



## **EMERGENCY RESPONSE IN THE GREAT HANSHIN-AWAJI EARTHQUAKE OF JANUARY 17, 1995: PLANNING, MOBILIZATION AND INTERORGANIZATIONAL COORDINATION**

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### **ABSTRACT**

The Hanshin Awaji earthquake is one of the most significant natural disasters to occur in an urban region this century. In this paper, interviews with representatives of local jurisdictions, documents, after action assessments and recently released reconnaissance reports are the bases for observations and commentary on emergency response by local, prefectural and national government agencies. The response effort was the subject of considerable controversy and public debate surrounding the inability of local agencies to gain a rapid assessment of the earthquake's impact and extent of damage, delays in mobilization of resources and the lack of adequate planning for a major earthquake. After brief summaries of several key response activities, the issues raised after the earthquake are examined.

### **KEYWORDS**

Emergency Response, Planning, Mobilization, Interorganizational, Coordination, Public Safety, Preparedness

### **INTRODUCTION**

As we pass the mid-point of the International Decade for Natural Disaster Reduction, our inclination is to emphasize the genuine strides which have been made in both developed and developing nations toward greater seismic safety through improved planning, greater public awareness and preparedness, stricter building codes and design standards and improved response and recovery capabilities. Indeed, progress has been significant on many of these fronts, nevertheless, the fact remains that we continue to be vulnerable, even in the most technologically advanced nations, to forces which have catastrophically impacted our societies for millennia.

On January 17, 1995 a major earthquake struck the Kansai region of Japan, killing 6,308, causing injury to 41,527, displacing several hundred thousand from their homes and causing an estimated \$100 billion in losses. The earthquake had a devastating impact on urban infrastructure—215,000 residential structures collapsed, burned or sustained serious damage, over 3,675 commercial and government buildings were damaged or destroyed, the Port of Kobe suffered major damage and the region suffered major utility outages including 1.3 million households which lost water, 860,000 lost gas, 2.6 million lost electricity and 300,000 experienced loss of telephone service.

The earthquake measured 7.2 on the JMA (Japan Meteorological Agency) scale with a moment magnitude of 6.9. The epicenter of the earthquake was located at the northern terminus of Awajishima Island on a right-lateral strike-slip fault which ruptured approximately 60 km to the northeast, directly into the heavily populated Kobe-Nishinomiya-Ashiya area of southern Hyogo Prefecture. The earthquake was shallow at a depth of 8 km and its duration was approximately 10 seconds. The City of Kobe experienced shaking intensities of 7 on the JMA intensity scale (equivalent to Modified Mercalli intensities of X-XI) and peak ground accelerations of .8g; PGA's of .5g to .7g were recorded in the most heavily impacted areas of Nishinomiya and Ashiya Cities. Extensive liquefaction, settlement and permanent ground deformation occurred in the bay margins and on man-made islands offshore.

The earthquake has been given several names; for the purposes of this paper, we have used the term Great Hanshin-Awaji earthquake. A brief digression to explain this varied nomenclature may prove instructive in that assigning names to earthquakes is a sometimes difficult and politically sensitive process. Other names have included: (1) Hyogoken-Nambu (South Hyogo Prefecture earthquake) which represents the geographic location and the "official" name given this event by the JMA, (2) Great Hanshin Earthquake Disaster which emphasizes the catastrophic loss of life and property in the Osaka-Kobe metropolitan region, (3) Great Hanshin-Awaji Earthquake Disaster, the term we have adopted, which recognizes the losses experienced by the rural area of northern Awaji Island as well as in the urban expanse of Hanshin. This name has also been adopted by national and local governmental authorities. (4) Finally, many journalists covering Japan for other nations have used the term Kobe Earthquake, identifying this disaster with the city which sustained the greatest losses (DPRI, 1995).

The examination of response issues including planning, mobilization and interorganizational coordination, which are the subjects of this paper, is based on personal observation carried out in two separate field visits to the area, including the actual experience of the earthquake while in Osaka for a Japan-US Workshop on Urban Earthquake Hazard Mitigation. The first visit was from January 16-27; the second was from May 27-June 10, 1995. During these field investigations, local government officials were interviewed and many documents including after-action reports, statistical summaries, public information materials, and news reports were assembled and utilized in preparing this paper. The field investigation and data collection were made possible by a grant from the National Science Foundation (NSF Grant # CMS-9521651) and assistance from the Disaster Prevention Research Institute of Kyoto University.

## HAZARD AWARENESS AND RESPONSE READINESS IN HYOGO PREFECTURE

The region which bore the brunt of the Great Hanshin-Awaji earthquake was prepared for the hazards associated with severe winds, typhoon and landslide. Unfortunately, major earthquakes were not among those hazards for which local and prefectural governments and private sector organizations in the Kansai area had prepared. While this lack of preparation may seem like gross negligence in retrospect, a careful examination of the seismic history and tectonic setting of Japan will provide perspective on, though not vindicate, official inaction.

Japan is one of the world's most seismically active regions. The most catastrophic natural disaster to affect this island nation was the Great Kanto earthquake of September 1, 1923 which claimed the lives of approximately 140,000 people in the Tokyo area and caused fires which burned much of the city. Japanese seismologists have warned that this area is the most likely in Japan to experience another catastrophic earthquake and both planning and resources have been concentrated on this region in anticipation of Japan's next "big one." Other major earthquakes in Japan this century include the Shikoku (western Japan) earthquake in 1946 (M8, 1,330 killed), the 1948 Fukui (M7.1, 3,769 dead), and more recently, the July 12, 1993, magnitude 7.8 Okushiri, Hokkaido earthquake and tsunami which claimed 200 lives.

By contrast, the Kansai region had been relatively aseismic prior to January 17, 1995. Historic records indicate that major earthquakes struck the region in 868 and 1596. The 1596 Keicho-Fushimi event caused over 1,100 deaths in Kyoto, Osaka and Sakai and caused the collapse of a large castle tower. Both of these events were believed to have exceeded magnitude 7 on modern magnitude scales. An earthquake of lesser magnitude shook the area in 1896 and the most recent significant event prior to January 17 occurred on November 26,

1916 in the same epicentral area as this most recent earthquake and was estimated to be approximately magnitude 6 (see Kanamori, 1995; Somerville, 1995; UNCRD, 1995). The geographic area most affected by the Great Hanshin Awaji earthquake is a narrow corridor of land approximately 2 to 4 kilometers wide between Osaka Bay and Rokko Mountain in Hyogo and eastern Osaka Prefectures. This area is highly urban with a population in excess of 10 million people in the Kobe-Osaka-Kyoto metropolitan region. The cities which experienced the greatest loss of life and damage in the earthquake were Kobe, Nishinomiya and Ashiya although other cities within Hyogo Prefecture also experienced significant losses.

Thus, the concentration of urban infrastructure and population, the lack of adequate preparation and earthquake readiness of both government and citizenry and the unique geography of the Kansai region combined to create conditions of extreme seismic vulnerability. Upon the occurrence of the earthquake, these three factors proved to be critical in emergency response to the Great Hanshin-Awaji earthquake and the interaction of geography, population density and lack of preparedness produced one of the great emergency response challenges of this century. The tragic events of January 17 and the struggle to cope with the crisis of the following days and weeks are the subject of this paper.

#### JANUARY 17, 1995, 0546: PREVAILING CONDITIONS AND IMMEDIATE NEEDS

The earthquake occurred in the pre-dawn darkness at 5:46 a.m. local time and the immediate response needs were for fire suppression, emergency medical care, large scale search and rescue and, in what would prove to be the most difficult and enduring of needs, shelter and mass care for hundreds of thousands of persons whose homes were destroyed, badly damaged or for whom some combination of damage, utility outage and fear drove them to seek housing elsewhere. Beyond these pressing human and public safety needs, the region experienced enormous transportation problems due to the collapse of elevated expressways, disrupted rail lines, badly damaged port facilities and debris blockage of city streets, a condition particularly acute in the wards and neighborhoods requiring the most immediate response. The extensive disruption of gas, electric, water and waste water utilities created conditions of great hardship for residents of the areas impacted and impeded emergency response.

Safety inspections, cordoning and regulation of access to thousands of damaged and questionably habitable residential buildings was also a pressing need as pedestrians filled the streets below damaged structures, and attempted to remain in, or retrieve possessions from, potentially unsafe residences. The unique geography of the affected region combined with the disruption of many transportation lifelines resulted in limited options for movement of the tremendous number of persons using available streets to leave or enter the area. Consequently, traffic congestion was a severe problem and a major barrier to effective response.

#### OFFICIAL UNDERSTANDING OF THE SITUATION AND EARLY MOBILIZATION EFFORTS

A basic problem experienced in the Great Hanshin Awaji earthquake was the lack of rapid situation assessment at levels of government where critical decisions are made and consequently a sluggish mobilization of resources and delayed initiation of critical response activities. This problem can be traced to many factors including the organization of disaster response in Japan, the lack of preparedness and planning for major earthquakes in the Kansai area, poor coordination among agencies responsible for emergency response, and other factors. In the remainder of this paper, specific response actions and the circumstances under which these activities were performed will be summarized, followed by observations on response issues.

##### *Fire Suppression*

Although planning and preparedness for major earthquakes were deficient in the Kansai area, fire safety in the densely populated and developed urban areas of Japan has been a high public safety priority. The fire departments of the most heavily impacted cities of Kobe, Nishinomiya and Ashiya are modern, well-trained and equipped forces. Water for firefighting comes from the city water systems and is accessible through hydrants as well as underground cisterns maintained for disaster purposes. Fire engines are equipped with hard suction so that additional water can be drafted from Osaka Bay or rivers which transect the area. In addition to full time firefighters (Kobe has 1,298 and Nishinomiya 337), the two most affected cities in the

region, Kobe and Nishinomiya have volunteer fire corps (brigades) numbering 4,000 and 731 persons respectively (Scawthorn and Cowell, 1995; Fire Department of Nishinomiya City, 1995).

There were 294 fires in the Great Hanshin Awaji earthquake, 90% of which occurred in Hyogo Prefecture and the remainder in adjacent Osaka Prefecture. A total of 7,538 houses and commercial buildings were destroyed by fire, an overwhelming majority of which were in Kobe City (Higashi Nada, Nada, Hyogo, Nagata and Suma Wards). In Hyogo Prefecture, 215 or 83% of all fires in the prefecture broke out on January 17 (UNCRD, 1995). These fires had a variety of causes which included ignitions due to damaged electrical appliances and equipment, combustion of volatile materials and gas leaks, and fires due to chemical reaction (Tokyo Fire Department, 1995).

The demands on fire services, particularly those of Kobe and Nishinomiya Cities, greatly exceeded local capabilities and mutual aid assistance from other cities and Self Defense Forces was required to bring fires under control. As in many major fires, community residents engaged in initial fire suppression and contributed significantly to the control of fires which may otherwise have grown into conflagrations. Fire suppression was hampered by numerous breaks in the water supply system which reduced pressure, heavy street traffic due to damage to roads and highways and the tremendous demand for search and rescue as well as firefighting. Fire services in Japan are also responsible for initial disaster reconnaissance and emergency medical assistance which, in this earthquake, placed an even greater burden on the fire services of the Kansai region.

### *Search and Rescue*

The Great Hanshin Awaji earthquake caused the damage or collapse of 394,440 housing units, 100,282 totally collapsed and 108,402 were classified as "half collapsed" (Ministry of Home Affairs, 1995). Many of the houses which collapsed in the earthquake were 30 or more years old, were weakly framed with foundations of unreinforced concrete, used heavy tile ("Kawara") roofs and lacked solid wall partitions. The earthquake occurred in the early pre-dawn hours when most people were at home asleep and, given the vulnerability of these older wooden houses, many people were killed, injured or trapped inside upon the partial or complete collapse of these structures. A great majority of the search and rescue activities focused on these residential buildings and their inhabitants.

Search and rescue activities are the responsibility of local fire services but the tremendous number of people needing rescue and emergency medical assistance required mutual aid from other jurisdictions, the participation of the Self Defense Forces and, most importantly, the rapid actions of residents of the heavily damaged areas. The actual number of total rescues by all who searched can only be estimated since those accomplished by community residents were not recorded, however, based on an investigation conducted by Prof. Murosaki of Kobe University, approximately 20,000 people were trapped in residential structures in the earthquake. About 5,000 rescues or recoveries were made and recorded by the fire services, police and SDF, implying that the remaining 15,000 rescues and recoveries can be attributed to the actions of community residents (see UNCRD, 1995).

Of recorded rescues, most were accomplished by January 23 with the largest number taking place on January 19 (816 rescues), a date which also coincides with deployment of large contingents of SDF, Hyogo Prefectural Police and fire and rescue personnel from other jurisdictions. Older persons were greatly over-represented among those who died in the earthquake or died shortly after being rescued. Fifty-three percent of those who died in the earthquake were 60 years of age or older and the death rate for people 75 and older was ten times that of persons under 40. This high mortality rate for older persons was attributed to their propensity to live in the most earthquake vulnerable housing, to sleep on the ground floor of two-story structures due to the difficulty of climbing stairs and the greater likelihood of disability or reduced physical capacity. Older persons were also more likely to live alone with limited social contacts possibly resulting in longer periods of time before their absence was noticed (UNCRD, 1995).

In the early hours following the earthquake, most rescues were made by community residents including neighbors, family members and others who were nearby. The demands of fire suppression greatly compromised the ability of local fire services to perform search and rescue and mobilization of the SDF and

mutual aid was still 24-48 hours away. The Self Defense Forces, upon activation by the Hyogo Prefectural governor, were able to mobilize a relatively large contingent for a number of different disaster response activities, but were poorly equipped for search and rescue and had little training in large scale disaster search and rescue operations (Securitarian, 1995). In some cases, search and rescue teams were given the locations where searches were to be conducted, but in the field, these teams were often approached by residents who successfully persuaded them to search for their family members or neighbors.

### *Emergency Shelter and Mass Care*

Plans prepared by individual cities and Hyogo prefectural government before the earthquake called for disaster shelters to be set up in public facilities, primarily schools, and also in recreation and senior citizens centers, university buildings and other large capacity buildings. Shelter managers were to have been recruited from the ranks of city employees. The estimated 500,000 people displaced by the Great Hanshin Awaji earthquake was well in excess of the scenarios envisioned by planners for the Kansai region even in the worst possible natural disaster. Thus, plans proved inadequate to rapidly mobilize, open the necessary number of shelters, provide adequate management and, most importantly, provide meals, medical care, sanitation and other necessities of life for the massive number of refugees.

According to statistics compiled by Hyogo Prefecture, 316,678 people were temporarily housed in 1,153 public shelters during the peak demand period of January 20-24 (Hyogo Prefecture, 1995). Those who did not report to shelters found refuge in cars, tents, public parks and, for the more fortunate, in hotels or with friends and family. The need for mass care overwhelmed local governments and available shelters quickly filled as they were opened, many becoming overcrowded. Sanitation was a problem as water and sewer utilities were unavailable and food, medicine, warm clothing, and other basic necessities were in short supply or unavailable. By January 20, conditions began to improve as city officials were able to obtain more accurate estimates of the number of sheltered persons, additional assistance became available with mobilization of the SDF and thousands of volunteers, and with better procedures for procurement and allocation of resources.

Parks, open lots and other areas where displaced persons congregated continued to experience shortages after the first week as local government and other disaster relief organizations focused on the public shelters. There were no official managers at these encampments, nevertheless, indigenous leaders emerged and served as advocates for victims and were often successful in obtaining resources and information. By late August, the number of sheltered refugees had declined to less than 7,000 and local jurisdictions, under pressure to resume school and other public functions, curtailed free feeding programs and closed all remaining shelters on August 20.

### *Emergency Medical Assistance*

The earthquake caused 6,308 deaths, 90% of which were due to crush injuries sustained when residential structures collapsed, the remaining 10% were due to fire and other causes. Of the 41,527 injuries, 1,819 were classified as severe and the remainder moderate and slight. On January 17, hospitals in the impacted region came under heavy demands for treatment but many experienced utility outages which, even in the absence of structural damage, rendered them non-functional except as "field hospitals." Transportation of patients to hospitals and transfer of injured persons from one hospital to another was severely hampered by traffic congestion. Helicopters were sporadically available for medical evacuation and transfer but not reliably so and were subject to severe restrictions and air traffic regulation.

Medical care in the earthquake appeared to pass through several phases (UNCRD, 1995) based on the types of medical problems and the organization of medical emergency response. The first phase involved the initial 36 hours after the earthquake and was characterized by triage and medical evacuation. The emphasis was on the most severely injured patients and their immediate treatment. Between the third and sixth day, mild trauma patients were treated by doctors who visited the shelters as "traveling clinics." A third phase, from the end of the first week until the end of the first month, involved treatment of colds, influenza and other acute diseases at fixed aid stations. The reliable availability of drugs was still somewhat problematic. One to two months after the earthquake, patients were once again being treated for routine and chronic ailments by family physicians who had, by this time, recovered and were once again practicing.

Mental health was also a concern in the aftermath of the earthquake as victims complained of a variety of symptoms including nightmares, restlessness, anxiety and sensitivity to environmental noise. Mental health workers from many parts of Japan responded to calls for volunteers and many traveling medical teams and clinics had a trained mental health professional available to counsel victims and disaster assistance workers who also experienced varying degrees of psychological stress.

### *Safety Assessment*

On January 16, 1995, a United Nations sponsored workshop was held in Osaka for the purpose of extending a program for safety inspection of damaged buildings to developing nations. The Emergency Assessment System of Damaged Buildings (EASDB) had only a foothold in Japan and had been implemented, but never tested, in an actual disaster. Three prefectural governments had adopted the EASDB. These were Kanagawa, Shizuoka and Tokyo; the system had not been adopted in Hyogo or Osaka Prefectures, the most heavily impacted areas in the Hanshin Awaji earthquake. Thus, when the earthquake occurred the day following the workshop, there was no locally adopted procedure for inspecting the many damaged buildings in the region.

Despite the lack of an inspection system, the city governments of Kobe, Nishinomiya, Ashiya and Takarazuka (partial inspections conducted in Itami and Amagasaki) attempted to provide rapid inspections of damaged residential buildings to determine whether residents would be permitted to stay or must leave. These inspections consisted of placing black posters on buildings deemed uninhabitable and were conducted by architecture and engineering professionals mainly from outside the Kansai area. This inspection generated citizen complaints because there was no way to tell whether buildings without tags were safe to occupy or simply had not yet been inspected. Beginning on January 24, the teams made up of volunteers from Shizuoka, Kanagawa and Tokyo Prefectures and organized by the Ministry of Construction (Building Disaster Prevention Section) conducted inspections by placing red (unsafe), yellow (caution-limited entry) and green (inspected-found safe for entry) placards on inspected buildings. Both residential and commercial buildings were inspected based on requests to city government. A total of 46,610 buildings were inspected, 6,476 were declared unsafe, 9,302 were declared to be safe with some caution and 30,832 were declared safe for occupancy (UNCRD, 1995).

Additional inspections were conducted for other purposes including one by the welfare boards of city governments in order to determine eligibility for disaster assistance, both payments to repair damage and for living expenses while homes were unavailable. These inspections were carried out by welfare workers or firemen. Tax officials also carried out inspections for the purpose of determining whether home and building owners qualified for disaster tax relief of up to ¥ 500,000. In addition, inspections were initiated for bridges, roads, highways and high rise buildings. Those inspections which evaluated damage to residential and some commercial buildings were the source of considerable controversy and complaints as diverse criteria and objectives resulted in confusing and inconsistent results for victims (Ohnishi, 1995).

### DISASTER RESPONSE: SOME OBSERVATIONS

For many American observers of the Hanshin Awaji earthquake, the temptation to compare Japan's worst earthquake disaster since 1923 with the Northridge earthquake a year earlier is compelling. The two events both occurred in heavily populated urban areas, they were of moderate size from a seismological perspective and both struck nations which have had aggressive programs of hazard mitigation and preparedness. While comparisons are inevitable, they can also be somewhat self-serving when the two events are juxtaposed in terms of emergency response. Southern California had experienced damaging level earthquakes in 1987, 1991 and 1992, prior to Northridge and emergency services organizations were in a state of partial mobilization in the immediate aftermath of serious urban fires just weeks prior to January 17, 1994. The Kansai region last experienced an earthquake of similar magnitude in 1596 and earthquake response readiness was focused on the Tokai region where the next great earthquake was expected to strike.

Interorganizational coordination was a major problem as were situation assessment, mobilization of resources, and overall management of the response effort. All of these problems have deeper roots in the lack of

adequate planning, in the organization of response agencies and the extent to which these agencies and organizations interact with one another in non-emergency times. Some response problems can be traced to attitudes and values which were legacies of Japan's experience in the Second World War. All of these factors were significant in response to the Hanshin Awaji earthquake and the remainder of this paper will identify some of these in the context of the basic response actions summarized in previous sections.

Indicative of the inadequacy of existing disaster plans was Hyogo Prefecture's decision to replace their disaster management plan in the midst of response to the earthquake on January 20. According to prefectural officials, the existing plan was based on the occurrence of an earthquake of lesser intensity which would have caused far less damage than that experienced on January 17, 1995. Crucial in the decision to revise the plan were the enormous number of displaced persons, the severe damage to lifeline systems and the long-term nature of recovery needs. The new plan gave greater emphasis to recovery, set up an organizational structure for recruiting building inspectors from other prefectures, enhanced public information capabilities and procedures for procurement and distribution of emergency supplies. Response plans at the national level are also being studied and will undergo change based on the experience of the earthquake. There is no organization at the national level with overall responsibility for coordination of response and recovery. Currently, these functions are parceled out among several ministries and reporting procedures, situation assessment capabilities and the role of the Self Defense Forces in disaster all require policy level attention.

Timely and effective response mobilization requires a well coordinated system of situation assessment and disaster intelligence. Hyogo Prefecture and other local jurisdictions have access to real-time seismic information from the Japan Meteorological Agency and the Kobe Marine Observatory and these systems functioned on January 17, however, officials deferred major decisions such as activation of the SDF until reconnaissance efforts could be undertaken. But reconnaissance was hampered by the impact of the earthquake on responders, many of whom were also victims. Traffic congestion, communications outages and conflicting demands on fire services which had primary responsibility for initial disaster assessment, also contributed to a poor understanding of the scope of the disaster. Despite rapid and extensive television coverage of the disaster, this source of disaster information was not closely monitored until several hours had passed.

The overwhelming and conflicting demands on fire and police services in the earthquake were also indicative of planning and coordination problems. The high priority placed on search and rescue by local jurisdictions was an understandable concession to the importance of life safety, but the emphasis on rescue with limited staffing appeared to contribute to neglect of other critical functions including damage assessment by fire services and traffic control by prefectural police, a function which impacted every other response measure. The division of labor among basic emergency services organizations requires review and redefinition in the context of a corresponding examination of the role of the Self Defense Forces in major disaster situations.

The Self Defense Forces occupy an ambiguous place in Japanese society and face some element of hostility from the former Social Democratic administration and a citizenry socialized to be wary of militarism. According to Japanese law, the prefectural governor must ask the Prime Minister for activation of the Self Defense Forces and the three branches of the SDF (army, maritime and air) must be requested separately. Although military units based at Himeji and Itami readied for activation immediately after the earthquake, the Hyogo Prefectural Governor did not request SDF activation until 10:00 a.m. on January 17 and, according to one military source, the request for SDF assistance was not officially transmitted to the Itami-based Middle Army until 6:00 p.m. on January 17, 12 hours and 14 minutes after the earthquake. The delayed mobilization of the SDF was partly a function of these procedures as well as inadequate situation assessment and a lack of coordination between the prefectural government and the SDF during nonemergency operations.

Disaster assistance was available to the stricken region in many forms including thousands of volunteer workers from all parts of Japan, material and monetary aid from other jurisdictions and international assistance in many forms, including well-trained and mobile search and rescue teams with considerable experience in heavy urban search and rescue. Local, regional and national government agencies were ill-equipped to utilize volunteers to maximize advantage due to a lack of planning and procedures for registering, organizing and deploying volunteers. In many cases volunteers were turned away by local jurisdictions which could not divert

staff from critical assignments to manage volunteers. International search and rescue teams were admitted belatedly and never integrated into local search and rescue efforts.

From the standpoint of emergency response, the lessons of the Hanshin Awaji earthquake are reasonably clear. Earthquake planning, preparedness and hazard mitigation must be applied nationally, not regionally, and accorded a high public policy priority for all units of government and the private sector. In Japan, as well as other nations that have experienced a major disaster, the months which follow will be characterized by a re-examination of basic assumptions that underlie earthquake planning and public policy. It is during these critical months that important changes must take place. Both official reports and commentary from media and other observers indicate that this exercise in policy scrutiny is now under way in Japan. This valuable reexamination of response readiness must address: coordination and mutual aid; training and exercises to assure that roles and responsibilities of all participants are fully understood; development of procedures for accommodating the volunteer efforts of organizations and individuals, domestic and foreign; the division of responsibilities among emergency response organizations to help assure that all critical missions can be accomplished; and, perhaps most importantly, information and training needed to assist citizens in preparing for, and responding to, damaging earthquakes.

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