquake.*

Basic steps in the Committee's work include:

- Identifying previously accomplished surveys, studies, and retrofit actions (Kodiak is a prime example of successfully addressing the seismic retrofit of at-risk school facilities)
- Identifying legislation and other key factors affecting design and construction
- Examining current plan review and inspection procedures
- Examining building code provisions relating to seismic design of school facilities
- Identification of at-risk facilities
- Identifying and interviewing stakeholders
- Developing conclusions and recommendation for the way forward

Future tasks will include: (1) inventory methodology, (2) recommended next steps, (3) implementation strategies and policies, and (4) examine potential funding sources.

The ultimate goal of the Committee is to suggest a program or system to provide guidance, technical expertise, support, and resources for Alaska's school districts to address at-risk facilities.

Earthquake Scenario Committee

The mission of the ASHSC Earthquake Scenario Committee is to present plans for funding and conducting scientifically credible earthquake scenarios in areas of high earthquake risk in Alaska as a basis for mitigation and preparedness planning.

The committee is currently concentrating their efforts on "planning scenarios," which will provide the information necessary to prevent casualties, reduce property losses, and efficiently respond to earthquake emergencies.

The elements of an earthquake planning scenario include:

- Description of the earthquake source event
- Description of the probable seismic, geologic, and induced effects
- Description of engineering effects
- Loss estimations
- Recommendations for mitigation and preparedness

The Earthquake Engineering Research Institute (EERI) has noted in a document titled "An Overview of Scenario Planning" that: "A well crafted scenario provides a powerful tool for members of private industry, government officials, and the general public to begin to draft mitigation policies and programs."

Commissioner Rod Combellick is currently serving on a national United States Geological Survey (USGS) steering committee that is addressing earthquake scenario development training.

Education and Outreach Committee

Initial ASHSC Education and Outreach Committee efforts will be to focus on legislators, the governor, administrative agencies, local governments, local emergency planning committees, and industry groups. The Committee strives to avoid duplicating efforts by other groups with responsibility for addressing earthquake education and outreach.

The Committee is currently prioritizing the following future deliverables:

- Periodic press releases addressing Commission activities or interesting facts relating to seismic risk mitigation
- Periodic newsletter to the governor and legislators
- Regular interaction with the local emergency planning committees
- Regular update and promotion of the ASHSC website as a source of seismic risk mitigation information
- Develop a directory of speakers with an expertise in seismic risk mitigation issues
- Develop a media education package with materials to explain basic seismic risk information to students and the public (see for example fig. 7)
- Develop potential model legislation

The Committee does not want to understate the importance of public education and outreach but believes that interaction with the groups noted above will provide the greatest future returns.

Hazards Identification Committee

Previous authors have noted that any earthquake loss reduction program entails three basic elements: (1) understanding the nature and extent of the earthquake risk, (2) taking actions to reduce that risk,

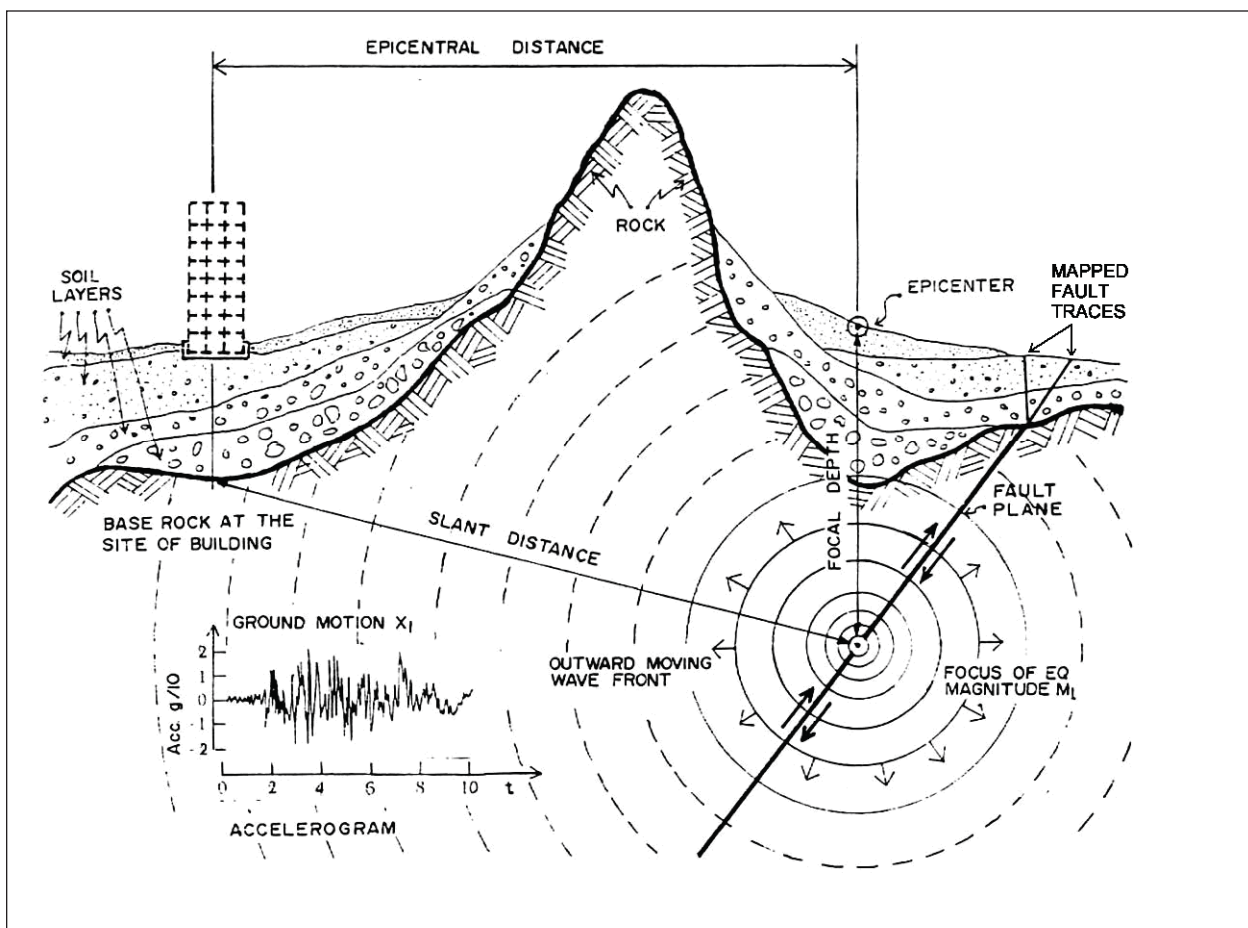


Figure 7. This illustration graphically describes various earthquake terms commonly used by the news media.

and (3) establishing policy to guide the development of effective earthquake risk reduction programs. The purpose of the ASHSC Hazards Identification Committee is to address item 1 above.

Goals of the Committee include:

- Identification and characterization of the seismic hazards
- Definition and description of the seismic risks
- Promotion and encouragement of seismic risk and hazard research
- Dissemination of seismic hazard and risk information to state and local governments, the public, business and industry, and the scientific and professional communities

The Commission believes that with proper identification of the earthquake hazards, potential earthquake damage can be reduced by: (a) taking account of earthquake hazards in land-use decisions, (b) using appropriate engineering design and construction to reduce the hazard, and (c) involving the communities in earthquake preparedness programs.

Response, Recovery, and Loss Estimation Committee

One of the powers and duties assigned to the commission by enacting legislation is to “offer advice on coordinating disaster preparedness and seismic mitigation activities of government at all levels, review the practices for recovery and reconstruction after a major earthquake, and recommend improvements to mitigate losses from future similar events.”

The ASHSC Response, Recovery, and Loss Estimation Committee, chaired by the Commission member from the Division of Homeland Security and Emergency Management, will address such tasks as:

- The need for an integrated approach to building design, land use, and emergency planning
- Creation of standard protocols for the various functions necessary in managing an earthquake disaster
- Address warning systems and the appropriate distribution of warnings
- Develop an understanding of the recovery process
- Address the provision of shelter and relief supplies

Important issues to be addressed prior to a damaging earthquake include the approaches to be used for victim extraction and debris removal. These are often areas that are neglected in earthquake risk reduction planning.

For example, development of a local guidance plan for debris removal is important. This would include pre-disaster agreements with public and private equipment and service providers and identification of disposal sites.

The Committee will develop work tasks for their efforts in 2008.

Post-Earthquake Planning Committee

The tasks associated with the ASHSC Post-Earthquake Planning Committee are currently being developed. The purpose of the Committee is to recommend future deliverables that will be developed in advance and made available during the window of opportunity after a major seismic event when public and legislative interest is high. The deliverables might address specific response approaches based on the size of the event and resultant damages.

Partnership Committee

Legislation establishing the Commission charges it to “establish and maintain necessary working relationships with other public and private agencies.” The purpose of the ASHSC Partnership Committee is to investigate potential relationships.

The commission recently heard a presentation by a member of the Cascadia Region Earthquake Workgroup (CREW) in the Pacific Northwest. CREW is a good example of how a coalition of private and public representatives working together can improve the ability of communities to reduce the effects of earthquakes.

The basic goals of developing partnerships are to:

- Promote combined efforts to reduce the loss of life and property
- Conduct education efforts to motivate key decision makers to reduce risks associated with earthquakes
- To foster productive linkages between scientists, critical infrastructure providers, businesses, and government agencies in order to improve the viability of communities after an earthquake event.

SEISMIC-RISK ISSUES BEING ADDRESSED BY THE ALASKA SEISMIC HAZARDS SAFETY COMMISSION

The following issues relating to seismic risk mitigation have served as a guide to developing the path forward for the Commission and for the formation of standing committees.

1. Assess the Structural Stability of Critical Facilities

Description of the Issue: Some existing critical buildings in the state may not be constructed in a manner to withstand future earthquake and tsunami events. A specific concern is school buildings. Hospitals, clinics, and fire, rescue and police stations across the state are also vulnerable to failure. Also at possible risk are large Federal, State and private complexes such as military bases, Coast Guard stations, airports, college campuses, harbors, power-generating stations, communication centers, water and waste-water treatment facilities, jails and detention facilities, pipelines, and highways and bridges.

Importance of the Issue: If attention is not brought to bear on this issue before a damaging earthquake or tsunami, communities in the State could see massive structural failure of important community facilities, resulting in human casualties, economic loss, and environmental damage. Furthermore, Alaska’s remote nature and extreme weather conditions can cause delays in response efforts and put displaced building occupants at severe risk from exposure. Adequate preparedness is imperative to timely rapid response and recovery from a significant seismic event.

Benefits of Addressing the Issue: Some private and public entities have taken important steps to improve the seismic resistance of key facilities and infrastructure. For example, prior to constructing the Trans-Alaska Pipeline System, Alyeska hired geologists and engineers to specifically address seismic hazards. The resulting design and earthquake-resistant construction prevented the spillage of any oil during the M7.9 Denali fault earthquake of November 3, 2002. The Alaska Department of Transportation and Public Facilities is undertaking a seismic retrofit program for State-owned

bridges, and is focusing on upgrading bridges that provide critical access to communities. Some boroughs and cities across the State have taken the initiative to identify and begin retrofitting seismically vulnerable school buildings and other essential facilities.

Despite the recency of most construction in Alaska and implementation of modern building codes, many buildings and key infrastructure remain vulnerable due to proximity to seismic hazards, some of which are known and others of which are poorly understood. Building codes continue to change and have been significantly upgraded in the period between 1976 and 1997. The Federal Emergency Management Agency (FEMA) and earthquake consortia such as the Cascadia Regional Earthquake Workgroup (CREW) in the Pacific Northwest have long recognized that addressing the problems prior to a catastrophic event can have long-standing benefits in the future. However, building codes are often inadequately implemented and recommendations of advisory bodies are often ignored.

How the Commission Can/Will Address the Issue: The Commission will encourage mitigation efforts by presenting information about earthquake hazards and risk and suggesting approaches to addressing the strengthening of at-risk critical facilities. Public education must include the correct mix of information on potential damage and suggestions of effective actions to be taken.

2. Address the Importance of Earthquake Insurance

Description of the Issue: Catastrophic natural perils, particularly earthquakes, are unpredictable, relatively infrequent, and can be financially disastrous. Earthquake risk is especially difficult to insure against because insurers are unable to accumulate adequate reserves for such high severity, low frequency losses.

Importance of the Issue: Insurers are unwilling to provide insurance in a market where premium rates are inadequate to create the reserves necessary to pay for damages in the event of a major earthquake. This can create a severe deficiency in availability of insurance as existing insurers withdraw from the market and new insurers are unwilling to enter.

Benefits of Addressing the Issue: Improved pre-loss mitigation efforts, such as retrofitting existing structures, emergency planning to speed post-loss recovery, and actuarially sound earthquake insurance rates encourage additional insurers to enter the market. This in turn improves availability of insurance products and results in more competitive premiums.

How the Commission Can/Will Address the Issue: The Commission can encourage development of public-private partnerships that provide education and mitigate the potential impact of future events. We will examine the seismic-hazard information needs of the insurance industry and provide recommendations for improvement.

3. Approaches to Seismic Risk Mitigation in Future Building Construction

Description of the Issue: Sustainable development entails maintaining environmental quality, improving a community's quality of life, and fostering social equity while maintaining a healthy economy. Therefore, sustainable development includes incorporating disaster resilience and mitigation into a community's decisions and actions. Building codes normally have a performance goal of life safety, which is considered a minimum safety level, but are typically the maximum level to which buildings are designed. Codes do not adequately address the effects of ground failure, ground-shaking amplification, or provide guidance to designers and construction contractors.

Importance of the Issue: Communities need to know the potential earthquake risk and impacts at a structure site and should implement appropriate standards to mitigate the identified risk so new buildings are not subjected to the effects of massive ground failure and strong ground shaking.

Benefits of Addressing the Issue: The results of addressing the issue are more effective mitigation and an assurance that countermeasures are not only adequate but the cost of implementation is not prohibitive.

How the Commission Can/Will Address the Issue: The Commission will encourage continued Federal, State, and private partnerships in updating ground failure susceptibility mapping of Anchorage, ground shaking characterization in high-risk Alaskan communities, and determination of structural response of buildings and bridges. We will work with the technical community and the construction industry to inform, educate and work with communities to provide guidance to improve building and land-use codes.

4. Response and Recovery Practices to Mitigate Future Seismic Risk

Description of the Issue: Communities don't have a good understanding of the costs and resources needed for response and recovery. First responders to a damaging earthquake in one of Alaska's major cities will be overwhelmed in the initial hours following the event. Damage to transportation systems will make movement of people and goods difficult. Demand for emergency shelter, food, and water will strain communities' resources. Disruptions to lifeline systems will complicate recovery.

Importance of the Issue: An understanding of response and recovery issues is critical to assessing the impacts to State and local resources.

Benefits of Addressing the Issue: Implementing effective response and recovery practices will reduce economic and social costs of recovery and will help mitigate risks from future events.

How the Commission Can/Will Address the Issue: The Commission will promote and assist in the development and use of "earthquake planning scenarios" to define the impact of future damaging earthquakes and will communicate lessons learned from past events to provide guidance to communities on recovery planning and preparation.

5. Hazard Identification and Public Education

Description of the Issue: A damaging earthquake has not affected a major population region in Alaska since 1964. The majority of the population is unaware of the consequences of a major seismic event. The 2002 Denali fault earthquake (see fig. 4) resulted in relatively minor damage to smaller rural communities but had little effect in larger communities such as Anchorage and Fairbanks. It was evident, during damage assessment evaluations after the Denali fault event, that the residents of the smaller at-risk communities had little understanding of the earthquake hazard, had not implemented measures to mitigate damage, and were unprepared to respond to the consequences of damage. It is important that the population of Alaska be aware of the earthquake hazard and be informed of the measures that can be taken to mitigate risk.

Importance of the Issue: There is a high probability that Alaskans will experience the results of a damaging earthquake in the future. All Alaskans will be better prepared to take measures ahead of time to reduce losses and casualties and to respond to the event if they are informed of, and truly understand, the hazard and the resultant risk.

Benefits of Addressing the Issue: An educated public has a greater potential of responding appropriately before, during, and after a damaging earthquake. Improved knowledge and public awareness of hazard and risk can change behavior and lead to more cost-effective mitigation.

How the Commission Can/Will Address the Issue: The Commission will examine the need for greater public investment in identification and assessment of earthquake hazards, and the most effective ways of communicating this information to the public. The Commission will examine and promote the concept of seismic resilience of communities, addressing reduced failure probabilities, reduced consequences of failure, and reduced time to recovery.

6. Recommended Public-policy Goals of the Commission

- a. Education
 - Develop an effective public education and outreach program.
 - Convey scientific and technical information from credible authorities.
 - Communicate information in a manner that is understandable by the public.
- b. Guidance
 - Provide advice on seismic risk mitigation and recommend policies to improve preparedness.
 - Recommend goals and priorities for risk mitigation to public and private sectors.
 - Recommend needed research, mapping, and monitoring programs.
 - Offer advice on coordinating disaster preparedness and seismic risk mitigation.
- c. Assistance
 - Review seismic and tsunami hazard notifications and recommend appropriate response.
 - Review predictions and warnings and suggest appropriate responses.
- d. Implementation
 - Establish and maintain working relationships with other private and public agencies.
 - Gather, analyze, and disseminate information.
 - Conduct public hearings.
 - Appoint committees from Commission membership and/or external advisory committees to address risk mitigation issues.
 - Accept grants, contributions, and appropriations.

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