



## *Earthquake Program*

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# **EARTHQUAKE READY: PREPAREDNESS PLANNING FOR SCHOOLS**

October, 1993

An earlier version of ***EARTHQUAKE READY: Preparedness Planning for Schools*** was developed under the guidance of the 1988/89 Schools Task Force of the Policy Advisory Board of the Bay Area Regional Earthquake Preparedness Project (now the Earthquake Program of the Office of Emergency Services):

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The work that provided the basis for this publication was supported by joint funding through a cooperative agreement between the Federal Emergency Management Agency and the State of California Governor's Office of Emergency Services (EMF-89-K-0313). The recommendations and suggestions included in this document are intended to improve earthquake preparedness, response and mitigation. The contents do not necessarily reflect the views and policies of the Federal Emergency Management Agency or the Governor's Office of Emergency Services and do not guarantee the safety of any individual, structure or facility in an earthquake. Neither the United States nor the State of California assumes liability for any injury, death or property damage which occurs in connection with an earthquake.

**OBJECTIVE**

***To provide an overview of earthquake preparedness issues, responsibilities and the planning process.***

Earthquakes are an unfortunate fact of life in California, as we all saw on October 17, 1989. Earthquake activity comes in cycles throughout history and the Bay Area is currently in a period of increased activity. Scientists estimate that there is now at least a 67% probability of another magnitude 7 earthquake striking the Bay Area in the next 30 years. This could be an earthquake on the Hayward fault, the Peninsula segment of the San Andreas, or the Rodgers Creek-Healdsburg fault. *Furthermore*, earthquakes of the size that hit Whittier in 1987 (M 5.9), Morgan Hill in 1984 (M 6.2) and Coalinga in 1983 (M 6.7) are much more frequent and could happen in the Bay Area at any time and at any place.

"The earthquake [October 17th, 1989] was probably the single most significant event in my 30 years with the Pajaro Valley Unified School District, in that I think it will be some time before people recover from the full impact of the quake. We can repair buildings, we can fix the light fixtures, we can take care of the painting, we can repair the cracks and take care of plumbing and gas leaks, but the emotional trauma as a result of the quake to me is almost as significant as the damage to the buildings."

James Baker, Superintendent (retired)  
Pajaro Valley Unified School District  
Watsonville, CA

As a school administrator you have the responsibility for ensuring the safety of your students in an earthquake. Developing earthquake emergency procedures is required by law. The packets in this set have been compiled to help you and your staff develop such a plan. Should you already have a plan or parts of a plan, you may wish to use only portions of a packet or only one or two packets instead of the set. Check what you have already developed against the recommendations made here.

"I think we have been very successful in our planning because of the commitment of the Board."

Dorothy Kakimoto  
Director of District Operations  
Oakland Public Schools

### **KEEP IN MIND**

- ⇒ In most schools you are the single most important factor in the successful development of an earthquake preparedness plan. Your support and commitment are critical to securing the involvement of your staff.
- ⇒ The planning process should be thought of as just that--a process. Think incrementally, divide your planning into manageable steps, decide what is most critical for your situation and focus on those steps first. Don't expect the plan to fall into place all at once.
- ⇒ At an absolute minimum each school should:
  - ✓ be sure students and staff know what to do in an earthquake
  - ✓ have an established release policy that has been communicated to all parents and staff.
  - ✓ have the ability to communicate to the district and/or the jurisdiction's emergency response agencies in the event the phone system is not working.
  - ✓ identify and eliminate those nonstructural hazards that represent the most serious threat to life safety.
  - ✓ provide training to students and staff so that they are familiar with the school's earthquake plan.

"I think that in our case for the past ten years we've been preparing for an earthquake such as the one we had on October 17th. If it had happened during school time (fortunately this one did not), I'm sure there would have been a whole different set of outcomes. You can't predict when it's going to be, so I think you've got to plan for the eventuality that the quake is going to hit when school is in session and that you're going to have the responsibility for 500 students, if that's what you have in your school, or for 20,000 students if that's what you have in your school district, and you're going to have to do all that you can to get ready for that."

James Baker, Superintendent (retired)  
Pajaro Valley Unified School District  
Watsonville, CA

## ACTIVITIES

1. Using the worksheet, *What the Law Requires*, briefly review your legal requirements. Is your school currently in compliance with the law?
2. Review the *School Administrator's Checklist* to determine what has/has not been addressed by your school's general operating procedures or specific disaster planning efforts. This will help you determine where you want to supplement or revise your planning effort.
3. Review *Summary of the Earthquake Planning Process* to identify plan components, organization and suggested planning approach. In light of your priorities and where you want to focus your effort, decide which components you want to address first. Set up a timetable for when you will address each component.
4. To begin the planning process at your school, set up a Planning Committee. This committee can either set up teams (perhaps using the suggested list in the *Summary of the Earthquake Planning Process*) or address responsibilities for each of the teams.
5. Use *Suggested Training Needs by Team* as a guide to structure a training program. Provide training at the time responsibilities are assigned, as well as on an on-going basis.

"The district, in terms of the administrators and the Board, needs to commit to the notion of disaster preparedness, which means making tough decisions and dealing with conflicting priorities. Site preparation needs to be a high priority."  
Michael Chambers, AIA  
State Department of Education

## WHAT THE LAW REQUIRES

### I. *Earthquake Preparedness*

In 1984 the state legislature passed AB 2786, sponsored by Assemblyman Katz, to require that schools establish an earthquake emergency system. This law applies to the governing boards of public and/or private elementary and high schools that have school buildings with over 50 students or more than one classroom, and to all county school superintendents. This law requires that you:

- ✓ Develop a school building disaster plan to maintain the safety and care of students and staff. The plan should outline roles, responsibilities and procedures for students and staff and should be ready for implementation at all times.
- ✓ Conduct periodic drills in a "drop and cover" procedure to train students and staff to cover in an earthquake under a table or a desk, dropping to his or her knees with the head protected by the arms and the back to the windows. Drop and cover drills should be held once a quarter in elementary schools and once a semester in secondary schools. School administrators should document these drills similar to the procedures used for recording fire drills.
- ✓ Take preparedness and mitigation measures to ensure the safety of your students, staff and school facility before, during and after an earthquake.
- ✓ Provide educational programs to ensure that students and staff are aware of, and properly trained to follow the procedures of the earthquake emergency system.
- ✓ Be prepared to have your school serve as a possible public shelter for the community during disasters or emergencies.

✓ "We found a lot of new people there. And actually they were commuters who were trapped between road closures. . . Those people were looking for a place of safety so they came here. . . Within about an hour we had maybe 200 commuters and local residents whose houses were destroyed. . . So that night we probably had 200 commuters, probably 50 children and maybe another 50 adults that we housed. And most of them were in cars or out on the turf with absolutely no sleeping bags or anything like that."

Kenneth Simpkins, Superintendent  
Loma Prieta Joint Elementary  
School District  
Los Gatos, CA

In 1988 the legislature passed an amendment to this law that specifies that the staff training in earthquake preparedness procedures should be for both ~~certificated~~ and classified staff.

*qualified teachers and non-teaching staff*

## II. *Disaster Service Workers*

You should also be familiar with the section of the Government Code that spells out when public employees can be considered Disaster Service Workers. California Government Code Section 3100 specifies that public employees are declared to be disaster service workers subject to such disaster service activities as may be assigned to them by their superiors or by law. The term public employees includes all persons employed by the state or any county, city, city and county, state agency or public district, excluding aliens legally employed.

## III. *The Field Act*

If you are a public school administrator, you should also be aware of the Field Act and subsequent related acts, the Garrison Act and the Riley Act. These laws set the building code standard for construction and remodeling of public schools, and assign responsibility for assuring building code compliance to the Office of the State Architect (OSA), a state agency. This means that public schools are built to more rigorous standards than other buildings in California (which are built to comply with the Uniform Building Code and are regulated locally). Since public schools are among the safest structures in California, school administrators should focus their attention on nonstructural hazards. These hazards (windows, furnishings, content) are not addressed by the building code and can represent a significant threat to life safety (*See Packet 4 for more detail*).

### *Older Field Act Schools*

Changes are made to the schools' building code to incorporate what is learned after major earthquakes, so newer school buildings (post-1976) will

most likely perform better in an earthquake than older buildings. A bill is currently pending (June 1990) in the state legislature that would require the Office of the State Architect to conduct a survey of these older Field Act schools to determine if in fact there is a problem with the performance of these buildings in a strong earthquake. Even if this bill were to pass, however, it will be some time before OSA can examine all these schools. In the meantime, districts that have older Field Act schools may want to consider hiring a structural engineer to evaluate these buildings to determine how well they would perform in a strong earthquake.

#### IV. *The Damage Assessment Process*

It became apparent after the Loma Prieta earthquake that there is not a standard damage assessment process used by Bay Area school districts. Some districts used structural engineers, some used contractors, some used local building officials and some used firefighters and maintenance staffs. The Office of the State Architect is the building department for public schools, and has the legal responsibility for determining the safety of these buildings after an earthquake. Local building departments have no legal jurisdiction over public schools. To help districts better perform their damage assessments in the next earthquake, OSA staff have drafted up *Postearthquake Damage Evaluation and Reporting Procedures for Schools*. This document helps school officials interpret hazards in their buildings in the immediate aftermath of a damaging earthquake. OSA would prefer that all schools in counties that have experienced damage have a structural engineer (licensed in California) evaluate the buildings prior to the opening of school. However, recognizing that it may take OSA engineers several hours or more to come to the damaged areas, and it may take several hours for local structural engineers to come and provide assistance, these guidelines can assist school staffs in determining if they can keep children in certain rooms and buildings. This document is available by calling the Office of the State Architect (916) 445-0783, or the BAREPP office (415) 540-7213.



✓ "In thinking about our preparedness [on October 17, 1989] I think that we missed the boat totally because we had no idea whether the buildings were structurally safe to reoccupy, and we had no checklists to make that determination."

Kenneth Simpkins, Superintendent  
Loma Prieta Joint Elementary  
School District  
Los Gatos, CA

V. *State Department of Education*

In January of 1990 a state law took effect, making the State Department of Education the lead agency "designated to develop plans and procedures to coordinate earthquake awareness, disaster planning, and preparedness and hazard reduction programs for public schools." Michael Chambers, a senior architect with the School Facilities Planning Division, is in charge of coordinating the Department's efforts, and can be reached at (916) 322-2482.

## SCHOOL ADMINISTRATOR'S EARTHQUAKE SAFETY CHECKLIST

*(Marked in parentheses are the packet(s) which address the issue.)*

### PREPAREDNESS AND MITIGATION

- Does your school have a disaster plan, and is your staff aware of the roles and responsibilities under the plan? Do they realize that they are responsible for the students during and after the emergency, which could mean 72 hours or possibly longer? *(Addressed in Packets 1 and 3)*
- Is your staff aware of the fact that, under Government Code #3100, they are Disaster Service Workers, and if the disaster occurs during school hours, they may be required to remain at school? *(Addressed in Packet 1)*

"The district's management of the earthquake [October 17, 1989], was, on a scale of 100, with 100 being perfect, a 50 or a 60. This was because of the communications problems, the [dead] batteries, the excitement. You just can't plan for every eventuality and have to be ready to adjust and to think or try to anticipate right after the earthquake of some of the necessities."

James Baker, Superintendent (retired)  
Pajaro Valley Unified School District  
Watsonville, CA

- Does your staff know the location of the main gas, electricity and water shut-off valves? Who has been trained to check for damage and turn them off if the need arises? *(Addressed in Packets 3 and 6)*
- Have you made a list and a map of the location and availability of First Aid and other emergency supplies? *(Addressed in Packets 1 and 5)*

What nonstructural hazard mitigation measures have been completed at your school: *(Addressed in Packet 4)*

- Have bookshelves, file cabinets and free-standing cupboards been bolted to the wall or arranged to support each other?
- Have heavy items been removed from the tops of bookshelves and cupboards?
- Have the windows in the classrooms and other campus buildings been equipped with safety glass or covered with protective film?

"Nonstructural components and building contents were important sources of injury [in the Coalinga earthquake]. Many of the injuries could have been avoided, either by modifying the physical setting or by providing better public information on appropriate behavior both during earthquake shaking and following the event."

Kathleen Tierney  
*Report on the Coalinga Earthquake*  
 September 1985

- Are the partitions, ceilings, overhead lights, and air ducts secured to the structure of the buildings?
- Have inventories been made of hazardous chemicals in areas such as the science building and maintenance shops? Has anyone been appointed to check on these chemicals after an earthquake?
- Have you conducted an inventory of the kinds of skills or needs of your staff? Have you conducted training in first aid, damage assessment and fire suppression? (*Addressed in Packets 1 and 6*)
- Does the school have any arrangements with structural engineers who will report to the school directly after a disaster to determine the damage and the need to evacuate? Do you know how to report your damage to the Office of the State Architect? (*Addressed in Packets 1 and 3*)

"If you happen to have school construction going on, or major contractors in your area you might keep [them in mind to help you with your repairs] or [make it] as part of your plan, because our crews could not handle the damage and the repairs that were necessary. It was all that they could do to help us do the inspection of the facilities and report what was damaged and what needed to be repaired."

James Baker, Superintendent (retired)  
 Pajaro Valley Unified School District  
 Watsonville, CA

- Do you know whether or not your school has been designated as a potential mass care shelter? (*Addressed in Packet 3*)
- Does your school have a back-up communications system such as a CB radio, ham operator, or two-way radio to communicate with your local emergency operations center? Who is trained to use this equipment? (*Addressed in Packets 5 and 6*)
- Does your school have an internal communication system such as walkie talkies, megaphones? (*Addressed in Packet 5*)
- Is there an earthquake preparedness program in your curriculum? (*Addressed in Packet 2*)

- Are there any programs established between the school and parent groups which discuss the school's policies regarding student release and retention and the development of an emergency plan for the home? (*Addressed in Packet 1*)
- How and where are you storing vital data and records? Do you have duplicate copies of important data stored in an off-site location? (*Addressed in Packet 1*)

"With something as large as earthquake preparedness, we need to work with the city government and the community at large. Parent participation is particularly critical to the success of any plan."

Patricia Monson  
Member, Board of Directors  
Oakland Public Schools

## EMERGENCY RESPONSE

- Has a central "command post" or other central planning area been identified, with maps of the campus, facilities and hazards in the area, an enrollment sheet for the current year, First Aid supplies, and other tools necessary to manage the emergency response activities after a disaster? (*Addressed in Packets 3 and 5*)

Do the teachers have basic operating procedures to follow such as:

- Knowing how to implement the basic "duck and cover" actions when an earthquake begins? (*Addressed in Packet 6*)
- Having an emergency kit near the desk which contains an attendance sheet, special medical information, and student release information? (*Addressed in Packet 5*)
- When to evacuate, and when to remain in the classroom after an earthquake? (*Addressed in Packets 3 and 6*)
- Knowing how to determine the most seriously injured (triage), to administer first aid and to comfort those who are frightened or hysterical? (*Addressed in Packets 3 and 6*)
- Working in a "buddy system" with another teacher and class so that if one teacher is injured, the other will take care of the students and get them to safety?
- If some students are seriously injured and an evacuation is ordered, what you will do with the injured? (*Addressed in Packet 3*)

- Does your school have established check-out procedures to be taken before a student is released to an adult? *(Addressed in Packets 1 and 3)*
- What are your immediate damage assessment procedures? *(Addressed in Packet 3)*
- Have you developed emergency sanitation procedures? *(Addressed in Packets 3 and 5)*
- Has a spokesperson been appointed to serve as liaison with the press after a disaster? *(Addressed in Packet 3)*
- Have you identified personnel who can translate information to non-English speaking parents? *(Addressed in Packet 3)*
- Have you identified an evacuation site? Is there an alternate location if you cannot use your initial site? *(Addressed in Packet 3)*

## RECOVERY

*The following items are district-level responsibilities. An individual school site might want to check with its district to determine the procedures that will be followed:*

- Identify recordkeeping requirements and sources of financial aid for disaster relief.
- Establish absentee policies for teachers/students after a disaster.
- Establish an agreement with mental health organizations to provide counseling to students and their families after the disaster.
- Establish alternative teaching methods for students unable to return immediately to classes: correspondence classes, tele-teaching, group tutoring, etc.
- Develop a plan for conducting classes if some of your facilities are damaged--half-day sessions, alternative sites, portable classrooms.

## SUMMARY OF THE EARTHQUAKE PLANNING PROCESS

While the steps in this process are not necessarily consecutive, it is useful to think of the process as containing separate components. Each component can be tackled when you are ready, and as you address and complete a component you will have a sense of accomplishment. (The basic components correspond to the packets in this set of training materials).

The planning process encompasses actions taken **before**, **during** and **after** an earthquake; it is not simply a matter of thinking about what you will do in the event of an earthquake. Actions taken **before** an earthquake can change how you behave in an earthquake, and actions taken beforehand can also affect how well you will be able to function after an earthquake. By identifying and removing certain obvious hazards in your classrooms, for example, you will be able to greatly reduce the possibility of injury.

By practicing what to do **during** an earthquake, you will increase the confidence of students and staff that earthquakes are survivable, manageable events. Thinking about how you can provide instruction **after** a damaging earthquake or how you will handle your students' psychological problems will help insure the continued regular functioning of your school.

✓ "When school did start on Tuesday [after the earthquake], we were prepared to spend a part of a day or a better part of a day or all day if necessary in talking about the earthquake, what their experiences were, letting students express what happened either on paper, or in groups, act out, anything we could do to bring out those emotional issues. . . In one school 20% of the homes in the school attendance area were damaged beyond use and some of them had burned down, so everyone had something to share."

James Baker, Superintendent (retired)  
Pajaro Valley Unified School District  
Watsonville, CA

There are several basic elements to this process which are important to understand before you begin the planning:

- ✓ **This is a group process.** You as an individual will not be able to develop and implement a plan for your school. The group process enables you to share information among colleagues, gain support for the planning process and in fact generate excitement and interest for what you all may learn.
- ✓ **Everyone will have responsibilities based on his/her job at the school.** Instructional staff, for example, will be expected to maintain control of their classrooms, account for their students, direct their classroom drills and evacuation, etc. Administrators will be responsible for making school-wide decisions (the need for evacuation, the need to close the campus, communication of the plan to parents.)

**In addition, there are certain responsibilities that are related to the emergency** that are not specifically related to one's job--search and rescue, and site security, for example. Thus some staff will have to be freed of classroom or office assignments so that they can fulfill particular emergency responsibilities. The following page summarizes the teams needed, and who might be on them.

- ✓ **Training is an important part of the planning process.** It helps staff become familiar with their responsibilities. In addition, it is critical for new staff who may not have been around at the time of the development of the plan.

"After this last earthquake [October 17, 1989], the District recognized the need for preparation, including more in-service training for every level of staff--administrators, custodians, site principals, teachers, classified staff."

Patricia Monson  
Member, Board of Directors  
Oakland Public Schools

## **SUGGESTED TEAMS/RESPONSIBILITIES FOR EARTHQUAKE PLANNING**

This list suggests ways that you can apportion various emergency responsibilities to your staff. Everyone will have some responsibilities based on his/her job, and some people will have additional emergency responsibilities. See **Packet 3** for checklists of suggested actions for each of these teams before, during and after an earthquake.

### ***The Planning Committee***

This team can be composed of staff and/or parents. Interested individuals who have the time to participate will be most effective. People on this committee do not necessarily have responsibilities at the school at the time of an earthquake--rather, this committee is responsible for insuring that the planning takes place and that someone is responsible for each of the major issues identified. This committee drives the planning process, and will also want to observe drills and oversee training.

### ***Responsibilities by Job Position***

#### **School Principal/Administrator**

This team would also include office staff, who would function as support to school administrators.

#### **Instructional Staff**

This team would include teachers, as well as aides.

#### **Maintenance Staff**

This team would include custodial, buildings and grounds and food workers.

### ***Emergency Response Teams***

(May not usually be part of school staff's responsibility. In order to have two or three staff participate on these teams, they will have to be freed from their usual staff responsibilities.)

***Emergency Operations Center***--principal or administrator and two or three others.

*(This center will be put into operation after an earthquake. Most or all members of the Coordinating Committee will report here.)*



**First Aid Team**--school nurse and two others (preferably with first aid and CPR training).

- Make sure that first aid supplies are up to date and always complete
- Keep emergency cards (list of medical resources in area) and health cards (for each employee and pupil) up to date
- Make sure training of staff expected to administer first aid is up-to-date.

**Search and Rescue Teams**--three teams of two or three people.

- Make sure needed supplies (crowbar, hard hat, etc.) are on site.
- Make sure team members stay current with their training.

**Site Security Team**--an administrator and two others.

- Work with Coordinating Committee to establish a release policy and communicate this policy to parents and staff. / Develop procedures for how release will be handled with non-English speaking parents. ✓

→ not translated

**Fire Safety Team**--two teams of two or three people.

- Make sure fire fighting equipment (extinguishers, etc.) is in working order and that staff has received training in its use.

**Evacuation Team**--an administrator and three others.

- Keep plans for designated emergency assembly area current
- Make sure that necessary supplies are accessible.

**Maintenance Team**--custodians and food workers.

- Assist the Coordinating Committee in the identification of non-structural hazards.
- With direction from the Coordinating Committee, assist in the reduction of non-structural hazards.
- Maintain inventory of food supplies.

## SUGGESTED TRAINING NEEDS BY TEAM

To help people meet their responsibilities in an earthquake, it is useful to provide training that goes beyond a hand-out at a staff meeting. The suggestions here include the basic concepts that each team or staff person might be expected to understand, as well as possible sources of more in-depth training and information.

### Planning Committee

- a) Familiarity with the earthquake threat and damage potential
- b) Understanding of components in emergency planning process
- ★ Materials and/or training available from local police, fire, and offices of emergency services.

### Principal/Administrator

- a) Understanding of emergency situation coordination
- b) Familiarity with emergency communications capabilities
- ★ Emergency response training available from California Specialized Training Institute, Red Cross

### Teacher/Aide

- a) Familiarity with what happens in an earthquake and the sorts of damages that result.
- b) Understanding of children's responses to disaster situations and knowledge of the recommended ways for coping with their distress
- ★ Information available from local offices of emergency services, Red Cross, and county or school district mental health professionals

### Maintenance Staff

- a) Familiarity with nonstructural hazard identification and reduction
- b) Familiarity with when and how to turn off utilities
- c) Understanding of techniques for food and water storage and distribution
- d) Knowledge of emergency sanitation provisions
- ★ Training and/or advice available from local offices of emergency services, Red Cross, PG&E.

**First Aid**

- a) Familiarity with principles and techniques of first aid and cardiopulmonary resuscitation
- b) Understanding of principles of triage → not translated
- ★ Training available from the Red Cross

**Search and Rescue Team**

- a) Knowledge of systematic procedures for sweeping the building and locating victims
- b) Mastery of victim extrication techniques
- ★ Training and/or advice available from local fire department

**Site Security Team**

- a) Understanding of damage potential and emergency situation coordination
- b) Knowledge of communications procedures
- ★ Local first responder agencies can give advice, as can local offices of emergency services

**Fire Safety Team**

- a) Knowledge of operation of different types of fire extinguishers
- b) Familiarity with when and how to turn off utilities
- c) Understanding of principles of fire safety, including techniques for extinguishing various kinds of fires
- ★ Local fire department and/or office of emergency services, PG&E can train

**Evacuation Team**

- a) Understanding of techniques for quick damage assessment
- b) Familiarity with procedures for crowd control
- ★ Training and/or advice is available from local offices of emergency services

**PACKET 2  
THE NATURE OF  
THE EARTHQUAKE  
THREAT**

**OBJECTIVE**

**To present information on the history, consequences, and existing threat of moderate to major earthquakes in California.**

*Central Asia*

When people know what to expect in an emergency, even if only in general terms, they tend to react in a more reasonable, coherent manner. It is very important, therefore, to present realistic, believable expectations about earthquakes.

As educators, take advantage of the natural laboratory we live in. There are all kinds of lessons we can learn from earthquakes--lessons in history, political science, urban planning, physics, and geology. You are educating children who may be able to make a difference in the future as engineers, seismologists, legislators, policy analysts--all of whom can play a vital role in making our environment safer.

The magnitude 7.1 Loma Prieta earthquake provides us with an excellent example of the types of problems that arise in a major earthquake.

Following are some of the "geologic lessons" learned or reaffirmed from the Loma Prieta earthquake:

- There were no known short-term precursors to warn of the impending quake.
- The intensity of ground shaking was affected by local soil conditions. Damage in the Marina District in San Francisco and to structures such as the Bay Bridge and the Cypress section of Interstate 880 was enhanced due to poor soils in these areas.
- Seismic shaking triggered many landslides in areas of steep unstable slopes. The landslides damaged buildings and blocked many highways and roads.
- Damage to structures with adequate foundations on good ground was minimal. Serious damage was primarily restricted to older buildings and homes that predate recent building code changes.

*Model*  
*2*

Damaging earthquakes are a certainty in California and in the San Francisco Bay region. The October 17th quake has not reduced the potential for major earthquakes in this region. In fact, scientists from the U.S. Geological Survey say that the Bay region is more likely to have a major, damaging earthquake now than we were *before* October 17, 1989. The probability of this event happening in the next 30 years is about 67% or 2 chances in 3. The Hayward fault in the East Bay, the Rodgers Creek fault in the North Bay, and the peninsula segment of the San Andreas fault in the West Bay are considered to be the most likely candidates for this major earthquake.

The fact that these faults are much closer to densely populated areas of the Bay Region means that damage and loss of life from essentially a Loma Prieta size earthquake (magnitude 7) will be much greater.

It is inevitable that there will be damaging earthquakes in California and in the Bay Area, but they need not be major catastrophes. You hold some of the keys to reducing the risk posed by earthquakes, both in terms of making our schools safer places now and educating our children to understand and live wisely with earthquakes.

### **KEEP IN MIND**

- ⊙ Don't paint too gloomy a picture of potential earthquake damage. Keep it moderate and believable. People tend to lose motivation if they believe the only damaging earthquake is a catastrophic one
- ⊙ Try to tie these activities to student preparation for a damaging earthquake as well as to the existing earth science curricula\*.
- ⊙ Staff, students and parents all should receive earthquake information. Remind staff that they need to have an earthquake plan at home so that they can confidently remain at school. Communicate your plans to parents and encourage them to develop plans at home as well.
- ⊙ Consider, if appropriate, bringing in an expert to discuss the earthquake threat with staff, or use video or slide shows to illustrate the threat \*.

\* ~~The Bay Area Regional Earthquake Preparedness Project (BAREPP) has an extensive lending library of videotapes and slide tape programs, as well as information on curricula materials available for classroom use. Call (415) 540-2713 for a listing.~~

## ACTIVITIES

1. Use the **situation cards** to guide a discussion with staff about what would happen at your school in the event of an earthquake.
2. Review *The Earthquake Threat in the Bay Region*, and discuss the nature of the earthquake threat with staff. Identify how an earthquake could affect staff in terms of ability to get to work, to get home, etc.
3. Remember that April is Earthquake Month in California. If you can, take advantage of that and schedule activities and presentations on the earthquake threat and preparedness plans.

"In 1865 there was a M6.5 earthquake on the same segment of the San Andreas that produced the recent Loma Prieta event--it was followed three years later by a M7 earthquake on the Hayward fault. We have no way of knowing if that scenario will be repeated this time, but the people of the Bay area must realize that such a possibility exists, and that it is up to them, and their elected officials, to take steps *now* to reduce the loss of life, and economic disruption, *when* (not if) another large earthquake strikes the Bay area. Even worse, because such an event would be much closer to the major metropolitan areas, it will result in *much greater levels of damage*, and *many more casualties*, than Loma Prieta did. Thus while we cannot tell you whether the current *Danville* swarm [of earthquakes] may be a harbinger of worse to come, we can tell you for certain that "worse to come", *will come*--the only question is whether it will be during our lifetime's, or during our kid's."

Al Lindh, Seismologist  
U.S. Geological Survey  
Press release, 4/9/90

## THE EARTHQUAKE THREAT TO THE BAY REGION

The San Francisco Bay Region lies within a broad and complex area of major *active* faults. People who doubted that had their minds changed on October 17, 1989, when the magnitude 7.1 Loma Prieta earthquake shook the entire Bay Area. At least ten active faults, each of them capable of producing damaging earthquakes, have been identified in the region. Other, yet undiscovered faults may be located here as well.

Since none of the counties in this area is free from active faulting, strong ground shaking could occur anywhere. And, as demonstrated in the Loma Prieta quake, there can be strong ground shaking 50 or 60 miles away from an earthquake epicenter.

**QUESTION:** What is the likelihood that another damaging earthquake will occur in the Bay Area in my lifetime?

**ANSWER:** The U.S. Geological Survey estimates a 67% chance of a large earthquake--magnitude 7 or greater--in the Bay Area sometime in the next 30 years.

**QUESTION:** What are the most dangerous areas in the Bay region?

**ANSWER:** Of the ten or so active faults, three major ones have the highest probability of producing damaging earthquakes: the Hayward fault in the East Bay; the San Andreas fault on the Peninsula; and the Rogers Creek in Sonoma County. Also, because of the poor quality of soft, alluvial, water-saturated soils in nearly all the flatland areas surrounding San Francisco Bay, there could be strong ground shaking on many of the Bay region's prime building sites. Other unstable soils elsewhere in the region are expected to cause problems for many other structures.

Many highways, bridges, utility systems and other lifeline networks in the Bay Area are constructed on or beneath these unstable soils as well. This fragile infrastructure could be seriously disrupted for an extended period of time following a significant earthquake.

**QUESTION:** Which lifelines are at greatest risk from strong ground shaking?

**ANSWER:** Movement along highways and streets built on soft soils will be severely impaired and will hamper emergency response activities. Another reasonable assumption is that all utilities will be out for part of the time in the first 72 hours after a major earthquake.

**QUESTION:** Which types of buildings are at greatest risk from strong ground shaking?

**ANSWER:** The most vulnerable building types are unreinforced masonry (URM), tilt-up concrete, and pre-1972 non-ductile concrete frame buildings. There are thousands of URMs in the cities around the Bay, and hundreds of tilt-ups and concrete frame structures were built in the 50s and 60s in the downtowns and industrial parks of Bay Area communities. X

**QUESTION:** I'm in a well-designed and engineered building; are there other potential hazards besides structural collapse I should be aware of?

**ANSWER:** Yes. Nonstructural hazards such as unbraced bookcases and file cabinets, light fixtures, glass, and electronic equipment may fall, shatter, and fly about. Contents can be just as hazardous as unsafe buildings.

Current estimates of the likelihood of a major earthquake in the Bay Region are about 67%, or 2 in 3, over the next 30 years. If anyone had those odds for winning the lottery, he or she would invest in lots of lottery tickets! A repeat of the great 1906 earthquake may be some decades away, but chances are high for one or more major, damaging earthquakes in the near future.

3 Earthquakes cannot be prevented; however, damage, destruction, loss of life, and even disruption can be significantly reduced by preparing Bay Area homes, neighborhoods, schools, workplaces, and communities for the next inevitable quake.



## SITUATION 1

It's midday and all classrooms are full. You feel a sharp jolt and immediately call for "duck and cover". A couple of seconds later the building begins to shake again, but more violently. Glass windows break and shower students with glass shards. Light fixtures and other non-structural elements fall on top of desks. The heavier items don't hurt the children, but the broken glass causes many minor cuts. Power is out and you are waiting for a decision on evacuation.

### *Discussion Points:*

1. Who makes the decision to evacuate and how is this communicated to the classroom in a timely fashion? (Remember the power is out.)
2. While waiting for the evacuation decision, what should the teacher be doing?
3. Given the possibility of aftershocks occurring, how can student anxiety be reduced?
4. Could any of these non-structural problems have been prevented or reduced?

## SITUATION 2

The time is 2:30 PM and a major earthquake of about 7 magnitude has struck near your school. Most major highways and surface streets are either damaged or clogged with cars and debris. It may be several hours before highways are passable. There are some injuries at school, but most students are only shaken and ready to go home. The power, water, and--most importantly--telephone systems are not functioning.

### *Discussion Points:*

1. Does the school (or the district) have a policy for the release of students?
2. Before any students are released, especially to a person other than a parent, what procedures must be followed?
3. How are school grounds secured and students accounted for?
4. What preparations have been made to keep students into the evening or overnight?
5. Which staff have been designated to remain on duty overnight if it becomes necessary?

**PACKET 3  
EARTHQUAKE  
RESPONSE  
PROCEDURES**

**OBJECTIVE**

***To develop an emergency response plan that ensures the safety and well-being of students, faculty and staff during and after a damaging earthquake.***

"I think planning that includes all staff, certificated and classified, and all students is important. You don't know beforehand who is going to be available and at the school site at the time of an earthquake."

Ron Staley  
Earthquake Preparedness Program Coordinator  
Pajaro Valley Unified School District  
Watsonville, CA

Response procedures can be as simple as a checklist, but it is important that all staff is familiar with the procedures and that a wide range of possible events have been discussed in the preparation of those procedures.

Your emergency procedures are the core of your school's earthquake plan. How well your teams can carry out their responsibilities will, of course, depend on how well each of them has prepared before the earthquake. Actions to be taken before an earthquake are suggested in each of the checklists in this packet. In addition, your teams should have had sufficient drills and training so that they can automatically and confidently perform necessary tasks (*see Packets 1 and 6*).

"Of course, there was a great deal of excitement in the area [October 17th, 1989]. There were gas leaks in the immediate vicinity of the central offices. You could smell the gas. People were coming out of the homes nearby and going onto the high school football fields and play fields which happen to be next to the central office. Others were coming by in their cars. You could tell the people were very frightened. With the fire engine sirens screaming, the police sirens going, you knew that there was a great deal of trouble and you could see the red glow of fire in the area."

James Baker, Superintendent (retired)  
Pajaro Valley Unified School District  
Watsonville, CA

## **KEEP IN MIND**

- ⇒ Keep lists, procedures, responsibilities as simple and straightforward as possible. The earthquake will not be the time to extricate a cumbersome plan from the cabinet.
- ⇒ Practice, practice, practice so that expected actions are rote and automatic.
- ⇒ Have backup for every necessary procedure in your plan.
- ⇒ Be sure it is clear at all times who is in charge and who makes what decisions.

## **ACTIVITIES**

1. If your staff has not already been divided into the teams recommended in Packet 1 (see *Summary of the Earthquake Planning Process*), consider doing so now.
2. Using *the Emergency Response Checklists* as a guide, have each team discuss its responsibilities after an earthquake. Remind staff that actions taken **before** an earthquake can greatly improve their ability to respond **during** and **after** an earthquake. Encourage staff to brainstorm expected actions, and to expand on the checklists provided.

"No doors would open, no doors would open at all [after the October 17th, 1989 earthquake]. We have no windows that open so anyone who had been in those buildings would have been trapped unless they had thrown a chair through a window to get out. And some of the rooms actually don't have windows so there would have been no way of knowing if there were people in there unless they were screaming, and no way to get an injured person out."

Kenneth Simpkins, Superintendent  
Loma Prieta Joint Elementary  
School District  
Los Gatos, CA

## EARTHQUAKE RESPONSE PROCEDURES

### SCHOOL PRINCIPAL/ADMINISTRATOR

#### **BEFORE:**

- Maintain staff awareness
- Hold drills and conduct/arrange training
- Oversee identification of non-structural hazards
- Establish a release policy and determine how this policy will be communicated to parents
- Familiarize yourself with district arrangements for immediate damage assessment after a damaging earthquake,
- Take an inventory of the staff for skills that may be useful in earthquake planning--ham radio operator, bi-lingual, etc.
- Evaluate records with the district and determine if there are any where a back-up copy should be stored off-site.
- Make sure the area to be used as an emergency operations center contains a map of the school site and an enrollment sheet for the current year.
- Develop a release plan for your staff that takes into account who has families and other responsibilities outside of school.

#### **DURING:**

- Duck, cover and hold at first sign of earthquake. Hold on to furniture legs if furniture moves. If outside, move away from buildings.

#### **AFTER:**

- Account for all staff and students.
- Implement and coordinate emergency operations.
- Control internal and external communications--including contact with the district, city agencies by radio, runner, etc.
- Decide on the need for evacuation and other critical issues.
- Keep record of events, decisions and actions.
- Designate a spokesperson for the press.
- If there is the slightest suspicion that the school has suffered structural damage make contact with the district architect or a structural engineer, according to the district's plan.
- An evacuation outdoors should be ordered if the structural integrity of the building is in doubt. Non-structural damage would not necessarily require an evacuation.
- In communication with district, assess overall situation--how long students might be at school, how supplies might be distributed, if students will be sheltered at school, etc. Be prepared to have the Red Cross designate the school as a Red Cross shelter.

## EARTHQUAKE RESPONSE PROCEDURES

### INSTRUCTIONAL STAFF

#### **BEFORE:**

- Maintain current class lists. Keep them in a safe, easily accessible place.
- Keep the classroom emergency kit in a safe, accessible place, probably near the door.
- Participate fully in school drills, encouraging students as well.
- If the teacher or aide has an emergency response team assignment, make sure there is a back-up to take control of the classroom and students.
- Provide instruction to students on earthquakes and earthquake preparedness.

#### **DURING:**

- Duck, cover and hold at first sign of earthquake. Hold on to furniture legs if furniture moves. If outside, move away from buildings. To demonstrate continued authority teachers might consider counting very loudly over the noise of the earthquake (most earthquakes last from 4 to 30 seconds--a very large earthquake might last 60 seconds).

#### **AFTER:**

- If an evacuation is ordered, take students out of building, with emergency cards.
- Know the procedures for getting first aid or other help to students who need it.
- Report missing students.
- Calm frightened students.

## EARTHQUAKE RESPONSE PROCEDURES

### **MAINTENANCE STAFF** **(INCLUDES CUSTODIAL AND FOOD WORKERS)**

#### ***BEFORE:***

- Assist the Planning Committee and/or Administrator in the identification of non-structural hazards.
- With direction from the Planning Committee and/or Administrator, assist in the reduction of non-structural hazards.
- Maintain inventory of food supplies.

#### ***DURING:***

- Duck, cover and hold at first sign of earthquake. Hold on to furniture legs if furniture moves. If outside, move away from buildings.

#### ***AFTER:***

- Check utilities and do whatever necessary to minimize further danger. Determine which utilities still work and which don't. Report findings to the EOC.
- Make a note of structural and non-structural damage when checking utilities. Report any identified damage to the EOC.
- Assist in evacuation, if one is required.
- Set up emergency sanitation system or procedures. Be sure not to use water or toilets until lines have been checked for breakage.
- Use emergency water supplies (including water from hot water heaters, etc.).
- Inventory supplies of food available to feed students and staff and begin planning distribution of food.

## EARTHQUAKE RESPONSE PROCEDURES

### FIRST AID TEAM

#### ***BEFORE:***

- Make sure that first aid supplies are up to date and always complete
- Keep emergency cards (list of medical resources in area) and health cards (for each employee and pupil) up to date
- Make sure training of staff expected to administer first aid is up-to-date.

#### ***DURING:***

- Duck, cover and hold at first sign of earthquake. Hold on to furniture legs if furniture moves. If outside, move away from buildings.

#### ***AFTER:***

- Report immediately to the Administrator (Emergency Operations Center).
- Administer first aid and record all cases and treatments.
- Determine need for further medical assistance. Coordinate requests for assistance through the Administrator.



## EARTHQUAKE RESPONSE PROCEDURES

### SEARCH AND RESCUE TEAM

#### ***BEFORE:***

- Make sure needed supplies (crowbar, hard hat, etc.) are on site.
- Make sure team members stay current with their training.

#### ***DURING:***

- Duck, cover and hold at first sign of earthquake. Hold on to furniture legs if furniture moves. If outside, move away from buildings.

#### ***AFTER:***

- According to pre-established pattern, check (visually, vocally, physically) every room in the building. Report location of injured to First Aid Team. Report location of other problems to Administrator (Emergency Operations Center).
- Look for obvious structural problems/significant structural damage as they sweep through the building(s)--report any damage to the Administrator (Emergency Operations Center).

## EARTHQUAKE RESPONSE PROCEDURES

### SITE SECURITY TEAM

#### ***BEFORE:***

- Work with Planning Committee, the School Administrator and the District to establish a release policy and communicate this policy to parents and staff. Develop procedures for how release will be handled with non-English speaking parents.

#### ***DURING:***

- Duck, cover and hold at first sign of earthquake. Hold on to furniture legs if furniture moves. If outside, move away from buildings.

#### ***AFTER:***

- Lock all external gates and doors, and secure building. Station one team member at main gate/front door to deal with community/parents. Have that member route fire, police, rescue and medical to area of need. Keep the Administrator (Emergency Operations Center) informed of activities.
- Release students according to pre-arranged policy.

## EARTHQUAKE RESPONSE PROCEDURES

### FIRE SAFETY TEAM

#### ***BEFORE:***

- Make sure fire fighting equipment (extinguishers, etc.) is in working order and that staff has received training in its use.

#### ***DURING:***

- Duck, cover and hold at first sign of earthquake. Hold on to furniture legs if furniture moves. If outside, move away from buildings.

#### ***AFTER:***

- Check for and confirm existence of fire. Report location to Administrator (Emergency Operations Center) and Site Security.
- Control fire, if possible.
- Rescue any personnel or students at risk.
- Secure areas.

## EARTHQUAKE RESPONSE PROCEDURES

### EVACUATION TEAM

#### ***BEFORE:***

- Keep plans for designated emergency assembly area current
- Make sure that necessary supplies are accessible.

#### ***DURING:***

- Duck, cover and hold at first sign of earthquake. Hold on to furniture legs if furniture moves. If outside, move away from buildings.

#### ***AFTER:***

- Ensure that emergency assembly area is accessible and safe.
- Report to Administrator (Emergency Operations Center). Determine need for help in evacuating. Assist in evacuation.
- Take roll call and report group status to Administrator (Emergency Operations Center).