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COMMUNITY RESPONSE TO EARTHQUAKE THREAT IN SOUTHERN CALIFORNIA

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PART TWO CHAPTERS ELEVEN THROUGH THIRTEEN THE MEDIA RESPONSE AND PART THREE THE ORGANIZATIONAL RESPONSE

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basis for understand	ing community response to	b earchquake preuice tod toward understar	ding media treat-
the public. This par	ated news since the an	nouncement in 1978 (of the southern
California Unlift	it consists of a detaile	d record of earthqua	ke-related coverage
in six newspapers, ar	ad includes some televis	ion and radio report	s, from January 2,
1976 through December	31, 1978. An interpre	tative section inclu	ides a summary
analysis of trends ar	nd patterns based on an	examination of trend	I-lines for total
coverage by the vario	ous newspapers. The app	endices contain a co	oding scheme used
in the newspaper anal	lysis and a summary of s	ignificant events as	reported in
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COMMUNITY RESPONSE TO EARTHQUAKE THREAT IN SOUTHERN CALIFORNIA

PART TWO

CHAPTERS ELEVEN TO THIRTEEN

THE MEDIA RESPONSE

* * *

Final technical report on National Science Foundation grants NSF ENV76-24154 and NSF-PFR78-23887, from 1976 to 1980, including preliminary work under US Geological Survey Grant 14-08-0001-G-347 in 1976. Any opinions, findings, conclusions, or recommendations are those of the authors and do not necessarily reflect the views of the Foundation or the Survey.

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CHAPTER ELEVEN

PERIOD X: APRIL 22, 1978, TO AUGUST 13, 1978

The Nikonov Prediction. A Soviet scientist released a prediction for a major earthquake to occur before the end of the year in the vicinity of the Palmdale Bulge. Andrei Nikonov, a geomorphologist (a specialist in relief features) with the Schmidt Institute of Earth Physics in the Soviet Union, based his forecast of a 7.5 magnitude quake on the correlation he discovered between the span of time it took for crustal deformations to develop and the magnitude of 25 earthquakes that followed in the areas where those deformations occurred. Nikonov's rule of thumb, as interpreted by George Alexander of the <u>LA Times</u>, is this: "the longer it takes for a crustal region to undergo changes, such as the generalized, blister-like swelling that has taken place over a 32,000 acre area of southern California during the last 18-20 years, the more violent will be the ensuing earthquake." The prediction was announced in the form of a press release and distributed to the <u>L.A. Times</u> and several other southern California news organizations by the Information Department of the Soviet Embassy in Washington, D.C.

Local seismologists, when contacted by area newspapers, expressed anger and skepticism over the prediction. Dr. Peter Ward of the U.S. Geological Survey called the forecast "irresponsible." "It's poor science to discuss an earthquake in someone else's country without involving the local scientists in the discussion," said Ward. Dr. Clarence Allen of Caltech said that he was "very skeptical of the prediction and I believe we have an obligation to be skeptical of such reports until we have some firmer evidence in hand." A third scientist who asked to

remain anonymous stated that he knew of Nikonov from Russian colleagues and had been warned to "watch out for him, that he's a little wild." Robert Castle of the U.S. Geological Survey, whose team had just completed a \$1.4 million study of the Bulge, questioned whether there was a link between crustal deformations and subsequent earthquakes. "There is geological evidence," said Castle, "that this kind of thing has been going on for tens of thousands of years." Castle also pointed out that a similar uplift appeared to have occurred in the Palmdale area between 1906 and 1926 without any associated tremors.

George Alexander explained that Nikonov's prediction did not quite satisfy the criteria that American scientists established for assessment of earthquake predictions. These criteria included a fairly specific identification of the of the place, time and magnitude of the tremor and calculation of the probability that the event will occur as forecast. The time and place stipulated in Nikonov's warning were rather broad, said Alexander and no probability of occurrance was given (L.A. Times, SGVT, front, KNBC-TV News, 4-22-78; <u>Antelope</u> Valley Press, front, 4-23-78).

Other predictions. In addition to the Nikonov forecast, there were several other near predictions during Period 10.

Dr. Creighton A. Burk, director of the University of Texas Marine Science Institute announced that evidence indicated a major tremor would occur in the state of Oaxaca, Mexico. The evidence was based on data analyzed with the aid of the university's new computerized seismic monitoring system. Burke and other University of Texas seismologists discovered an area at the southern tip of Mexico where no major quakes had occurred in five years. This was unusual given that the area is a very active seismic zone that normally underwent

continual movement. "The only reasonable interpretation," said Burke, "is that this part of the earth's crust has become locked in place so that seismic stresses are being released in adjacent areas but continue to build up here. It seems inevitable that all of these accumulated stresses will yield a very major and destructive earthquake in Oaxaca." Burke said that he anticipated a quake of 8 on the Richter scale or possibly two quakes of magnitude 6 or 7. He did not say how soon or what the probability of occurrence might be. The Texas researchers planned to go to the area and monitor "everything from changes in magnetic and gravitational fields to erratic behavior of animals preceding the quake." The team planned to utilize the new computerized monitoring system which was already processing seismic data in Costa Rica and was being installed in Panama, Guatamala, Honduras and Mexico. The new system, said Burke, was superior to older monitoring systems in that it was not dependent on conventional power sources as were older monitoring devices. The new system utilizes solar power to radio local ground motions to a centralized recording station. "The objective is to try to catch this earthquake with all the tools and techniques we can," said Burke (L.A. Times, 5-25-78).

Identical Associated Press reports appeared in the <u>L.A. Times</u> and <u>San</u> <u>Gabriel Valley Tribune</u> announcing the findings by Goddard Space Flight Center scientists that the San Andreas Fault was shifting at a more rapid rate that would have been expected from geological history. The ground shifts, measured by laser beams and an orbiting satellite, had reached three inches per year. Center geophysicist David E. Smith said the ground shifts were approximately 50% greater than normal which implied that "strain is accumulating in the region of the San Andreas Fault at the rate considerably larger than we had heretofor expected, implying that an earthquake, when it comes, might be larger because of the additional forces accumulated, or that the quake might occur sooner." Noting that the last great California earthquake struck San Francisco in 1906,

the articles announced that "scientists have predicted a second major earthquake would hit the area sometime between the present and 2025." It was unclear as to which scientists had made the forecast, where along the San Andreas a major tremor would occur or how soon it might strike (CBS-TV, News, 6-18-78; <u>L.A. Times</u>, <u>SGVT</u>, KHJ-TV News, 6-19-78). Results of the laser study were questioned by University of California, Berkeley seismologist Bruce Bolt who pointed out that a faster rate of displacement could mean a major earthquake might occur sooner than anticipated but it would not mean that its magnitude would be greater. The size of the shocks, said Bolt depend on the strength of the rocks. Bolt also said that measuring devices used by northern California scientists indicated a two rather than three inch annual shift in that area. He added that movement of the massive crustal plates varied considerably and the rate could return to normal in a few years (Herald Examiner, 6-19-78).

A study of southern California's last great earthquake which occurred on January 9, 1857, was the topic of a front page feature article by George Alexander in the L.A. Times. Dr. Kerry Sieh of Caltech examined the subsurface "scars" left by major earthquakes in the past and determined that large ground shifts occur, on an average, about every 160 years. Based upon both the trenching study at Pallet Creek and careful research into eyewitness reports of the 1857 tremor, Sieh arrived at several conclusions regarding a future great quake in southern The 19th century tremor caused low frequency, long-period shock California. waves which, if they were to occur in the next major strike, could cause severe damage to high rise buildings. The 1857 quake, according to Sieh, was preceded by two moderate to strong foreshocks in the early morning preceding the main event and possibly by three others in the night before. Sieh considered the foreshocks an exciting finding because such tremors could provide advance warning for future giant earthquakes. Sieh speculated that the next great strike could occur on the San Andreas Fault between Palmdale and the Salton Sea. If his model

of the 1857 tremor is correct, the continuous fault creep and small-to-moderate tremors in that area will continue to chip away at the locked segment just north of the Brawley-Imperial Valley region. If the major tremor were to strike there, the rupture would propagate from southeast to northwest toward San Bernadino, Palmdale and Los Angeles. This would not bode well for the city because long period motions are stronger in the ground ahead of the propagating seismic wave than behind it. "The waves tend to sort of pile up on each other and their amplitude is greater," said Sieh. Alexander concluded his article with the observation that the direction of the 1857 break was toward Los Angeles and the low-rise structures of that time did not fare too badly (<u>L.A. Times</u>, front, 7-10-78). The <u>Valley News</u> on 8-8-78, carried a brief report of Sieh's work on the 1857 quake which differed little in tone or content from the Times feature.

A brief UPI article announced a prediction by Jim Berkland, Santa Clara County Geologist that a moderate earthquake registering between 3.5 and 5 on the Richter scale would occur within ten days (of July 18, 1978) in San Francisco Bay. The forecast was based upon the stresses caused by "lunar and solar tides." Seismologists were critical of Berkland's methods despite his claim to have correctly predicted fifty percent of the time (La Opinion, 7-19-78).

Chinese seismologists, during a visit in Tokyo, said they predicted the great July 1976 Tangshan quake that killed over six hundred thousand people. One of the scientists, Chou Chi-chia said that "unusual earth activities" elsewhere in China just before the quake prevented identification of the area in which the most devastating tremor would hit (Herald Examiner, 7-24-78).

A lengthy <u>L.A. Times</u> article reported a study of predictions by "amateur scientists, psychics, religious visionaries, astrologers and dreamers." Over an eighteen month period two U.S. Geological Survey geophysicists gathered some 2500 predictions from 230 persons. The researchers, Roger N. Hunter and John S. Derr arranged the predictions of non-scientists against a computer

programmed to produce purely random guesses about the time, date, location and magnitude of earthquakes around the world. All were scored against the worldwide record of earthquake events in 1977. The computer and its random guesses won. The amateur scientists, astrologers and psychics scored "significantly worse than chance." The study was initiated in late 1976 and coincided with an earthquake scare in southern California created by Henry Minturn described as "an unemployed security guard who had once worked as a technical assistant for a geophysical exploration firm." The furor created by Minturn "helped persuade the staid Geological Survey, one of the federal government's oldest research establishments, that a review of unorthodox predictions was warranted (<u>L.A.</u> Times, 7-27-78).

Palmdale Bulge. Only five articles which appeared in area newspapers during Period 10 deal with the Bulge. Three of these reports have already been covered in discussion of the Nikonov prediction. The Uplift was mentioned in a <u>Herald Examiner</u> article which featured reports on the scientific status of earthquake prediction at a Caltech conference. The Bulge, it was pointed out, resulted from the constant motion of tectonic plates pushing against one another, plunging beneath one another, creating mountains, volcanoes, earthquakes and surface deformaties. Scientists, once convinced that the Bulge represented stresses which would result in one or more earthquakes, were becoming less firm in that conviction. "We really don't know what the Palmdale bulge means," admitted Peter Ward (<u>Herald Examiner</u>, 6-22-78). University of Southern California geologists hoped to utilize deep oil well instrumentation techniques to gain greater insight into the Palmdale bulge. Dr. Thomas Henyey said that if the Bulge continued to rise at its present rate of two centimeters per year, in a million years "we will have a range of mountains as high as the Himalayas." But this possibility

is remote, according to Henyey, in view of southern California's geological history. Noting that such uplifts had preceded quakes in Japan and China, the USC geologist interpreted the bulge was a sign of an impending large earthquake (Valley News, 7-21-78).

Other prediction topics. The remainder of articles which deal with earthquake prediction fall under the headings of general state of the art reports, legislation, research reports, a "public forum" whose topic was "earthquakes" and a miscellaneous category.

In a report described as the first step toward a national earthquake hazard reduction program, Dr. Frank Press, the President's science advisor, stated that reliable earthquake predictions were at least a decade away. In the report, Press urged scientists "to think twice before issuing earthquake predictions that might unduly alarm the public" (L.A. Times, 4-30-78).

A conference on earthquake prediction and control was held at Caltech June 21st and reported by Elaine Warren in the <u>Herald Examiner</u>. The consensus of the assembled earthquake scientists and civil engineers, according to Warren, was pessimistic regarding accurate predictions in the near future. "We may never know how to accurately predict earthquakes," said Clarence Allen of Caltech. During the early 1970's seismologists were more optimistic particularly in the aftermath of the successful predictions in Haicheng Province, China and the Adirondack area of New York. "There was a general euphoria that all it took was to throw in more money and get a strong program established for prediction and control," said University of California, Berkeley seismologist Thomas McEvilly. The quakes which were accurately forecast, however, gave warning signs, signs which do not occur before some quakes. What was needed rather than more money, said McEvilly is more sensitive instruments to detect pre-earthquake ground movements. It was moted that of the \$75 million which is spent each year on earthquake research \$15 million goes into prediction. Despite the fact that California, with some 1000 earthquake measuring devices, is the most heavily instrumented area in the world, says Warren, "the only certainty that geophysicists are claiming . . ., is that the Great California Quake will eventually happen sometime between today and the year 2025" (Herald Examiner, 6-22-78).

Greater optimism about quake prediction was expressed by Dr. Thomas Henyey who was conducting a study on the interrelationship between oil field activity and seismic activity. The last ten years, according to Henyey, have been "a gearing up phase" a time of developing the necessary techniques to predict quakes. He believed the next decade would be spent learning to interpret the data from these methods. "Eventually, researchers will be able to look at signals such as the changes in internal stress, magnetic fields and water tables to predict earth movements of various sizes. And I believe the public will take these predictions seriously, if they are based on sound scientific evidence, even though there have been many false predictions in the past" (<u>Valley News</u>, 7-21-78).

On May 25, Governor Brown signed legislation which called for a study of earthquake prediction and methods of reducing earthquake hazards. The law appropriates \$12,000 to the state's Seismic Safety Commission to study the feasibility of a comprehensive prediction and hazard mitigation program. The funding level fell far short of the original \$350,000 sought by the bill's author, Sen. Alfred Alquist, D-San Jose (Valley News, 5-26-78).

A program prepared in accordance with the Earthquake Hazards Reduction Act called for "the creation of new federal agencies, widespread reinforcement of structures and extensive research on earthquake prediction, control and hazard reduction." The program was drafted by the President's Office of Science and Technology Policy. A supporting document contended that planning and preparation for earthquakes, "the largest single-event natural hazards faced by the nation,"

had hitherto been inadequate on almost all levels of government. The program establishes a timetable for development of hazard reduction measures through 1983. One agency created by the legislation would be the National Earthquake Prediction Evaluation Council. The agency would not issue warnings, but would provide the governor in whose state the quake was expected an evaluation of the threat. The council would consist of 5 to 10 specialists from the U.S. Geological Survey and a comparable number from outside government. The report identified the ten metropolitan areas which face earthquake risk as: Los Angeles, San Francisco, Salt Lake City-Ogden, Puget Sound, Hawaii, St. Louis-Memphis, Anchorage-Fairbanks, Boston, Buffalo and Charleston, S.C. But of the 39 states where the risk is most obvious, only California has taken extensive measures like modifying bridges, building construction and dams (Herald Examiner, front, 6-4-78).

It was announced that a Japanese scientist had developed an underwater cable system designed to detect tiny signals of an impending tremor. Nozomu Den of the Japan Meteorological Agency said that \$6.7 million had been spent over the last five years to develop the four recorders of 3,000 power magnification which would be connected to a one-once coaxial cable. The cable would soon be emplaced on the 1.4 mile deep sea bed off Cape Omaezaki (Herald Examiner, 6-1-78).

Underwater sensing devices were also being placed in the Gulf of California by American scientists. The sensing devices, which were the first ever to be placed on the ocean floor for a long period, would add to an expanding network of seismic sensing devices throughout the world. The recording mechanisms will be placed in a 12 inch hole drilled under 4,000 feet of water at the mouth of the Gulf of California. The area was selected for the test because of its high level of crustal activity as the Baja Peninsula pulls away from mainland Mexico. The Rivera Fracture Zone traverses the test site and researchers estimate that there is a 90% chance of a measurable earthquake during the trial period. Donald Heinrichs, an oceanographer, said burying the device in the ocean floor

represented an improvement over conventional recording devices which are affected by the noises made by currents and interference in operation caused by soft bottom sediments. If improvement in data justified extra costs, a network of such instruments would be established. The project cost \$200,000 and was funded by the National Science Foundation (L.A. Times, front; <u>Herald Examiner</u>, 7-10-78).

A front page article in the Herald Examiner featured the operation of the Tsunami Warning Center. The Pacific Center located in Hawaii is linked by teletype to 31 seismic stations and 50 tide guage stations. Minutes after the occurrence of a 7.5 magnitude quake near Sendai, Japan, a "Tsunami Watch" was issued, the station nearest the quake reported only a six-inch change in sea level, others detected no change. The watch was canceled 42 minutes after it was issued. The Tsunami Warning System has been in operation for thirty years, but has not achieved sufficient reliability to assure public response. The Honolulu station has issued more than two dozen warnings but only five have been followed by damaging tsunamis. In 1960, a warning was issued six hours in advance, yet many people remained in low lying sections of the Hawaiian port city of Hilo. Sixty-one people were killed in the ensuing tsunami. A Soviet-American program was initiated to improve forecasting ability. Improvements included new pressure sensors which record sea depth changes to a fraction of an inch, development of satellite links between stations and use of a computer for rapid data analysis (Herald Examiner, front, 7-10-78).

A study of the interrelationship between oil field activity and seismic activity focused upon two questions: "does the removal of oil change the earth's internal stress, thereby triggering an earthquake? Does the injection of fluids for secondary oil recovery reduce this stress? Professor Thomas Henyey, a geologist of USC, hypothesized that the withdrawal of oil trapped between the pores of rocks tends to facilitate earth movement where internal stress has built up. Recording

devices were installed in abandoned wells in the Baldwin Hills area to determine the effects of differing fluid levels on seismic activity (Valley News, 7-21-78).

On 5-27-78, 5-30-78 and 6-1-78 the Valley News announced that its "Public Forum" for Saturday June 3rd would be devoted to the subject of earthquakes. "Should there be greater input by all levels of government in earthquake preparedness programs -- including a speed-up in the development of technologies to predict temblors? Should the necessary public funds be allocated for this work, or should the private sector be more involved in these important projects?" On June 3rd five letters were printed. A Van Nuys writer placed responsibility for earthquake preparedness on "all levels of government and the private sector down to and including households. Development of technologies to predict temblors should be governmental, both state and federal." The writer was critical of the \$12,000 appropriation for state legislation to study prediction and hazard mitigation when \$350,000 had been sought. Finally he/she suggested that the prediction methods utilized by the People's Republic of China be studied both to establish better relations with that country and to improve the level of prediction technology in this country. A Northridge woman urged that development of prediction technology be of top priority. "I, for one," she said, "would prefer some warning even though 99 percent of the warnings might be false alarms." She emphasized individual preparedness in her suggestion that people should put aside a few days supply of water, food and medications and determine the safest places to be in home, school and office. Another "Public Forum" writer cited a Valley News editorial of 5-25-78 which was critical of local governments lack of preparedness and dam evacuation plans. He said that the editorial seemed like an extension of a novel, "Goodbye California" by Alistair MacLean which he had just completed reading. He urged others to read the book. "If nothing else it will demonstrate the absolute necessity for a national security capability geared to an infinite

variety of threats and staffed with people with experience, imagination and intelligence." A Northridge man offered the opinion that "it should be sheer idiocy to burden the already overburdened taxpayers with the added and incalculable expense of employing 'experts' to devise a method of predicting earthquakes." He implied that private foundations should finance such ventures. Finally, a retired Los Angeles fireman noted that most structures both woodframe homes and high rise buildings would fare pretty well in a quake. "The seismologist will have my attention when they drive a stake in the ground and accurately predict the 'biggie' at 4:52 A.M. on such and such a date. Until they can do that, I, as a fireman, will be more concerned about the crazies who want to vote for Proposition 13, cutting off their noses to spite their face with hundreds of square miles of dry vegetation surrounding this Valley having a fire potential far in excess of the possible loss of property by earthquakes at any time in the future" (<u>Valley</u> News, 6-3-78).

An editor's footnote to some lengthy excerpts from Alister MacLean's book "Goodbye California" reads; "California is a land of many things -- including the land of the earthquakes. It's a coastal state that could at any moment shake and slide into the cold waters of the Pacific." The book's plot involves a terrorist blackmail in which the antagonist threatens to induce a devastating earthquake with nuclear weapons. MacLean offers the following fictional scenarios were such a giant quake to occur. "Say it struck where you were sitting now (Los Angeles). You'd wake up in the morning -- only of course the dead don't wake -- and find the Pacific where Los Angeles is and Los Angeles buried in what used to be Santa Monica Bay and the San Pedro Channel. The San Gabriel Mountains might well have fallen down smack on top of where we are now . . ., A monster quake off the Golden Gate would be of interest. For starters, San Francisco would be a goner. Probably the whole of the San Francisco peninsula, Marin County would go the same way . . ., the real damage would come from the immense ocean of water that would

sweep into the San Francisco Bay . . ., earthquakes have generated water levels three and four hundred feet above normal. Richmond, Berkeley, Oakland all the way down through Palo Alto to San Jose would be drowned. The Santa Cruz Mountains would become an island." MacLean's novel includes a James H. Whitcomb of Caltech although the statements the author attributes to him are ficticious (Herald Examiner, 7-30-78). In the LA Times "You" section, a San Andreas Earthquake Fault Tour was advertised as one of the "things to do in the Antelope Valley area." The tour area "hardly the place to be when the Big One hits, is otherwise a delightful spot for a leisurely Sunday drive, with its small fishing lakes, picnic spots and herds of cattle and horses grazing in the distance"(LA Times, 4-25-78). Channel Seven News advertisements announced that Dr. George Fischbeck would be simulating "the most massive earthquake yet to hit Los Angeles, because the experts say it is surely coming. When the big one comes," continued the ad, "hundreds of people will die of ignorance or fright. Don't let them be you or your children. Watch every night this week" (LA Times, TV Section, 5-23-78, 5-24-78). The ensuing four part series on KABC-TV entitled "Superquake" focused upon the earthquake danger facing Los Angeles. In the first segment, Dr. George Fischbeck opened by saying that some people believed that the public was fed up with hearing about earthquakes, but students in a science class at UCLA (referring to this project) interviewed a sample of 500 people in LA and found that people overwhelmingly wanted more news. He then presented sensationalized estimates of damage and death based upon an NOAA study in which a quake of 8 or more on the Richter scale was simulated (KABC-TV News Special, 5-23-78-other four segments not minitored). A lengthy article on the Jarvis-Gann Tax Initiative measure began with an earthquake analogy. "It was a little like the earthquake predictions. Everybody agreed that the "big one" would

hit someday. And things went on just about the same as always. But two weeks ago the big one--the Jarvis tax limitation initiative hit with a thunderous jolt that registered 2 to 1 on the political Richter scale." The articles's title read "Jarvis Earthquake Still Reverberating Throughout the State" (LA Times, 6-21-78).

Earthquake preparedness. Several media items which refer to either organizational or individual preparedness in addition to prediction themes have already been discussed. These include the Valley News "Public Forum" letters, the report on implementation of the Earthquake Hazard Mitigation Act, the KABC-TV quake simulation series and the feature article on the Tsunami Warning Center.

The Valley News continued its editorial critique of the lack of adequate governmental preparedness for earthquakes. Citing a Seismic Safety Commission report indicating that less than 15 percent of California's local jurisdictions have effective dam evacuation plans, the editors declared, "there are no credible arguments to justify this inexcusable lack of statewide preparedness for earthquakes and other disasters" (Valley News, 5-25-78). On June 2, the Valley News featured an editorial cartoon by Greenberg which depicts a man labeled "California" sitting on the ground sucking his thumb, with blindfold, earmuffs and teddy bear while the "next big earthquake" is creating a chasm which will shortly encompass him. A brief article announced that copies of the seismic safety plan were once more available to the public. The plan, adopted by City Council in 1975, identifies areas that may be subject to problems during an earthquake. It also identifies areas requiring specialized engineering reports for new construction. The article advised those interested in obtaining the plan to contact Don Wayman or Steve Crother at City Hall (Valley News, "Southland Briefs," 7-6-78).

<u>Building safety</u>. Building safety was, by a wide margin, the most discussed among safety or preparedness issues. Thirty-five reports focused upon the earthquake safety of buildings and other structures. Twenty-four reports dealt with proposed construction of a liquified natural gas terminal at Point Conception and its attendant controversy. Five reports covered the relocation of the Rinaldi school. The remainder of items were classified as miscellaneous.

On April 29, John Hurst, writing in the <u>LA Times</u>, reported discovery of "a relatively young and possibly active earthquake fault" at Point Conception, proposed site of an LNG terminal. The fault, which reportedly ran directly under the planned location of the storage tanks, was discovered by a geologist hired by opponents of locating the terminal at Point Conception. When asked the significance of the fault, the geologist, Donald D. Asquith of the Envicom Corporation said that if the location is not eliminated entirely, it should be given lesser priority among the other four locations under study. A second geologist hired by the State Coastal Commission confirmed Asquith's discovery. Keith McKinney, president of Western LNG Terminal Associates, the consortium planning to build the facility, attributed the discovery to an attempt by the opponent's attorney George Allen "to raise some sensational development"(LA Times, 4-29-78; Herald Examiner 4-30-78).

At a California Public Utilities Commission hearing on May 4, Dr. Asquith testified that a full scale seismic study should be conducted at the proposed LNG site at Point Conception. Based upon his preliminary study, Asquith noted that the fault he discovered at the site gave evidence of having moved in the last 30,000 to 80,000 years. The project is designed to receive liquified natural gas from ships and store it until it is further transported by pipeline (SGVT, 5-5-78)

At their next meeting, the State Coastal Commission selected the Camp Pendleton Marine Corps Base as the top choice for a liquified natural gas terminal. Point Conception, because of the fault discovery, fell to third in the ranking, behind Camp Pendleton and Rattlesnake Canyon (San Louis Obispo County) and ahead of Deer Creek Canyon (Ventura County). The commission's site recommendations were to have been forwarded to the Public Utilities Commission, responsible for a final decision, by May 31. Neither Marine Corps officials nor Western LNG associates were pleased with the decision to locate the facility at Camp Pendleton. A Marine Corps spokesperson explained that the military and the Secretary of the Navy were adamantly opposed to locating the LNG terminal on the 125,000 acre base because it would interfere with defense training and pose a threat to the base's 45,000 inhabitants. Western LNG had campaigned for the Point Conception site and had obtained an agreement from the Southern California Edison Company, owner of the site, to buy the property. M. E. Fuller, manager of engineering for Western LNG, said that building the facility at Camp Pendleton would require two and a half years longer than at Point Conception. Fuller added that Western's seismic consultants regarded the earthquake fault discovered at the Point Conception site "a minor thing." Coastal Commission staff members said that if they had possessed the authority, the Point Conception site would have been ruled out altogether because of quake danger. The Coastal Commission set Monday, May 15th, for a public hearing on the choice of Camp Pendleton (SMEO, front, SGVT 5-8-78; Valley News, 5-9-78).

An editorial which appeared in the <u>Santa Monica Evening Outlook</u> was critical of the "bureaucratic tug-of-war" over the siting of the LNG terminal. The editors reviewed legislation banning the siting of LNG terminals near populated areas and an unsuccessful legislative attempt to divest the "no

growth oriented" coastal commission of any authority in determining site location. But the legislation was watered down, according to the authors, resulting in the awkward procedure currently being practiced. The editors were not favorable toward any of the sites, describing Point Conception as "the Cape Horn of the Pacific" and asserting that it would take an act of Congress to permit the facility to be located at Camp Pendleton. "We fear we may be in deep trouble. Irresponsible legislators, by turning the LNG issue into a political football laced with endless and needless red tape, have increased the risk that the LNG decision will be delayed again. This, in turn, means that southern California will become even more vulnerable than it is now to long predicted gas shortages in the 1980's. If these shortages occur, hundreds of thousands of Californians could be thrown out of work." The impending crisis, it was suggested, might aid Governor Brown in his ambitions to become President. "If there is an impasse with the federal government over the Camp Pendleton site, Brown could blame the Carter administration for California's natural gas problems--and at the same time, appeal to voters on the left who delight in giving our armed services a bad time."

A new development in the terminal siting controversy emerged on May 13, when trenching studies for evidence of earthquake faulting at the Point Conception location evoked protests by Indians. The Indians, who regard the Point Conception area sacred, occupied the site and brought the excavation to a halt. A meeting was set up between Western LNG president Keith McKinney, a representative of the Public Utilities Commission and a five member Indian delegation. The parties were reportedly near agreement the next day. The tentative settlement gave the Indians access to the site for religious purposes and some authority to prevent destruction of the remains of ancient villages and cemeteries on the property. The Indians, in turn, would agree not to obstruct the geological study or future terminal construction. Western

LNG, it was reported, favored the Point Conception site over Camp Pendleton, the top ranked location by the Coastal Commission. Western LNG Associates were anxious to settle the dispute and continue the seismic study in their effort to gain approval for the Point Conception location prior to a July 31 deadline for site selection (LA Times, 5-14-78, 5-15-78).

At its meeting on May 24, the Coastal Commission voted unanimously to recommend Camp Pendleton as the site for California's first liquified natural gas terminal. A final site selection, it was reported, would be made by the Public Utilities Commission which was not bound to adopt the Coastal Commission's recommendation. The Coastal Commission justified its decision on the Pendleton site as causing the least adverse impact. The site had been vigorously opposed by military officials, utility company officials and federal energy staff members. Western LNG officials, who favored the Point Conception site were publicly confident that the terminal would ultimately be built at Point Conception. Keith McKinney, president of Western LNG, disputed the Commission's decision that Camp Pendleton was the most feasible choice contending that a terminal could not be completed near the Marine base before 1987, "way beyond the time when you will see major curtailment of gas services." The Point Conception site was rejected by the Commission due to the possible damaging effects of "high winds, waves and earthquakes." McKinney countered these arguments by asserting that wind and wave conditions simply "aren't bad." As for the fault, "there is still a question as to whether or not it is a fault at all, or whether it is a significant fault" (SMEO, front, Valley News, 5-25-78).

Western LNG Terminal Associates announced on June 1 that trenching operations at Point Conception revealed that the earthquake fault discovered by geologist Donald Asquith did not pose a hazard to the proposed facility. Western's president, Keith McKinney, was quoted as saying, "from an engineering

standpoint it (the fault) has no significance whatsoever." Paul McClay, a geologist representing the State Public Utilities Commission, gave cautious support to Western's position. But Donald Asquith, who discovered the fault, disagreed. "I would consider it a hazardous fault for an LNG facility" (LA Times, SMEO, 6-2-78).

Annoyed by what she termed incomplete coverage of the LNG site selection, Coastal Commission member Judy B. Rosener presented the Commission's viewpoint in a letter to the editor of the LA Times. Rosener pointed out that the Commission was compelled by state law to choose a site based upon the impact a facility would have on local marine environment, recreation, beach access and geology. The coastal panel, she explained, could not make a decision based upon the availability of site property or whether or not the utility favored the chosen location. She added that the Public Utilities Commission, which was charged with final site choice, had different criteria, which included need, cost, timing and availability. Rosener insisted that the Coastal Commission's choice of Camp Pendleton was "not a capricious act, it was a torturous one." The decision was made with "almost all agencies who have responsibilities in the area of coastal resources supportive of our recommendations." This latter point, according to Rosener, was not made in the LA Times article of May 25, nor did it point out the legal constraints under which the Coastal Commission operated (LA Times, 6-5-78).

A brief article in the <u>LA Times</u> on 6-18-78 announced that Public Utilities Administrative Law Judge John Doran had ordered additional trenching studies at the Point Conception site, favored by the Western LNG associates for a terminal. The earthquake fault discovered in an earlier study was the reason for the additional excavations. The Indian Center of Santa Barbara promised to oppose any further trenching in an area they regard

as sacred (LA Times, 6-18-78).

A group of Chumash Indians set up a "spiritual encampment" to protest additional trenching studies ordered by the Public Utilities Commission at Point Conception. About sixty Indians occupied the site which is regarded as the "western gate," the spiritual door through which an Indian's soul passes on to join the souls of his ancestors. Were the LNG terminal to be built, the Indians believe, the soul of the dead Indian would be doomed to wander for eternity. Said Salvatore Ruiz of the Central Coast Indian Council: "To trench up Mother Earth (at Point Conception) is like going to a Catholic cathedral and tearing down the walls and saying to the people inside, "Don't worry about it; go on with your religion." An earlier Indian occupation of the Point Conception site had resulted in an agreement in which Western LNG Terminal Associates promised the Indians access to the site during trenching operations, on site inspection by an archeologist to be agreed upon by both parties and continuing access for religious purposes. According to LA Times staff writer Michael Seiler, "The agreement fell apart early this month when the PUC ordered two more trenches dug in addition to the two large trenches already excavated." Western LNG was unable to find an archeologist to oversee the third and fourth excavations because the professional code of ethics bars such work if the local Indian community opposes it. The Indians, through the Native American Heritage Commission, requested a rehearing on the trenching question. If the PUC denied the request, the Indians vowed to take their case to the California Supreme Court (LA Times; 7-10-78). On July 15, it was reported that no new trenching for seismic evaluation purposes would be undertaken. The decision was reached by Western LNG and the PUC in response to the Indian occupation. PUC Administrative Law Judge set August 1 for the beginning of hearings on site safety considerations (SGVT,

7-15-78).

A report prepared by the State Coastal Commission offered the option of locating the controversial LNG terminal offshore, rather than at any of the onshore sites. The favored offshore site, located twelve miles off Ventura in the Santa Barbara Channel would, according to the report, be virtually free from earthquake danger, be more remote from people and have less environmental impact. The cost of a "Ventura Flats" terminal was estimated at \$500 million but would require considerably longer to build than onshore sites. The offshore site was a longshot, according to Commission staffers and stands a better chance of being selected for a second LNG terminal, which is perhaps a decade away (<u>SGVT, LA Times</u>, 7-16-78).

A July 18 <u>Valley News</u> editorial urged approval of Point Conception as the site for the LNG terminal. The editors predicted dire economic consequences including loss of LNG contracts with Alaska and Indonesia, delays, increased construction costs and loss of jobs if the Public Utilities Commission chose any other site for the facility. "We are convinced that the Point Conception site is the most suitable location for the terminal. We believe it is a safe and financially feasible site that would serve the best interests of the people of Southern California." There was no mention in the editorial of earthquake faulting at the site or Indian opposition to project (Valley News, 7-18-78).

On July 31, the state legislature's mandated deadline for choice of a terminal site, the Public Utilities Commission voted unanimously in favor of locating the LNG facility at Point Conception. Issuance of the construction permit was contingent upon further seismic studies and wind and wave tests at the site. The ultimate decision as to whether the terminal would be built rested with the federal Department of Energy. Western LNG president Keith McKinney remained confident that the DOE would approve the Point Conception

site despite publicly voiced reluctance on the part of federal energy officials to locate an L.N.G. terminal in an active seismic zone. It was also noted that local opponents including area ranchers, Indians and real estate interests were planning to appeal the PUC decision to the state Supreme Court. Several Public Utilities Commissioners expressed regret at having approved the Point Conception site but conceded that it was the only viable choice (L.A. Times, front, L.O., front, 8-1-78; Valley News, 8-3-78).

The <u>L.A. Times</u> of 8-1-78 carried a second article on its front page regarding LNG. This report revealed the findings of a General Accounting Office report on LNG safety. The report warned that liquified gases posed a potential threat to the public and urged the government to impose greater safeguards. Disastrous leakage and explosions could occur said the report, "through sabotage, an airplane crash into a ship carrying liquified gas in a harbor, a tank truck falling from an elevated urban expressway or an earthquake splitting a storage tank." The GAO's recommendations included:

- (1) "Prohibiting expansion of existing liquified gas facilities in densely populated areas.
- (2) Requiring careful evaluation of present urban storage facilities.
- (3) Putting future large energy gas facilities in sparsely populated areas.
- (4) Giving congressional consideration to a new, independent agency to monitor energy safety now the responsibility of many federal agencies."

The American Gas Association, an industry group, attacked the report as misleading. Said association President George H. Lawrence, "the report often poses unreal hypothetical situations which don't relate to industry practices as they exist today" (L.A. Times, Front, 8-1-78).

A new development in the attempt to relocate Rinaldi Elementary School was announced in the L.A. Times on May 18th. Having dropped from consideration an

earlier site because of earthquake faults on the property, The approved site, it was discovered, would require \$1 million in improvements to meet city building requirements. The improvements included construction of storm drains and sewers and extension of two streets. School Board member Phillip Bardos drew criticism when he suggested that another community meeting be held to see if there was still support for the school's relocation. Angry parents accused Bardos of stalling (L.A. Times, San Fernando Valley Section, 5-18-78). A front page article in the Valley News announced that a community action group called Freeway Action for Children's Environment and Safety (FACES) had made a formal request for a Grand Jury investigation into the matter of the long delayed relocation of Rinaldi. In a letter to the Los Angeles County Grand Jury, co-chairpersons Gigi Ray and Peg Ferran detailed their group's struggle to find a new site for the school which parents felt was adversely affected by the construction of a freeway nearby. They accused Los Angeles school authorities of foot dragging and administrative bungling. Grand Jury officials promised to take up the issue as soon as a new group was empaneled (Valley News, front, 7-21-78). School Administrators, however, faced with the \$1 million deficit, uncertainty regarding the actual effects of air and noise pollution on children and the inadequacy of the relocation site architecturally, recommended that Rinaldi not be moved and that the district renegotiate the sound abatement finding with the state Department of Transportation. The Board of Education's Building Committee would take up the question at its July 27th meeting, it was reported (L.A. Times, San Fernando Valley Section, 7-27-78). At that meeting angry exchanges took place between Board member Phillip Bardos, who now opposed the move and parents who felt betrayed and called for court action to force the Board to relocate the school. Bardos was joined by fellow Board member Bobbi Fiedler in calling for an in-depth study of the health effects of air pollution on school children. The Board's planning

committee expressed fears that moving Rinaldi might set a costly precedent affecting some 55 to 68 schools also located near a freeway or busy thoroughfare (Valley News, Front, 7-28-78, 8-2-78).

A Japanese disaster specialist warned that a major earthquake in Tokyo could claim more lives now than the 100,000 who died in the 1923 quake. Masani Sugawara said Japan's wooden houses, while built to withstand earthquakes were highly vulnerable to fires that can follow a major quake (L.A. Times, 5-1-78).

Professors Anshel J. Schiff and T.Y. Yang of Purdue University headed a study of elevator safety under earthquake conditions. They also hoped to develop equipment to record the effects of tremors on buildings. While elevators are considered quite safe, earthquakes pose a particular danger in that the heavy counterweights which ease the load on the elevator's motor may be knocked loose and bang into the cars when they pass in mid-building. The specific goal of the Purdue research was to improve counterweight systems. The report also noted that a survey of older quake prone buildings was underway in Los Angeles. While details were not yet available, the earlier estimate that there were 14,000 structures which could collapse in a major quake according to <u>L.A. Times</u> sources was somewhat high. There were actually about 10,000 pre-1933 buildings in the city (L.A. Times, 5-21-78).

In another building safety study, Ben Schmid and a team of structural engineers used a 6-ton push-pull hydraulic jack to simulate the kinds of loads an earthquake might impose on an old, unreinforced masonry structure. The Los Angeles City Council had acquired the 1913 vintage building in 1977 in a plan to widen Olympic Boulevard. The building was described as typical of the 10,000 to 12,000 similar structures in the city which could collapse in a major tremor. The old tenement was of brick construction with now crumbling

lime mortar. Its joists-timbers which extend from sidewall to sidewall and support flooring and roofing were merely set into recesses in the brick walls and were not otherwise secured. Schmid pointed out that a seismic wave would ripple through the ground under the building lifting parts of the building while other parts remained stationary. Even in the unlikely event that the exterior walls would remain standing, the walls would probably flex enough that the joists would slip out of their recesses and fall, "along with everyone and everything that had been resting on the floorboards attached to those joists." Schmid speculated that it might be possible to reinforce old buildings "by applying half inch thick plywood sheathing directly to existing wood studs in certain walls and by building concrete foundations underneath, if none now exist." Schmid added that such reinforcement would require only one-seventh the cost of replacing such structures and would comply with existing seismic safety codes (L.A. Times, 6-9-78). A one line article announced the replacement of a one half-mile long bridge in Tanshan, China destroyed in the great earthquake of July 1976 (L.A. Times, 7-13-78).

Dam safety. Six articles contained some mention of dam safety during period 10, the lowest number since Period 5 (Nov. 22, 1976, to Feb. 2, 1977).

A brief <u>L.A. Times</u> article announced that faults near the construction site of the \$337 million Melones Dam were not capable of causing an earthquake. The nearest fault offering quake potential, according to a study conducted by a San Francisco geotechnical firm, was 2.6 miles from the dam. The fault could produce a quake of up to 7.5 on the Richter scale at a depth of 6 miles (<u>L.A.</u> <u>Times</u>, 5-16-78).

A May 25 <u>Valley News</u> editorial which sharply criticized the lack of local government preparedness, was particularly critical of the lack of earthquake evacuation plans especially in areas that were located below dams.

On June 9th, the U.S. Senate passed two bills designed to step up safety inspections of thousands of hazardous dams across the country. One measure would authorize \$45 million through fiscal 1981 to encourage states to become more involved in dam safety inspections, thereby phasing out the role of the Army Corps of Engineers in inspecting non-federal dams. This bill was directed mainly at 20 states which had no inspection programs whatsoever. The second measure ensured that the Army Corps of Engineers would have access to all dam sites for inspection and the right to pertinent records (<u>L.A. Times</u>, 6-10-78).

The Los Angeles County Flood Control District experienced severe funding cutbacks due to the passage of Proposition 13. The budget cut amounted to 71%, a reduction from \$40 million to \$12 million. In response, the District layed off 569 employees and demoted 279. According to Art Bruington, chief engineer, there would be service cutbacks as well mostly in the areas of maintenance and emergency response ability. One of Bruington's concerns was for seismic review and proper maintenance of the District's 20 dams (L.A. Times, 6-15-78).

Two articles, one appearing in the <u>L.A. Times</u>, the other in the <u>Herald</u> <u>Examiner</u>, revealed the results of new studies to determine the safety of the proposed Auburn dam in the event of a major quake in the area. The headlines of the two articles were quite different: The <u>Times</u> article contained the heading "Auburn Dam Quake Threat Heightened in New Study," the <u>Herald Examiner</u> read, "Studies Show Auburn Dam Could Be Safe." The <u>Times</u> article, by staff writer Gaylord Shaw, emphasized the findings of U.S. Geological Survey scientists who concluded that faults at the Auburn site could produce an earthquake of 6.5 to 7 magnitude which might cause a surface displacement of three feet. They
also suggested that the weight of the water impounded behind the dam could trigger an earthquake. But separate reports by five private consultants, said Shaw, took "a less alarming view" than the document prepared by the Geological Survey. The other scientists generally agreed that the maximum credible earthquake at the Auburn site was 6.5. They disagreed on the amount of surface displacement with estimates ranging from 1 to 9.6 inches. There was agreement between Survey scientists and Clarence Allen, one of the independent consultants that reservoirinduced displacement on nearby faults "cannot be dismissed, and the reservoir might significantly increase the probability of rupture during the service life of the dam." It was reported that Reclamation Bureau officials were reviewing the types of dams which could be safely built at the site. They were expected to have a decision by the end of the year. The final decision as to whether to proceed would be made by Secretary of the Interior Cecil Andrus. The Herald Examiner report, generated by the Associated Press offered the same information as the Times article but emphasized those reports which minimized the earthquake threat at the Auburn site (L.A. Times, Front, Herald Examiner, 7-29-78).

<u>Nuclear power safety</u>. Four reports in area newspapers dealt with nuclear power safety. Side-by-side articles in the San Gabriel Valley Tribune reported an attempt to take the issue of whether to build the Sundesert Nuclear Power Plant to the voters in November; a second report included statements made by Attorney General Evelle Younger and his energy advisor, Dr. Edward Teller, at a news conference in which Younger, a gubernatorial candidate, presented his views on nuclear power. Two legislative attempts by Assemblyman William Dannermeyer, R-Fullerton, to place the issue of the Sundesert Nuclear Power Plant before voters died in committee. One measure would have read: "Should legislation be enacted exempting the

development of the Sundesert nuclear facility from nuclear safeguard laws?" The other would have put on the ballot a proposed constitutional amendment to exempt Sundesert from nuclear safety laws. A companion article featured Dr. Edward Teller's views, shared by Evelle Younger that nuclear plants were both needed and safe. Teller said that there were many potential nuclear sites in California which were free of earthquake danger. Teller blamed Washington bureaucrats for arousing fears over the disposal of nuclear wastes which he insisted, could be safely accomplished. Younger warned that unless California built nuclear plants to satisfy the state's energy needs, "the lights will go out and depression will follow" (SGVT, 5-12-78).

In a report made public July 19th, the Advisory Committee on Reactor Safeguards concluded that the Diablo Canyon nuclear power plants, built near the Hosgri fault were safe enough to allow operation. But in a report to the parent Nuclear Regulatory Commission the committee reported that it would have applied tougher standards had the two units been in the designing stage rather than being nearly completed. The committee recommended a reevaluation of the projects design in about ten years" taking into account applicable new information about earthquakes and their effects." The Hosgri Fault, according to the U.S. Geological Survey, is 4 miles offshore from the plants and is capable of generating an earthquake of up to 7.5 Richter magnitude (SGVT, 7-20-78). A feature article in the Valley News by Mike Wyma traced the recent history of nuclear energy. Nuclear power has been challenged on two fronts says Wyma: safety and economics. Safety concerns have focused upon possible radiation leakages, particularly in California at facilities like Diablo Canyon where a fault runs just four miles from the plants. Wyma noted that organized opposition like the Abalone Alliance on the West Coast and the Clamshell Alliance on the East have used demonstrations, acts of nonviolent resistance and court action to stop the proliferation of nuclear Their concern has been primarily safety and environmental concerns. power.

But Wyma felt that the biggest road block to the development of nuclear energy was economic. The author noted that from 1967 to 1976 the general construction price index rose by 88% but the cost of generating electricity by nuclear power went up by 136% from 1972 to 1976 alone. The average time required to obtain a construction permit rose from 10.5 months in 1966 to 37.7 months in 1970. More stringent safety regulations and the sheer volume of paper work were blamed for the delays. Wyma added that during 1974 and 1975 the utility companies ordered seven new plants while there were 30 new orders in each of the three previous years. Nuclear fuel -- uranium is becoming less plentiful and world supplies may run out by the year 2000. Wyma quoted many of the facts and figures from a study commissioned by the Federal Energy Research and Development Administration which was conducted by Caltech researchers (Valley News, 8-4-78).

Earthquake events. Three major earthquakes occurring in northern Japan, Greece and Chile caused extensive damage and casualties.

On June 12th, the strongest quake recorded in 1978 hit central and northern Japan. Centered off Japan's Pacific coast, the quake measured 7.5 on the Richter scale killing 21 and injuring 340. Hardest hit was Hiyagi Prefecture, about 180 miles north of Tokyo. Authorities there reported that the quake wrecked 140 houses, knocked down utility poles, bridges and telephone lines and cut roads at fifty-two locations. A tidal wave warning was issued for the Pacific coast of northeast Honshu, Japan's main island. It was later canceled without incident. In Tokyo a weaker intensity was recorded but caused tall buildings to sway for nearly 30 seconds. The Japanese Meteorological Agency said that the quake's force was the strongest in 14 years; since the 1964 Niigata quake which also registered 7.5 and caused 400 casualties. Some reports indicated that

residents in the hardest hit area panicked and fled into the streets. The strongest shock was preceded nine minutes earlier by a weaker quake, then some twenty aftershocks occurred, including one on June 14th which registered 4 on the Japanese scale of 7. There were no further casualties or damage. Eight thousand troops and police were mobilized in the relief effort. Nine reports on the Japanese quake appeared in area newspapers, four of which appeared on the front pages. The <u>San Gabriel Valley Tribune</u> contained three articles covering the quake the <u>Herald Examiner</u> two, the <u>L.A. Times</u>, the <u>Valley News</u>, <u>La Opinion</u> and the <u>Santa</u> Monica Evening Outlook each contained one report.

After a month of lesser tremors, a damaging quake which registered 6.5 on the Richter scale struck the heavily populated area around Salonika, Greece. The death toll exceded 40, 150 were injured. According to one report, nearly every building in Salonika sustained some damage. Panic behavior was reportedly witnessed including people jumping to the street from balconies and flight from shaking buildings. Fear of more tremors, according to some reports, caused an exodus of some 600,000 residents from Salonika, population 720,000. Huge traffic jams were reported. By the evening of the day following the quake, "Salonika was empty of people, except for police, troops and rescue workers laboring with the aid of search lights to dig out the victims" (L.A. Times, 6-21-78). The government ordered a state of emergency and army troops occupied the city in an attempt to maintain order and prevent looting. The following day residents returned to their homes to claim personal belongings and buy food but returned to parks on the outskirts of town to spend a second night outdoors. Tours of the city by civil engineers revealed that buildings built prior to World War II took the brunt of the quake. Newer buildings fared better but most sustained some damage. Tents and medical supplies were air lifted to the area from military bases around the country. Premier Constantine Caramanlis

said that there were no plans to seek foreign disaster aid. On June 23rd, amid continued aftershocks, less than half of Salonika's shops opened despite a government order to resume business. Public Works Minister Nicholas Zartinidis threatened police action to enforce the decree. A strong aftershock measuring 5.0 on the Richter scale struck the Salonika area on July 5th. Falling debris reportedly injured 16 persons, one died of a heart attack. Coverage of the Greek quake included twenty-five articles (six front page reports), the last of which appeared on July 6th, eighteen days after the quake. The <u>Herald Examiner</u> published six reports on the quake, <u>La Opinion</u> and the <u>San Gabriel Valley Tribune</u>, five each, the <u>Valley News</u> four, the <u>L.A. Times</u> three, and the <u>Santa Monica</u> Evening Outlook. two.

A "strong" earthquake occurred near Copiapo, Chile killing one miner as the quake induced a cave-in at a copper mine about 24 miles from Copiapo. The quake registered 6.7 on the Richter scale and was felt as far away as Santiago, 850 miles to the south. Houses were destroyed and communications cut in Copiapo. Approximately seven people were injured badly enough to be hospitalized. The quake was reported in <u>La Opinion</u>, which carried two front page reports, and one report each appeared in the L.A. Times, the Valley News, and the Herald Examiner.

Summary. The events which commanded the greatest press attention during Period 10 were the LNG controversy and the devastating earthquake which struck northern Greece. There were also significant developments in continuing earthquake related events and issues.

The Caltech conference on earthquake prediction was significant in that considerable pessimism was expressed toward accurate predictions in the near future. This stands in contrast to the early optimism following the successful 1975 Hiacheng, China prediction, the accurate forecasts of several small quakes

in California and New York and the infusion of federal money into the prediction effort. Although the reasons for scientific pessism were not explored one might guess that the disappointment was due to such factors as the failure of Chinese seismologists to accurately forecast the July, 1976, Tangshan quake which claimed several hundred thousand lives, the inconclusive results of extensive studies of the Palmdale Bulge and the failure of promising theoretical approaches to produce predictions with any degree of accuracy. Certainly the widespread coverage of the Haas-Mileti findings on the social and economic consequences of earthquake prediction indicated to seismologists concerned with prediction that the public might become ambivalent about the desirability of accurate forecasts.

Appearing for the first time in Period 10 was reference to a predicted great earthquake by the year 2025. This forecast was not a quote from any known scientific source. It appeared in media reports and was attributed to "scientists." The projection was carried in two reports; one appeared in the concluding paragraph of an Associated Press article featuring the findings of Goddard Space Flight Center scientists that movement on the San Andreas fault was more rapid than normal. The report appeared in the <u>LA Times</u> and the <u>Tribune</u> on 6-19-78. A second mention appeared in the <u>Herald Examiner</u> on 6-22-78 which reported on the Caltech conference on earthquake prediction and control. The context in which the mysterious projection appeared might be described as an attempt to salvage some degree of certainty amidst faltering scientific confidence in the ability to achieve accurate prediction techniques.

Finally, there were indications in the media of implementation of the Earthquake Hazard Mitigation Act. The first steps included, a timetable for development of hazard reduction measures, the creation of a National Earthquake Evaluation Council and designation of quake-prone areas of the country which would be granted priority in the hazard reduction effort.

1

TABLE 1

PERIOD X: APRIL 22, 1978, TO AUGUST 13, 1978

1

NEWSPAPER COVERAGE BY TOPICS: FREQUENCIES

Topic	Frequencies							
	LAT	: HE	SMEO	SGVT	VN	LO		
fajor Categories								
Earthquake Events	28	43	14	25	12	23		
Prediction Topics	12	8	0	2	8	2		
Preparatory and Safety Issues	21	4	4	7	19	1.		
Other Items	2	5	1 .	7	9	9		
etailed Topics				l				
Earthquake Events	28	43	14	25	12	23		
General Predictions	11	8	0	1	1 8	Z		
Palmdale Bulge		1 1	0	1 .	<u> </u>			
Whitcomb	0	1 1	0	0	0			
Minturn	1	0	0	0	0	0		
Organizational Preparedness	0	2	0	0	8			
Individual Preparedness	1	0	0	0	3	0		
Building Safety	16	1 1	- 4		10	<u> </u>		
Dam Safety	4	1	0	0	<u> </u>	- 0		
Nuclear Power Plants	0	0	0	2				
Other Items	2	5	1	7	9	9.		
Notal Articles (Per Basic News-			10	20	40	24		
paper Frequencies)	62	00	17	57	40	54		

TABLE 2

NEWSPAPER COVERAGE BY TOPICS: PERCENTAGES

Topic	Percentages							
	LAT	HE	SMEO	SGVT	VN	LO		
Major Categories								
Earthquake Events	45	77	74	64	30	68		
Prediction Topics	19	14	0	5	20	6		
Preparatory and Safety Issues	34	7	21	18	48	3		
Other Items	3	9	5	18	23	26		
Detailed Topics								
Earthquake Events	45	77	74	64	30	68		
General Predictions	18	14	0	3	20	6		
Palmdale Bulge	2	2	0	3	3	0		
Whitcomb	. 0	2	0	0	0	0		
Minturn	2	0	0	0	0	0		
Organizational Preparedness	0	4		0			N	
Individual Preparedness	2	0	0	0	8	0		
Building Safety	26	2	21	13	25	3		
Dam Safety	6	2	0	0	3	0		
Nuclear Power Plants	0	0	0	5	3	0		
Other Items	3	9	5	18	23	. 26		
	100		1.00					
lotal percentage*	L	1 100	1 100	1 100	1 100	1 100	1	

*Column totals may add up to more than 100% due to multiple coding

PERIOD X: APRIL 22, 1978, TO AUGUST 13, 1978

CHAPTER TWELVE

PERIOD XI: AUGUST 14, 1978, TO DECEMBER 31, 1978

The Santa Barbara Earthquake. At 3:45 PM on August 13, a sharp tremor caused injuries and structural damage to Santa Barbara and the surrounding area. The Caltech Seismological Laboratory reported that the quake measured 5.1 on the Richter scale and was centered in the ocean floor about six miles south of Santa Barbara. The quake was described as a sharp jolt and severe shaking which lasted about ten seconds. The quake was felt in five counties: Santa Barbara, San Luis Obispo, Ventura, Kern and Los Angeles.

The injuries reported were mostly minor. Between sixty and seventy people were treated at Goleta Valley Hospital for cuts and bruises inflicted by flying glass, burns caused by spilled boiling water and injuries sustained in quake-induced traffic accidents. In keeping with hospital disaster policy, the emergency room of the hospital was moved outside to the parking lot as a precaution against aftershocks. The hospital set up a "15-gurney train" with five areas for treatment of burns, lacerations, possible heart attacks, obstetrics and a general medical area designated "anxiety and bandaids."

The quake caused derailment of a diesel locomotive and twenty freight cars in the Ellwood area about three miles west of Goleta. One car of the train came to rest on nearby US 101 and blocked traffic. A landslide induced by the quake blocked all lanes of Route 154 in the San Marcos Pass area. Damage was heaviest in the beach areas. An estimated \$9 million in damage was

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done to the University of California campus near Santa Barbara. Thousands of books were scattered ankle deep in the library, laboratory facilities and heating and cooling equipment were badly damaged. Television and radio stations were knocked off the air for several hours. Downed power lines caused several fires, none of which caused major loss. Thousands of windows shattered and mobile homes were shaken from their foundations. Several roofs collapsed and air controllers at a nearby airport abondoned a flight tower when a 5 degree list was discovered in the structure (<u>SGVT</u>, front; <u>SMEO</u>, front; <u>LA Times</u> (four articles, one front); LO, front; Herald Examiner, front, 8-14-78).

A security official at the Diablo Canyon nuclear power facility near San Luis Obispo said that the quake did not register on the plant's earthquake monitor (Herald Examiner, front, 8-14-78). The quake caused 50 to 80 cubic meters of soil to fall from a bluff within a quarter mile of a proposed site of the controversial LNG terminal at Point Conception. Al Pizano, Santa Barbara district manager for the Southern California Gas Company said that the soil slippage and the quake would have no effect on Western LNG Associates (a firm formed by Southern California Gas Company and Pacific Gas and Electric Company) plans to build the terminal at Point Conception. Pizano reported that a team of geologists dispatched to the site by the Public Utilities Commission on August 14 found no evidence of earth movement on the fault located there and only minor soil slippage. Others were not as confident as the utility company. Paul Wack, assistant Santa Barbara County planning director and chair of the County LNG task force said, "We hope that the state and Western LNG take the quake as seriously as we do." Activist Tom Hayden announced through his Campaign for Economic Democracy that he had sent Governer Brown a telegram warning of the seismic dangers of proceeding with the Point Conception LNG site (LA Times, 8-15-78). Santa

Barbara Indian Center spokesman Johnny Flynn said the quake confirmed the danger of building an LNG terminal at Point Conception and announced that the Indian Center would file suit in Santa Barbara Superior Court charging Western LNG Associates with creating a public nuisance by digging two trenches to study the site's geology (SGVT, 8-17-78). The Coastal Commission admonished the Public Utilities Commission for their choice of Point Conception citing the Santa Barbara quake as warning of what might occur at a future LNG facility. In a letter to the Public Utilities Commission, the Coastal panel's director Michael Fischer formally petitioned for a rehearing on site selection (SGVT, 8-17-78). A Valley News article offered a somewhat different version of the Coastal Commission's position. Commission president Bradford Lundborg was quoted as saying that he did not oppose the PUC's selection of Point Conception as an LNG site but objected to the PUC's removal of environmental controls imposed by the Coastal Panel. The controls had included a requirement that the Coastal Commission monitor all LNG terminal operations which could result in spills or damage to public beaches or kelp harvesting, The PUC also overrode a Coastal Commission recommendation that a sea water generating system not be used at the terminal due to its harmful effect on marine life. Lundborg's comments were made at a news conference on August 16 (Valley News, 8-17-78). The Coast Guard reported that the quake apparently caused no increase in oil seepage or damage to oil drilling rigs in the Santa Barbara Channel. Some increase in the amount of surface oil was observed northwest of the city (Valley News, 8-15-78; LA Times, Herald Examiner, SGVT, 8-16-78).

On August 14, the Santa Barbara County Board of Supervisors declared a state of emergency. Such a declaration is the first step in the direction of state and federal aid. On the following day, Governor Brown also declared Santa Barbara in a state of emergency and announced that a team of state officials

would conduct an assessment of damage to the area. Jeff Samson, assistant county administrative officer, noted that approximately \$4.5 million of the damage was to private homes, very few of whose owners had earthquake insurance (<u>LA Times, Herald Examiner, SMEO</u>, front, 8-15-78; <u>SGVT</u>, <u>LA Times</u>, <u>Herald Examiner</u>, 8-16-78, 8-16-78). On September 1, it was announced that some victims of the August 13 quake would be able to seek low cost federal loans through the Small Business Administration. The four counties designated a disaster area included Santa Barbara, Kern, San Luis Obispo and Ventura. Uninsured homeowners in those counties became eligible for the loans (<u>SGVT</u>, 9-1-28).

Significant aftershocks of the August 13 event were reported on August 17, 3.8 Richter magnitude (Valley News, 8-17-78), September 12, 3.7 (SGVT, 9-12-78; LA Times, SMEO, VN, 9-13-78) and September 23, 3.6 (SGVT, 9-24-78). In all, over thirty aftershocks were recorded in the area of the damaging Santa Barbara quake. An LA Times article which appeared the day after the August 13 quake recounted Santa Barbara's earthquake history. The city's worst quake occurred on June 29, 1925, ten people were killed with widespread property damage. On that quake's first anniversary, the city was badly shaken again. Another major quake on June 30, 1941 did considerable damage but caused few casualties. University of California at Santa Barbara seismologist Michael Reichle speculated that the Pitas Point Fault, one of several in the Santa Barbara channel, was responsible for the quake (Herald Examiner, 8-15-78).

The US Geological Survey created a special panel of scientists from Caltech, the University of Southern California and USGS's Center for Earthquake Studies at Menlo Park to look into the possibility that the Santa Barbara quake had precursory events. Three such events were to be investigated.

A small temblor which measured 2.3 on the Richter scale occurred three hours before the main shock on August 13. The Survey was also curious about a bubble of natural gas at a Texaco drilling site in the Santa Barbara Channel which erupted to the surface four days prior to the quake. A swarm of between 50 and 100 small tremors was discovered to have occurred very close to the quakes epicenter in late March and early April. There were doubts expressed however as to whether the Santa Barbara quake had any precursory signs. Texaco officials reported that it was quite common to hit pockets of natural gas when oil wells were being dug in the Santa Barbara Channel. Dr. Hiroo Kanimori, an expert on earthquake foreshocks, expressed doubts that the quake swarms of March and April shared the same epicenter with the August 13 event. The Channel, he pointed out, is heavily criss-crossed with faults, making it nearly impossible to identify which fault moved on August 13. The panel was chaired by geophysicist Russell Wayland and was to provide a preliminary report to USGS headquarters by December 31 (SGVT, 8-18-78). On September 9, it was reported that the panel had ruled out the natural gas bubble as an earthquake precursor or that the two events were related in any way (LA Times, 9-8-78). A Hollywood Hills couple reported strange behavior on the part of their cat approximately four hours prior to the Santa Barbara quake. Jean Selleck told the LA Times that her cat began a strange wail and walked around her in circles at 11:25 AM, the day of the quake. The Sellecks recalled similar behavior from the cat the night before the 1971 Sylmar quake (LA Times, 10-3-78).

A <u>Valley News</u> editorial which appeared two days after the quake urged "all levels of government as well as the public at large to accelerate the formulation of statewide earthquake disaster plans--including programs to evacuate large masses of people." The editors cited California Seismic

Safety Commissioner Will H. Perry's report released nine months earlier in calling for more and improved disaster preparedness programs, emergency operating centers, evacuation training for local officials and disaster workers and greater direction and aid from the State Office of Emergency Services. The editors also hoped that the Santa Barbara quake would speed up the federal inspection of dams around the country. "Certainly, Santa Barbara's jarring earthquake on Sunday afternoon was a grim reminder that residents of the San Fernando Valley and its neighboring communities are not immune to temblors of equal or greater intensities"(Valley News, 8-16-78). The State Seismic Commission scheduled a fact finding hearing in Santa Barbara to look into ways of stabilizing dwellings, particularly mobile homes. Commission Director Robert Olson noted that more than 300 mobile homes were damaged in the August 13 quake which knocked them off their "precarious" foundations. Euguene Schader, a civil engineer, explained that engineering techniques existed to make the homes more stable but current state law did not allow mobile homes to be permanently attached to foundations because they are classified and taxed as vehicles. Jack Kerin, assistant chief, State Department of Housing and Community Development, said the mobile home owners themselves, citing cost, had resisted attempts to require more stable fastening methods. The fact-finding hearing was an attempt, according to commissioners, to enlist the advice and support of the mobile home owners in any change in regulations (LA Times, 9-15-78). Safety engineers at the University of California at Santa Barbara said they learned a great deal from the quake because it exposed many potential hazards and structural weaknesses. The event also pointed out the need for a more effective public information program during emergencies, according to George Silva, director of emergency services for Santa Barbara County. Details of what was learned or the type of public information needed

was not specified in the report (Valley News, 10-8-78).

Other significant earthquake events. Cracks in the ground and swarms of small quakes near Mt. Shasta set off speculation that an eruption may occur. Although it has not erupted for 200 years, Mt. Shasta is still classified as an active volcano. Hundreds of small earthquakes ranging in magnitude from 1 to 4 on the Richter scale were reported in the first two weeks of August. State Geologist James Davis reported discovery of discontinuous north-south cracks nearly a mile long and one large block of ground which sank three feet. The Shasta Dam, according to Davis' office, was in no danger (SGVT, 8-18-78; Valley News, 8-20-78). Seismic activity at Shasta was again reported at the end of August. About seven tiny quakes a day were being recorded on seismographs moved to the site after discovery of the cracks and subsidence. The California Division of Mines and Geology said that any possible eruptions or earthquakes at Mt. Shasta would not endanger people or property since the area is very thinly populated (Valley News, 8-30-78; Herald Examiner, 8-31-78). A 3.7 magnitude quake occured on Mt. Shasta October 13th. University of California at Berkeley seismologists called the quake an aftershock from an earlier quake (L.A. Times, SMEO, 10-14-78).

An earthquake measuring 5.5 Richter and centered about 60 miles southwest of Guatamala City, caused a tidal wave which killed ten people. The wave caused the fatalities in Acajutla, El Salvador's main port. Two thousand people were left homeless. Red Cross spokesman Javier Mendez said the National Guard, the Salvadorian Navy and the Red Cross evacuated 2000 of the 10,000 residents of Acajutla (<u>Herald Examiner, SMEO, LO, 8-19-78; L.A. Times, Valley</u> News, 8-20-78).

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Germany's strongest earthquake since 1943 caused millions of dollars in property damage but caused no casualties. The quake which occured Sept. 3 registered between 5 and 7.5 on the Richter scale and was centered in southern West Germany. The historic Hohenzollern Castle suffered extensive damage. The area is thinly populated which accounted for the absence of casualties, according to reports (L.A. Times, SGVT, LO, 9-4-78).

The largest recorded quake of the year struck a heavily populated region of Iran on September 16th. Late reports estimated that 15,000 and possibly as many as 25,000 people were killed in the 90 second long tremor recorded at 7.7 on the Richter scale. The quake's epicenter was near Tabas, located 400 miles southeast of Tehran. The Iranian news agency Pars reported that only 2,000 of Tabas' 12,000 people survived the quake and most of those were seriously injured. Tabas and Firdaus (population 100,000) were the cities hardest hit. The quake destroyed forty villages and badly damaged sixty others.

One thousand Iranian army troops were sent to the devastated areas to assist in digging bodies from the ruins. Corpses were being buried in mass graves. Many people buried their own dead family members. The Iranian Air Force was flying-in food and medical supplies, landing on a dirt airstrip on the outskirts of Tabas. Emergency medical facilities replaced two hospitals which were reduced to rubble. Reports indicated that "conservative Moslem clergymen who had challenged the Shah's regime in recent months also sent dozens of truckloads of food, blankets and medicine in a parallel effort that appeared to have political overtones." The empress took a tour of Tabas after the quake but was quickly escorted away by security men when angry residents began shouting, "dig out the dead." Complaints mounted that the relief effort was confused and poorly coordinated. The Shah reportedly ordered an investigation into the complaints.

A second quake struck southwestern Iran on December 16th. Apparently unrelated to the earlier tremor, the quake registered 5.5 on the Richter scale and killed at least 42 persons. Over 17 villages around the towns of Masjid-e Solaiman and Izeh were destroyed or severely damaged (<u>L.A. Times</u>, <u>L.O.</u>, front, 12-17-78). The September 16th quake was the topic of nineteen reports in Los Angeles area newspapers, nine of which appeared on the front pages. The <u>L.A. Times</u> contained five articles, <u>La Opinion</u>, the <u>Herald Examiner</u>, <u>Outlook</u> and the <u>Tribune</u> each carried three and the <u>Valley News</u> two.

On November 30, a series of quakes caused nine deaths and 500 injuries in Mexico City and the surrounding areas. Five quakes were recorded between 1:55 and 3:15 p.m., the largest of which registered 7.9 on the Richter scale. The U.S. Earthquake Information Center at Golden, Colorado reported that the quake was the largest recorded since an August 1977 quake in the Indian Ocean registered 8.9. The shaking lasted two minutes and damaged over 750 buildings in the capital. In an article which accompanied a lengthy front page L.A. Times report of the quake's occurrence, three University of Texas scientists were credited with having accurately predicted the quake. "With uncanny precision," wrote George Alexander, "a team of scientists at the University of Texas accurately forecast, more than one year ago, both the place and magnitude of Wednesday's destructive earthquake off the Mexican coast." In an article published in the October 1977 issue of Pure and Applied Geophysics, Drs. Tosimata Matumoto, Gary Latham and Masakazu Ohtake said that a 7.5 magnitude quake could occur anytime in the near future at a point 16.5 degrees north latitude and 96.5 degrees west longitude. The National Earthquake Information Service pinpointed the quake at 16 degrees north latitude and 96.4 degrees west longitude, an error of about 30 miles. Matumoto said the forecast was based upon a particular seismic pattern in the area. The researchers had noticed that an area of fault near Oaxaca, known to produce frequent earthquakes had not

moved since 1973. They operated on the knowledge that when a quake occurs, "strain does not disappear or evaporate. . ., it is transfered to other regions upstream and downstream of where the quake took place. Those upstream and downstream regions are subjected, in turn, to growing accumulations of strain until, finally, they too, rupture and pass on the strain to adjacent areas." Matumoto said that two strong quakes which occured in 1965 and 1968 bracketed the 250 kilometer area near Oaxaca and put an increasing amount of strain on it. The stress was so great that it temporarily "locked" the region from mid-1973 on and there was no seismic activity along that section of the fault until November 30th. Matumoto called his group's quake warning a "forecast" rather than a prediction since an estimate of time and probability of accurance were not stated. Nine newspaper articles reported the Mexico quake, seven others mentioned the event but focused primarily on the forecast. The event drew three reports in the L.A. Times, two each in the Valley News and La Opinion (all four on the front pages), one front page report in the Outlook and one page 2 article in the Tribune. The forecast received four mentions in L.A. Times' articles (two front page reports) and one each in the Valley News, the Tribune and La Opinion.

<u>Predictions</u>. Prediction topics have been divided into several categories: the Palmdale Bulge; quake warnings, forecasts and near predictions; prediction related research (including the LA mayor's Task Force on Earthquake Prediction recommendations); state of the art of prediction articles and a book review.

The Palmdale bulge was mentioned in five articles during Period 11, two articles featured the Uplift as the main topic. All reports appeared in the L.A. Times, one report received front page priority. A lengthy front page article

by Times staff writer Robert Toth explored the background events which resulted in substantial budget cuts in the earthquake hazards reduction program. Congressional appropriation committees, alleging management deficiencies, cut the program's budget 16% to \$48.8 million for the fiscal year that begins Oct 1. Most of the cut, according to Toth, was made in the area of research which lagged behind the most, social and behavioral studies into how persons and institutions would respond to credible earthquake_predictions. The \$4,8 million requested for the National Science Foundation's social policy research was cut 80% to just \$800,000. This drastic reduction in funding was attributed to a scandal in which Dr. Eugene Haas of the University of Colorado was a principle. Haas, it was reported, misused National Science Foundation funds by paying travel expenses and apartment rent for his secretary out of a grant he had obtained to study the social and economic implications of earthquake prediction. Although the funds were recovered after Haas pleaded guilty to a felony charge of misusing federal grant money, the incident was a key factor in House deliberations which resulted in the budget cuts. Another aspect of the program, the improvement of construction standards for buildings, dams, bridges, pipelines and other structures also suffered funding reductions. It was unclear from this report just why this element of the project was cut. One part of the program which escaped budget reductions was site research that deals with the effect of seismic ground motions on various types of soil and rock. Toth attributed the differential treatment to Senate and House Science Foundation subcommittee "antagonism toward 'soft science' projects whose findings often seem to conclude the obvious and are thus easy targets for ridicule." This year, noted Toth, the subcommittees, headed by Sen. William Proxmire (D-Wis) and Rep. Edward P. Boland (D-Mass) were particularly "vindictive" due to exposure of the Haas scandal. Despite attempts by Senators Brown and Cranston of California to restore the funds, the Senate voted to approve the scaled down House version of the Science Foundation budget. The earthquake program funds had risen 50%

in the three preceding years according to the report, "fueled by fear and promise: the discovery of the ominous Palmdale bulge in southern California, which might be the precursor of a massive quake, and the first successful prediction of a major earthquake -- the forecast by Chinese scientists at Haicheng, which was credited with saving thousands of lives in February, 1975 (L.A. Times, front, 10-15-78). Also containing a mention of the bulge was an October 16th report by George Alexander on the survey of community response to earthquake danger in southern California conducted by Dr. Ralph Turner at UCLA. The survey results quoted by Alexander focused on media coverage of earthquakes. The author reproduced figures which demonstrated that approximately 75% of those polled felt that they were receiving too little information about; what to do at the moment an earthquake strikes, predictions of coming quakes, the Palmdale bulge as a possible earthquake precursor and what government officials were doing to prepare for a quake. Forty three percent felt that the media gave too much attention to the forecasts of non scientists. Turner was quoted as saying that dissatisfaction with media coverage of these topics tended to contradict the notion that Californians cope with earthquake danger by not thinking about it. Turner also suggested the possibility that the contradiction might be explained away due to the low prominence that quake danger occupies in people's everyday lives. Nevertheless, the findings did indicate a public desire to become more informed of earthquake hazards, Turner concluded (L.A. Times, 10-16-78). On October 17th, the column "Around the Southland" by David Larsen featured a slogan seen on a bumper sticker which read: "The Palmdale Bulge is Not all San Andreas' Fault" (L.A. Times, 10-17-78). An article entitled, "The Bashful Palmdale Bulge" announced that the geodetic study of the bulge, the results of which were expected sometime during the summer of 1977, were still not ready. The survey, costing \$1.5 million, was commissioned by the U.S. Geological Survey after it was discovered that a huge area of southern

California desert had risen, then partially subsided over a relatively short span of years. The project had been undertaken with some sense of urgency due to the opinion of seismologists that the uplift might be a precursor of a large, damaging earthquake. The survey had been delayed, according to the report, because of the mass of data and certain measurement discrepancies which had to be rechecked. It was hoped that the survey would permit an updated "snapshot" of the uplift, providing seismologists with a clue to its meaning (LA Times, 12-7-78). A report presented to the American Geophysical Union meetings in San Francisco theorized that the Palmdale bulge may be one manifestation of a "slow" earthquake. This type of seismic event occurs over a number of years and because it takes so long to release accumulated stress it presents no danger of serious damage. The idea that the Bulge may represent such an event was advanced by Drs. John B. Rundle of the Sandia Laboratories and Wayne Thatcher of the US Geological Survey. The slow earthquake, according to Rundle, occurs when some types of rock layers relax or flow plastically when subjected to stress rather than abruptly fracture. The stress is shifted to other areas, in this process, without a violent tremor on that section of the fault. When there is a crack in the lithosphere, the 30 mile thick outermost layer of the earth's crust, the stress eventually works its way upward "like a bubble in very thick mud." When the bubble reaches the top crustal layer, it could do one of two things: it can break the crust in a violent quake or cause it to deform slowly. Rundle and Thatcher believed the latter action was occuring in the Palmdale area. "If the model is correct," said Rundle and Thatcher in their report, "it would imply that episodes like the Palmdale uplift are fairly common historical events in southern California and need not be associated one-to-one with large destructive earthquakes." The two scientists added that a similar "swelling and deflation occurred between

1897 and 1926 without an immediate large quake. Caltech's Don Anderson pointed out that the notion of slow quakes was new, the model presented by Rundle and Thatcher was untested and that scientists should not be too sanguine about earthquakes, even if the model eventually receives support. It is possible, continued Anderson, that slow quakes may precede rapid tremors in a cause and effect manner. The article's author, George Alexander, referred to the anxiously awaited geodetic survey, implying that its analysis may hold some clue to the mysterious uplift (LA Times, 12-24-78).

Several earthquake warnings were issued in the aftermath of seismic events. One warning involved the occurrence of earthquakes as a possible precursor to a volcanic eruption. A swarm of hundreds of earthquakes ranging in magnitude from 1 to 4 on the Richter scale was being considered a possible precursor to a Mt. Shasta eruption, according to State Geologist James Davis. Although Shasta had not erupted for 200 years, it was still classified as an active volcano (LA Times, 8-19-78). A series of quakes near Tokyo led experts there to warn that another major quake, perhaps as large and damaging as the 1923 tremor which killed 140,000 people and caused widespread damage, could hit the area at any time (LA Times, 9-2-78). A quake registering 6.6 occurred near Taipei, Taiwan, causing damage and panic, according to a UPI report. A meteorological agency on the island had announced just two days prior to the event that "a new quake was due at any time." The agency warned that more earthquakes could strike in the next few months (LA Times, 9-5-78). In the wake of a series of tremors which killed nine and injured 500 in Mexico City, local seismologists cautioned that new quakes could occur at any moment, given the recent seismic activity in the Pacific (La Opinion, 12-14-78). A seismologist who studied earthquakes which occurred between 1900 and the present said that California appeared to be in the midst of an unusual lull in earth-

quake activity. Touson Toppozada stated in an interview that he feared that the state may be overdue for a large, damaging quake. Said Toppozada, "if I had 10 centuries to look at, I could tell if this lull was normal or ominous" (Herald Examiner; SGVT, 10-16-78). An earthquake shook parts of northern New Jersey on June 30, 1977, prompting local officials to contact the Lamont-Doherty Geological Observatory at Columbia University for advice. Dr. Yash Aggarwal determined that the Ramapo Fault ran directly under the town of Mahlwah and was capable of generating a major quake. He projected that over the next 100 year period, the Ramapo Fault was likely to undergo one quake of six on the Mercalli scale. Aggarwal recommended that "critical" facilities not be built on the fault including liquid natural gas units, hospitals or schools (SCVT, 11-18-78; LA Times, 12-3-78).

Unusual animal behavior as a possible precursor to earthquakes was again a topic of media attention, as new studies were initiated. Dr. Arnfrid Wuenschmann, director of Munich's Hellabrunn Zoo, recounted animal behavior abnormalities which were observed just prior to a damaging quake on September 3. Wuenschmann said a huge tropical fish became frantic, broke through the wire netting around its aquarium and died, elephants became restless prior to a 1976 tremor and many pet owners wrote to the zoo describing similar frenzied behavior in their pets before quakes. Seismologists were skeptical, according to the report, in that such behavior may appear a few seconds to several days prior to a quake and the reactions are difficult to measure. A Stuttgart geophysicist pointed out that reports of animal sensitivity to tremors are heard only after a quakes occurrence (<u>Valley News</u>, 9-9-78). A German biochemist with the Max Planck Institute in Berlin studied accounts of behavioral anomalies in animals and hypothesized that they were sensing electrically charged aerosol particles produced by ground currents preceding

a quake. Dr. Helmut Tributsch said that past research had demonstrated that intake of positively charged ions can increase the production of a neurohormone called serotonin which affects psychological functioning--causing migraine headaches, nausea and irritability. Such charged particles may affect animals in the same way. Tributsch added that controlled scientific studies must be done before observation of animal behavior could serve as a reliable earthquake warning device (Valley News, 12-27-78). Another study which was to be a joint project of the US Geological Survey at Menlo Park and a zoological garden called Marine World-Africa, USA, would involve systematic observation by trainers and handlers of the animals' daily activities. The zoo is located just thirty miles from the San Andreas Fault. USGS Geophysicist Jack S. Evernden hoped that the study might provide some insight as to what triggers the animals to react. Some scientists believed that changes in electric, magnetic or gravitational fields were responsible, others attributed the reactions to sounds inaudible to humans, minute ground movements or a variety of atmospheric changes which precede a quake. Evernden explained that observers would record "aggressive behavior, vocal expression, out-of-season breeding, unusual movements or the appearance of depression, stubbornness or apprehension" in park animals. If tremors or movements occur along the fault, scientists would check the records of animal behavior for the days preceding the movement (La Opinion, 12-2-78; Herald Examiner, 12-21-78).

A Task Force on Earthquake Prediction appointed by LA Mayor Tom Bradley submitted a report reflecting two years of study by the 26 member panel. The report urged the city to take steps to cope with anticipated economic and social problems resulting from scientific predictions of earthquakes. The report outlined the problems which might accompany a credible prediction as: (1) "determining the immediate response once a prediction is

verified, both to avert panic and to help achieve credibility for the prediction so that the public will in fact benefit from it, (2) overcoming inaction by people who might believe the prediction but prefer to cope with it by living normally, (3) recognizing that family stability will be important in the fact of an earthquake prediction, and thus taking early steps, through parents and schools, to prepare children for what might lie ahead, (4) heading off flights of capital out of an area, reducing work absenteeism and combating potentially declining tax revenues at a time when the need for public services may be increasing, (5) determining whether buildings that might prove hazardous in an earthquake should be upgraded, vacated or demolished, (6) clarifying legal responsibility for any financial losses incurred because of earthquake predictions. The most significant recommendation, according to LA Times staff writer Erwin Baker, called for the city to prepare "an earthquake prediction response plan geared to the time, location, magnitude and probability or reliability of the prediction." Media reports on the Task Force findings tended to focus greatest attention on panel member James Cook's observation that prediction had the potential to cause considerable economic disruption in the predicted impact area and Dr. Ralph Turner, also a Task Force member, who pointed out that contrary to popular belief, panic in the face of a disaster was not common or widespread. Public reaction, according to Turner, would depend upon the kind of leadership exerted by those in responsible positions in the community. An LA Times editorial of November 8 urged that the problems be seriously addressed by city government (LA Times, 10-28-78, 11-8-78; SMEO, 10-28-78; Valley News, 10-29-78; Venice Marina News, 11-2-78; KCBS-TV News, 10-27-78).

Two reports in <u>La Opinion</u> dealt with the state of the art of earthquake prediction. According to Antonio Quesada, a specialist in scientific affairs

for the Organization of American States, Latin American seismologists will be able to predict earthquakes as scientists in other countries have done. Although the technology of prediction has not been perfected, experts do know a great deal about such seismic events and can advise officials in vulnerable urban centers on how to protect lives and structures (La Opinion, 10-26-78). A November 19 article featured earthquake prediction and Hiroo Kanamori who was in Caracas, Venezuela at the time for a symposium on geophysics sponsored by the Venezuelan Foundation for Seismic Research. The biographical sketch of Kanamori noted that the Caltech geophysicist was regarded by colleagues as a world authority on the physics of earthquakes. He had analyzed the rocks gathered by American astronauts on the moon's surface, had taught in both Japan and the United States and was doing important research in the field of quake prediction. Asked if scientists could predict earthquakes, Kanamori responded that exact specification of time, place and magnitude was not possible but some quakes, like the one which hit Caracas in 1967, was preceded by a series of micro-tremors which, if more fully understood, might prove to be a tip-off to future large tremors. Kanamori felt that the technology to determine location and time of occurrence of an impending quake could be developed before the magnitude and duration could be accurately forecast. At present, earth scientists could only project that a quake might occur within very broad parameters of time, place and magnitude. Kanamori affirmed that even inexact predictions could have the beneficial effect of motivating government officials and the public to take preparatory measures (La Opinion, 11-19-78). A Valley News editorial used the occasion of the powerful Mexico City quakes to urge support for scientific research into earthquake prediction (VN, 12-1-78). At the American Geophysical Union meeting in San Francisco, Don Anderson explained the advantages of the new computerized seismic network called

SCARLET (Southern California Array for Research on Local Earthquakes and Teleseisms). It is the largest and most automated seismic array in the world, said Anderson. It consists of 140 seismographs scattered throughout southern California and connected to a computer system which can quickly and accurately determine location and magnitudes of earthquakes in the area. Improvements over older systems, explained Anderson, were in more rapid analysis, ability to record smaller quakes and better discrimination between seismic motion and background noise (Valley News, 12-7-78).

A highly sensationalized advertisement for a book entitled We Are The Earthquake Generation by Jeffery Goodman appeared in the Calandar section of the LA Times on August 20. According to the advertiser, B. Dalton Bookshops, the book features the predictions of psychics that "beginning in 1980, California and the rest of North America will be hit by catastrophic earthquakes and coastal changes." The psychics were credited with "an amazingly accurate record of forecasting previous earthquakes." The predictions were assembled and analyzed, continued the announcement, by Dr. Jeffery Goodman, engineer and anthropologist, who found that "they were supported by a wide range of geological data." A review in the Herald Examiner was critical of Goodman's book because it was redundant material and took somewhat bizarre tangents. Says the review, "he serves up a lot of material that's been reported before . . . that between 1980-85, San Diego, Los Angeles and San Francisco will be destroyed, and Palm Springs will be under water . . . Goodman gets so carried away that he starts talking about Armageddon and the Second Coming and that sort of stuff." Most of the book, writes the reviewer, is about science, but features such "unvoguish" geological theories as catastrophism and pole shifts. The review concludes with the somewhat ambivalent observation that "we used to burn people like him at the stake. Now we merely ignore them, which, for all we know,

could turn out to be worse"(Herald Examiner, 9-24-78).

<u>Preparedness</u>. A number of articles which featured both preparedness and prediction themes have already been discussed in the previous section. The remainder were quite diverse and will be considered separately in chronological order.

Several preparedness and safety issues were raised in a front page question and answer article in the <u>Herald Examiner</u>. Being questioned by <u>Herald</u> staff writer Catherine Healy in the immediate aftermath of the Santa Barbara quake was Michael Regan, coordinator of Civil Defense for Los Angeles. Regan was asked what would have happened in Los Angeles had a 5.1 Richter scale quake hit the Civic Center. Regan responded that he would have expected approximately the same kind and extent of damage as occurred in Santa Barbara. It was possible, he continued, that some older, pre-1933 buildings, would have collapsed depending on how severe the jolt was close to the foundations. In response to a query regarding flying glass from high rise buildings, Regan replied that a skyscraper would lose windows only in certain places where the twisting of the building would be most severe. The bottom level would suffer more damage than the top, the center would probably sustain the least of all. Regan recommended that people who find themselves near windows when an earthquake occurs take cover (Herald Examiner, front, 8-15-78).

A brief <u>San Gabriel Valley Tribune</u> article announced a program of films on earthquakes at the West Covina Library. According to the report, the Santa Barbara earthquake had "generated great interest in library materials on geology, earth movement and quake predicting." The program was designed to answer questions on the subject. Included in the program would be suggested precautions to minimize damage (SGVT, 9-4-78).

A group of twenty engineers, architects and builders in the field of earthquake safety visited the People's Republic of China in late September for an exchange of information on prediction and seismic safety. The report held that Chinese technology surpassed US knowhow in quake prediction but lagged behind in land use planning and construction in seismically active areas. The visit would facilitate an exchange beneficial to both countries, the report implied. Robert Rigney, chair of the California Seismic Safety Commission, was one of the experts planning the China visit. Rigney reviewed some of the safety improvements he would like to see implemented here: (1) "independent review panels and cooperation between the federal and state governments on requirements for major dams, liquified natural gas plants, nuclear generators and other sensitive structures, (2) a reasonable review of older buildings to make them at least life-safe, if not property safe, (3) land use planning so that quake danger areas are used only for low density purposes, such as warehousing or agriculture, (4) continued research on building standards and (5) educational programs in schools explaining what to do if a quake occurs (Herald Examiner, 9-25-78).

The <u>LA Times</u> magazine section contained an advertisement for a wrenchlike device designed to be placed on the main gas value for easy turn-off during or immediately after a damaging quake. After warning that "the next one may take place while you read this," the advertiser promised that the device would "eliminate panic." The gas shut-off tool was offered for \$3.49 plus handling and sales tax by Sombrero Enterprises of Studio City (<u>LA Times</u>, 10-8-78).

A <u>Santa Monica Evening Outlook</u> article which discussed the findings of Dr. Ralph Turner's survey of community attitudes toward earthquake danger emphasized preparedness. The report cited findings that three quarters of the

respondents felt that they were receiving insufficient information from the news media regarding what to do when an earthquake strikes, on longer term preparations for a quake and on what government agencies were doing to prepare for tremors. Too much attention was paid to earthquake predictions by non scientists according to 43% of those surveyed (SMEO, 10-16-78).

A Peanuts cartoon featured Snoopy reading a booklet on earthquakes and preparedness while his friend Woodstock looked on with growing alarm. When Snoopy reads that the safest place to stand during an earthquake was in a doorway, Woodstock immediately moved from the roof to the doorway of Snoopy's dog house (L.A. Times, comic section, 12-17-78).

<u>Safety issues</u>. Of the three safety issues, dam safety received the least attention. Only six reports featured dam safety themes. Nuclear power safety was the subject of sixteen reports and building safety was cited in twenty-five articles.

After studying the conclusions of seismic reports prepared by Woodward-Clyde, the U.S. Geological Survey and several independent consultants, Bureau of Reclamation officials determined that any dam located at the Auburn site should be able to withstand a 6.5 Richter magnitude quake with an epicenter 2 miles from the dam. The Bureau also accepted one inch as an estimate of foundation displacement which could be caused by the maximum credible earthquake. While nearly all consultants agreed on the 6.5 magnitude quake estimate (the U.S. Geological Survey said a quake at the site could range between 6.5 and 7), there was considerable disagreement over the displacement potential of such a quake. The independent consultants all reached the conclusion that the maximum quake could displace the foundation one to two inches except Woodward-Clyde which estimated a possible slippage of 9½ inches. The U.S. Geological Survey's projection amounted to 3 feet. State officials were expected to require about

six months to review the Reclamation Bureau's conclusions and to reach a decision by March of 1979 (L.A. Times, 9-15-78).

In response to the Reclamation Bureau's conclusion regarding a maximum credible earthquake at the Auburn site of 6.5, Rep. Leo Ryan (D-Calif) called for congressional hearings into the Bureau's "unacceptable" proposal Ryan was concerned that a warning by the U.S. Geological Survey that a 7 Richter magnitude quake could occur at the site was being ignored. Hearings on the matter were expected to begin in October (L.A. Times, 9-16-78).

An October 3rd editorial in the <u>L.A. Times</u> was supportive of Ryan's call for public hearings on the Auburn dam situation. The editors reviewed the situation beginning with the 5.7 quake on October 1, 1975, which surprised experts who thought that the Foothill fault system was dormant. They recounted the findings of the various consultants and the disastrous projections should the huge dam collapse. The tremendous amount of information on the project, wrote the editors, was before the Secretary of the Interior who held final authority as to whether the dam would be built. The state of California, it was pointed out, was conducting its own review which would involve the Division of Dam Safety in the Department of Water Resources, the Division of Mines and Geology and the Seismic Safety Commission. As for Ryan's hearings the editors thought "public ventilation of these issues in an atmosphere free of finger pointing can only enhance credibility for the final decision" (L.A. Times, 10-3-78).

An ariel photo of the Los Angeles Reservoir appeared in the <u>L.A. Times</u> on October 1st. The brief accompanying story revealed that the outstanding Civil Engineering Achievement Award for 1978 had been awarded to the Los Angeles Department of Water and Power for the reservoir project which replaced the lower Van Norman Reservoir. The reservoir had been drained after near collapse of the Van Norman dam during the 1971 San Fernando quake (<u>L.A. Times</u>, 10-1-78).

In late October, Congress authorized the Bureau of Reclamation to spend up to \$100 million on repairs of 13 federal dams in California, Nevada, South Dakota, Utah, Montana, Idaho, Oklahoma, Arizona and Wyoming. The <u>L.A. Times</u>, in which the article appeared, credited itself with having spurred the legislation with a series of reports disclosing "that red tape and political indifference long had stymied needed safety repairs on a number of major federal dams." An Interior Department spokesperson was quoted as saying that none of the dams were in imminent danger but that failure was probable if record flooding were to occur (L.A. Times, 10-20-78).

An article featuring the Baldwin Hills Dam collapse appeared in the <u>Valley</u> <u>News</u> on the occasion of the disaster's 15th anniversary. The dam's collapse sent 300 million gallons of water rushing through a neighborhood beneath the reservoir killing five and causing \$13 million in damages to homes and apartment buildings. Investigations were inconclusive on the cause of the failure. It was speculated that oil drilling in the area, particularly the injection of water under high pressure to bring the oil to the surface, might have caused subsidence which affected the dam's stability. It was also noted that a branch of the Newport-Inglewood fault, responsible for frequent mild earthquakes in the area ran under the reservoir. "No one in those days," the report added, "seemed to think that was a hazard" (VN, 12-15-78).

In a letter to the editor of the <u>Herald Examiner</u>, a Venice resident expressed his concern over the safety of operating the Diablo Canyon nuclear power plant near San Luis Obispo. He refered to the Santa Barbara earthquake and noted that "a big earthquake fault (lies) right under the plant which could bust it open easier than a bear can smack a bees nest." The writer continued, "that thing will make 500 pounds of deadly plutonium a year -- and they say just an ounce of it could give cancer to everyone in this great state of ours. . ., I don't know

about you, but that's too high a price to pay for my power!" (<u>Herald Examiner</u>, 8-18-78).

In an article which appeared in the "Opinion" section of the San Gabriel Valley Tribune writers Angle and Walters refer to the Diablo Canyon facility as "a monument to the bad faith, arrogance and incompetence that have become the hallmark of the controversy over the future of nuclear power." The authors pointed out some of the errors which resulted in their harsh assessment as: the failure of Pacific Gas and Electric to conduct seismic studies of the ocean floor in the vicinity of the plant and , after the fault was discovered, PG & E continued construction of the plant for almost a year without making modifications to provide additional protection against an earthquake; the failure of the Atomic Energy Commission, responsible for regulating nuclear power and safeguarding the public, to discover the fault's existence for $2\frac{1}{2}$ years despite publication of the finding in scientific journals; and the opposition movement known as the Abalone Alliance which, according to the authors, refuses to be satisfied with anything less than abandonment of the plant despite belated but extensive efforts to reinforce the facility against any possible quake which could occur. Angle and Walters concluded that the blame for delay in operation must be shared by all parties involved -- conservation groups, the utility company and federal regulatory agencies (SGVT, La Opinion, 11-12-78).

The Nuclear Regulatory Commission's Safety and Licensing Board began hearings Monday, December 4th to decide if the Diablo Canyon plant was safe to operate. Pacific Gas and Electric, it was reported, was confident that the plant had been sufficiently reinforced to withstand the maximum credible earthquake of 6.5 at the site. If the review panel agreed that the changes rendered the facility safe, operation could begin in April of 1979, according to PG & E executive representative A.C. Smith. The attorney for the utility, Bruce Norton told the board in an opening statement that studies done since discovery of the Hosgri

Fault caused a "quantum leap" in design knowledge. He said that the studies were "the most detailed seismological analyses done anywhere in the world for any project." David Fleischaker, attorney for the Center for Law in the Public Interest, which represents individuals and environmental groups opposed to the plant said the NRC and the utility company had attempted to "analyze away" the earthquake danger. Fleischaker charged that company officials used figures which exaggerated the plant's strength and figures for ground motion lower than those suggested by the US Geological Survey. He also said that NRC staff departed from its normal practice by changing technical assumptions for the safety analysis which violated commission regulations or at a minimum bent them to the advantage of the utility. James Tourtelotte, an NRC lawyer, denied that the staff had departed from normal practice but was merely exercising flexibility. Licensing board chair Elizabeth Bowers warned the audience present at the hearing several times for expression of approval or disapproval of arguments presented. Most of the 100 spectators were opposed to licensing the Diablo facility (LA Times, 12-5-78; SGVT, 12-23-78).

A brief report in the "Energy-Environment" section of the <u>LA Times</u> announced that two seismic experts, Michailo Trifunac of USC and J. Enrique Luco of the University of California at San Diego, would be permitted to submit written testimony to the licensing hearings, but would not testify. Chairperson Elizabeth Bowers explained that the seismologists were disqualified as witnesses because they were serving as consultants to the Nuclear Regulatory Commission when they reported on the seismic safety question (<u>LA Times</u>, 12-12-78).

An <u>LA Times</u> editorial was critical of Diablo Canyon opponents who demonstrated against startup of the facility in August. During the trials of those arrested for trespassing on PG and E property, the defense invoked the the notion that "a higher law" gave nuclear opponents the right to protest

on property owned by the utility. The editors held that "a claim to exemption from laws that govern the rest of us poses dangers to society in general and the protesters themselves. What law would they invoke in their own protection if another group of opposing views attacked them in the name of some 'higher law'?" The editors noted that other movement leaders like Ghandi and Martin Luther King practiced civil disobedience but never claimed exemption from the law (LA Times, 12-26-78).

The issue of earthquake safety at other nuclear power sites captured media attention during Period 11. A small quake measuring 2.2 on the Richter scale occurred near Seabrook, New Hampshire, site of a controversial nuclear power plant. The quake was reported by E. F. Chiburis, a geophysics professor and assistant director of Boston College's Weston Observatory, who said the quake was "not at all" capable of causing damage. Opponents of the plant have argued that the area could have earthquakes. Gordon McKenney, spokesperson for the plant builder, said the facility was designed to withstand an earthquake 100,000 times greater than the one which occurred August 25 (Valley News, Herald Examiner, 8-29-78).

Faulting was discovered at the site of the Black Fox Nuclear Power Plant under construction near Inola, Oklahoma. Officials of the Public Service Company and the Nuclear Regulatory Commission confirmed the existence of the fault but said that it would not affect the safety of the plant (LA Times, 10-4-78).

Geological studies at the site of General Electric's Vallecitos Nuclear Center revealed that an earthquake fault was just 200 feet from the reactor, not 2000 feet as earlier studies had shown. The US Geological Survey had determined that the fault was active and not simply an ancient landslide as GE had contended. The plant had been in operation for twenty years. Its fate,

according to the report, would be determined by the Nuclear Regulatory Commission when a final safety report had been prepared. Confirmation that the fault was closer than previously thought was expected to renew efforts to close the plant (LA Times, 11-29-78, 12-10-78).

The reinforcement of the San Onofre Nuclear facility against possible earthquake damage along with inflation, new government regulations and higher wages were blamed for the soaring costs of building two new units onto the reactor (La Opinion, 12-16-78).

The US Atomic Safety and Licensing Board authorized the Trojan nuclear power plant to resume operation during modifications to bring the facility in line with design specifications for resistance to earthquakes. The plant is owned and operated by General Electric Company (SGVT, 12-24-78).

A three year old study compiled by an independent panel of scientists at the request of the Nuclear Regulatory Commission generated considerable controversy and was ordered reviewed by a congressional committee. The study, called the Reactor Safety Study--WASH 1400 or the Rasmussen Report--was conducted by an "industrial-academic-governmental" team under Dr. Norman Rasmussen, an MIT professor of nuclear engineering. The study's most controversial conclusion was that the chances of a catastrophic accident happening inside a civilian nuclear power plant were extremely small. This finding was widely quoted by the nuclear industry to fend off its critics. A review panel of scientists chaired by Dr. Harold Lewis of UC Santa Barbara examined the study and concluded the following: (1) "The absolute values of risks which the Reactor Safety Report attached to nuclear power plants were not nearly as absolute as claimed (that a plant would fail catastrophically and kill 100 people with the frequency of once every 100,000 years, 1000 or more fatalities once in 1 million years) and should not be used in the
regulatory process or for public policy purposes" (2) "There was insufficient data to justify the conclusion that such accident-triggering mechanisms as fires, earthquakes and human error were negligible contributors to the overall risks of operating a nuclear plant" (3) "The report was difficult to read and understand, even by experts and this lack of scrutability impaired its usefulness." The Lewis panel also concluded that nuclear energy had more facets than just safety. The most serious threat was the proliferation of fissionable materials, from which bombs could be made. A second problem was the disposal of long-lived radioactive wastes from plants. Safety, Lewis concluded, was the least worrisome aspect of nuclear power (<u>LA Times</u>, George Alexander, 10-5-78; SGVT, 10-6-78).

Most reports of building safety focused on the California LNG siting controversy. It was the theme of fifteen of twenty-five reports. A <u>San</u> <u>Gabriel Valley Tribune</u> article recounted the history of the controversy and concluded that Western LNG's "stickiest" problem was to placate American Indians who had set up an encampment on the Point Conception site to protest the terminal construction. The Indians, according to the report, had gained local support for their protest and that donations of food and money were flowing into the Indian Center (SGVT, 8-22-78).

A brief <u>LA Times</u> article on August 23 announced plans by Western LNG Associates to resume seismic-geological studies at the Point Conception site. The firm reported plans to erect a fence around the area to be excavated and to back fill two investigative trenches dug earlier (<u>LA Times</u>, <u>SGVT</u>, 8-23-78). The next day, however, a report appeared which indicated that all trenching activities had been indefinitely postponed by a PUC order. The commission demanded a plan detailing the effect of the project on potential archeological sites. A group of 60-100 Indians and their supporters promised non-violent

resistance to Western's trenching plans but the PUC order averted a potential confrontation. The archeological impact plan was to be submitted to the PUC which was required to consult with the Coastal Commission, the State Office of Historic Preservation and interested members of the public before a final decision could be made. The additional trenching studies were ordered by the Public Utilities Commission to determine the extent of faulting at the proposed LNG terminal site (LA Times, 8-24-78).

A staff attorney for the Federal Energy Regulatory Commission, in a letter to that commission, recommended that Oxnard rather than Point Conception serve as the site for an LNG terminal. Staff Council Brian Heisler said the presence of active earthquake faults and the area's archeological significance make Point Conception unattractive for the LNG terminal. Harvey Proctor, Chairman of the Southern California Gas Company was quoted as saying, "we are astounded that one staff attorney of the FERC would take this unprecedented action, filing this document before all the evidence in the case has been considered . . . we consider it specious and unprofessional." The utilities executive charged that the action ignored the will of the state legislature (which stipulated that LNG facilities could not be located in populated areas) and the decision of the California Public Utilities Commission (LA Times, 9-1-78).

On September 15, the Coastal Commission recommended the southeast Ventura Flats as the most appropriate site for an offshore LNG terminal. The Ventura Flats is about 12 miles offshore from the cities of Ventura and Carpinteria in Santa Barbara channel. The Coastal Commission, in its report to the PUC, suggested that Point Conception may prove to be unfeasable because of wind, wave and seismic conditions. The commission further recommended that the LNG Terminal Act be amended to permit an offshore site and that the PUC

should amend its decision of July 31 requiring parties seeking the LNG construction permit be required to study the Ventura Flats site as well as Point Conception (Valley News, LA Times, 9-16-78).

On November 1, the Federal Energy Regulatory Commission in its final environmental impact report rejected Point Conception as a site for an LNG terminal in favor of Oxnard. Active earthquake faults and archeological artifacts at the site were the reasons Point Conception was passed over according to the report. Opponents of the Point Conception location were elated. Said Michael Fischer of the Coastal Commission, "This (Point Conception) is an extraordinarily beautiful place, so any facility on that stretch of road would significantly deteriorate the quality of the place." "We're tickled pink," said Faye Rivera, a Chumash Indian, "This is what you get by people sticking together and fighting for your rights." Gas Company spokesperson Steve Gray was quoted as saying that "the staff position completely ignores differences among faults and whether or not the fault poses any hazard to the site . . . fortunately, when DOE (Department of Energy) makes its decision, it will have the benefit of more expert and realistic evidence to weigh against its staff's opinion." Gray warned that without state and federal agreement on the site question the company could lose contracts with LNG suppliers in Alaska and Indonesia (SGVT, front; LA Times, Herald Examiner, 11-2-78).

On November 27, the State Lands Commission approved a 30 year lease for the proposed LNG facility at Point Conception. State law, according to the report, requires a lease for any site approved by the state Public Utilities Commission (<u>Herald Examiner</u>, 11-28-78). About 50 Indians vowed to remain camped at Point Conception to protect their sacred burial ground from desecration "despite an order from the Santa Barbara County Planning Department

to remove the Indians (LA Times, 12-10-78).

Two reports dealt with the continuing controversy over whether or not to relocate Rinaldi Elementary School. A front page summary of the controversy appeared in the Valley News on August 23. The group committed to relocating the school, Freeway Action for Children's Environment and Safety (FACES), had asked for a grand jury investigation alleging breach of faith and failure of school officials to obtain a proper environmental impact report. School Board Building Committee Chair Phillip Bardos was convinced that Rinaldi should stay where it is. He pointed out that efforts had been made to locate other sites for the school but earthquake faults had been to blame for rejecting two relocation sites and the need for expensive alterations had excluded a third. Bardos also claimed that studies of harmful effects of freeway pollution had not been conclusive (Valley News, front, 5-23-78). A final decision from the LA School Board came on September 27. The Board voted to not relocate the school due to inability to find an acceptable new location. FACES members promised to continue their struggle to relocate the school and accused school board members of "stupidity, mismanagement and dishonesty (LA_Times, San Fernando Valley Section, 9-28-78).

Local building safety concern was the theme of four articles. The Center for Enriched Studies, the most successful magnet school in the city, according to school officials, was in jeopardy because the Wilshire Temple, which houses the school, did not meet earthquake safety standards. It was pointed out that state law prohibits the use of leased faculties for more than three years for educational purposes when the buildings do not meet the earthquake safety standards of the 1939 Field Act. School officials said they would attempt to relocate the school prior to the beginning of classes September 12 (LA Times, 8-25-78). The new Sylmar Juvenile Hall opened

Monday, September 18, seven and one half years after the 1971 quake had destroyed the first center. The replacement was undertaken at the same site after studies of the area resulted in new soil stabilization methods (<u>Valley</u> <u>News</u>, front, 9-20-78). <u>La Opinion</u> announced that fourteen Los Angeles city libraries did not meet current earthquake safety standards. All were built prior to 1933. Library Administrator C. Erwin Piper said that there simply was no money in the budget to reinforce or rebuild the facilities. Proposition 13 was blamed for the budget cutbacks (<u>La Opinion</u>, front, 10-19-78). A Venice resident wrote a letter to the editor of the <u>LA Times</u> expressing displeasure over subsidized government loans to those whose homes are destroyed by fires, slides or earthquakes. It was this person's opinion that those who build in areas which present significant risks should bear those risks themselves. "I have no quarrel" he wrote, "with paying taxes to assist people who cannot be faulted for their misfortune, but I resent state and federal funds being spent to subsidize repeated stupidity"(LA Times, 10-30-78).

Two reports revealed findings of studies with relevance to building safety. A survey under the direction of UCLA sociologist Ralph Turner revealed that "the vast majority of those polled, some 88 percent, feel that unsafe buildings should either be closed down until they can be reinforced or posted with signs warning people of danger in case of an earthquake." Turner was quoted as saying, "This (finding) indicates a clear mandate for local jurisdictions to proceed promptly with these measures"(<u>Valley News</u>, 10-12-78). According to a study conducted by the Association of Bay Area Governments, local jurisdictions could be "taken to task for damage inflicted by major earthquakes." The report charged that some cities have ignored pleas to upgrade the quality of structures for decades (<u>Herald Examiner</u>, 10-25-78).

Building safety was a matter of concern generated by strong quakes in Italy and Mexico City. New building standards were imposed when two quakes one year apart caused severe damage in northern Italy. The first quake killed 939, the second 12. Said a government official, "the second earthquake taught us that we could not rebuild with our hearts. We needed technology." It was decided that all houses, even those badly damaged should be rebuilt, to preserve the ambience, the culture and history of the region. A local resident proudly displayed his home which had been restored to its original appearance as of 1450. "But behind the plaster, reinforced concrete formed a hidden web of new seismic strength"(<u>LA Times</u>, 8-26-78). A team of American and Mexican seismologists flew to Mexico City with 25 seismographs hoping to record aftershocks of the November 30 tremors. The leader, Dr. James Brune, said, "if we can get good recordings of some of the strong motion aftershocks, it will provide data that can be used for better design of buildings and nuclear power plants"(LA Times, 12-1-78).

<u>Summary</u>. The Santa Barbara quake, the most severe tremor to occur in a populated southern California area since the 1971 San Fernando quake, generated news reports touching nearly every other theme considered in this study. It was speculated that there may have been precursors and was thus relevant to quake prediction. It generated concern about quake preparedness both individual and organizational. Public scrutiny of the earthquake safety of mobile homes was generated and the controversy over nuclear power and a proposed LNG storage facility in the area was rekindled.

Speculation as to the meaning of the Palmdale bulge continued to move away from an earlier scientific consensus that the uplift portended a violent

tremor. Geophysicists Rundle and Thatcher's model of a "slow earthquake" was perhaps the first comprehensive interpretation which excluded one or more major quakes. A geodetic survey designed to give updated dimensions of the uplift were anxiously awaited.

Important developments occurred in two continuing controversies. A Federal Energy Regulatory Commission recommendation that California's first Liquified Natural Gas Terminal be located at Oxnard caused elation among opponents of siting the facility at Point Conception but dissappointment and consternation among utility executives. Western LNG Associates, which hoped to build the terminal at Point Conception, remained publicly confident that the Department of Energy, responsible for a final decision on siting, would choose Point Conception. The Los Angeles School Board voted not to relocate the Rinaldi Elementary school after a lengthy controversy which involved rejection of two alternate sites because of earthquake faults.

TABLE 1.

NEWSPAPER COVERAGE BY TOPIC: FREQUENCIES

			Free	quencies		
Topic	LAT	не	SMEO	SGVT	VN	L0 -
Major Categories						
Earthquake Events	57	19	- 16 -	31	25	29
Prediction Topics	19	4	1	5	5	5
Preparatory and Safety Issues	35	6	2	12	11	2
Other Items	11	2	0	3	5	5
Detailed Topics				· •		
Earthquake Events	57	19	16	31	25	29
General Predictions	17	4	1	5	1 5	5
Palmdale Bulge	5	0	0	0	0.	0
Whitcomb	0	0	0	0	0	0
Minturn	. 0	0	0	0	0	0
Organizational Preparedness	6	2	2	0	2	0
Individual Preparedness	3	1	1	1	0	0
Building Safety	15	3	1	6	7	1
Dam Safety	5	0	0	1	4	0
Nuclear Power Plants	9	1	0	4	1 1	
Other Items	11	2	0	3	5	5
Total Articles (Per Basic News- paper Frequencies)	· 98	30	. 18	.44	38	36

PERIOD XI: AUGUST 14, 1978 TO DECEMBER 31, 1978

TABLE	2
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PERIOD XI: AUGUST 15, 1978, TO DECEMBER 31, 1978

NEWSPAPER COVERAGE BY TOPIC: PERCENTAGES

	╶╺┾╍┸┲╺┊╸╝╴╝╴╗╸╸╸╸╸╸╸		Perc	en tages		
Topic	LAT	HE	SMEO	SGVT	VN	LO
Maior Categories						
Earthquake Events	58	63	89	70	66	81
Prediction Topics	19	13	6	11	13	14
Preparatory and Safety Issues	36	20	11	27	29	6
Other Items	11	7	0	7	13	14
Detailed Topics		ļ				i 3
Earthquake Events	58	63	89	70	66	81
General Predictions	17	13	6	11	13	14
Palmdale Bulge	5	0	0	0.	0	0
Whitcomb	0	0	0	0	0	0
Ninturn	0	0	0	0	0	0
Organizational Preparedness	6	7	11	0	5	0
Individual Preparedness	3	3	6	2	0	0
Building Safety	15	10	6	14	18	
Dam Safety	5	0	0	2		
Nuclear Power Plants	9	3	0	9	3	3
Other Items	11	7	0	7	13	14
Total percentage*	100	100	100	100	10 0	100
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*Column totals may add up to more than 100% due to multiple coding

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CHAPTER THIRTEEN

MEDIA ANALYSIS

Introduction

The purpose of this interpretative analysis is twofold. Up to this point, our narrative history has included, in chronological form, a broad array of earthquake-related issues subsumed under the categories of earthquake events, prediction, preparedness and safety. This narrative has, to some extent, artificially divided the three year monitored period into eleven time segments for convenience of presentation. In this final chapter, several topics, all of which became salient themes of media attention, will be analyzed independently over the entire three year period of newspaper monitoring. These topics include the Palmdale bulge, the Whitcomb and Minturn "predictions," the question of what to do about old unreinforced masonry buildings which could collapse in a strong earthquake and three politicized controversies in which quake safety became an issue--the construction of the Auburn Dam, the Diablo Canyon nuclear power facility and the location of a liquified natural gas terminal at Point Conception. These topics were chosen for close scrutiny over other events which received heavy press attention, the Guatemala quake for example, because of their more direct relevance to the theme of this study -- the perception of earthquake threat in southern California.

A second purpose of this final chapter is to subject these important topics to close analytical scrutiny according to several questions which emerged during the course of data collection. One question deals with the "timeliness" of media reports, or once a topic has been deemed newsworthy, how does it remain newsworthy? A related and more focused question--is it possible to maintain a long-standing state of alert which remains newsworthy? If so, what are the mechanisms? Uncertainty is implicit in nearly

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all aspects of earthquake threat. The science of earthquake prediction is in its infancy, anomalies such as the Palmdale bulge are only partially understood by the scientific community, the safety of dams and facilities where volatile fuels are stored or utilized cannot be assured. How do the media present the fact of uncertainty and contradiction in news about the earthquake prospect? Considering the fact that the threat element may have an unsettling effect upon the mass audience which reads about earthquakes, how are potential fears and alarm handled journalistically? Seismology and geophysics are highly sophisticated disciplines. Since university and government technical experts are the essential sources of earthquake information, how is the sophisticated language of science translated into understandable lay terminology? Finally, how do the actions of agencies follow new earthquake information? How are interpretations of threat generated in organizations which must respond? How are these organizational responses interpreted by the media? Before proceeding with the analysis outlined above, a review of three year trends will provide some sense of longitudinal consistency which may have been masked by the division of the monitored period into time segments.

Events

Figure 1 presents, in histogram form, reported earthquake events in four week units over the entire three year monitored period. Not surprisingly, the quakes which were the largest in magnitude and costliest in terms of damage and casualties tended to get the greatest press coverage. A tremor which measured 7.5 on the Richter scale, killed approximately 23,000 people, and destroyed much of Guatemala City on February 4, 1976, received the most extensive coverage of any quake event in the three year period studied. Over 200 articles reported various aspects of the quake, its aftermath and the

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EARTHQUAKE EVENTS IN FOUR WEEK PERIODS JANUARY 1, 1976 TO DECEMBER 31, 1978

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FIGURE 1

international relief effort. La Opinion, which offered the most extensive coverage of any paper, published eighty-three reports. On May 6, 1976, the most destructive quake to hit Europe since 1963 killed over 800 people and devastated much of the Friuli region of northern Italy. The quake was the subject of fifty-six reports. Figure 1 reveals another peak of event coverage in August and September of 1976. Three quakes account for the enhanced media attention to events: the great China quake of July 28 which destroyed the industrial city of Tangshan and claimed the lives of 655,000 people; an 8.0 Richter magnitude tremor in the Philippines killed 4,000 on August 17; and, on September 10, two powerful aftershocks of the May 6 quake in Italy caused further casualties and damage in the Friuli area. The three events accounted for one hundred and forty-six reports; ninety-eight on the Tangshan quake, twenty-six on the Philippines tremor and twenty-two on the aftershocks in northern Italy. A quake which registered 7.9 on the Richter scale and destroyed scores of villages in eastern Turkey on November 24 contributed to the greatly increased earthquake event coverage in the closing weeks of 1976.

Two large earthquakes, both occurring in March of 1977, caused a significant increase in media attention to events during the months of March and April. The first of these quakes hit Rumania on March 4, killing 1,357 and injuring 10,000. The eastern European quake, reported to be the worst to hit the region since 1922, was the subject of 46 reports. In late March and early April a series of large tremors battered Iran, causing 352 deaths and widespread damage. These quakes generated twenty reports in area newspapers. The remainder of 1977 and the first seven months of 1978 were characterized by a low output of news reports on earthquake events. There were, of course, earthquakes during this period, some of which were quite large, but the damage and casualties which resulted were not as heavy as in those events extensively

covered during 1976. The significant increase in newspaper coverage toward the end of the monitored period reflected news media attention to two events, the Santa Barbara earthquake of August 13 and the quake on September 16 which claimed the lives of 25,000 Iranians. The Santa Barbara tremor received considerable media attention despite the low casualty figures. Its significance lies mainly in the fact that it was local and caused the most property damage in southern California since the 1971 San Fernando tremor.

The extensive coverage of earthquake events by local media during 1976 reflects the tragic fact that nearly 700,000 people died in earthquakes around the world. While 655,000 of this number died in one great quake on July 28 in China, nearly 40,000 others died in earthquake-related incidents. There were eighteen quakes during the year which equaled or exceeded 7 on the Richter scale. The death toll represents the largest for any one year this century and the second highest in recorded history.

Prediction

Figure 2 represents earthquake prediction in four week segments for 1976-1978. It will be noted that there are three prominent peaks of media discussion of prediction topics during 1976. One such peak rises rapidly in April and extends through May. After a decline in June and July another dramatic increase in media attention to prediction topics is observed during the month of August. The third peak of media interest in quake prediction and the point of greatest attention, judged by the large number of reports, came in December. In the last two years in which local media were carefully monitored coverage of prediction topics did not achieve the salience observed during those three periods of 1976. Only a minor flurry in mid-February of 1977 brought the total number of prediction-related articles above twenty

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FIGURE 2

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GENERAL PREDICTIONS IN FOUR WEEK PERIODS JANUARY 1, 1976 TO DECEMBER 31, 1978

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for any four week segment in the last two years. The remainder of this section will focus on the prediction related events which received extensive coverage during the monitored period.

The sudden upshot in coverage of prediction topics in April, 1976, reflects two important events--interpretation of the California Uplift and the public announcement by Caltech geophysicist James Whitcomb that a moderate quake might strike southern California within a year. Discovery of the Bulge had been announced in mid-February. The Seismic Safety Commission had held hearings on the Uplift on March 11. At these hearings, the fundamental question was whether or not the bulge should be considered an indicator of a large damaging quake. Despite the lack of certainty as to the meaning of the bulge, most reports tied the crustal anomaly to a possible great earthquake in southern California, one with an intensity as great as the 1906 San Francisco tremor. Many reports explored the consequences of such a quake in the heavily populated Los Angeles basin. Despite considerable restraint in interpretation of the bulge by the seismological community, a gloomy scenario was presented in local papers projecting thousands of deaths and widespread damage including dam failures and collapse of unreinforced masonry buildings. A comparison between prediction technology and earthquake preparedness in the United States and the People's Republic of China also became a theme of the April-May period--keynoted perhaps by Dr. Frank Press' "Tale of Two Cities" address delivered at the American Geophysical Union Conference on April 14.

Amid intense media discussion of prediction and preparedness in connection with the bulge, James H. Whitcomb, a senior fellow in geophysics at Caltech, announced his experimental forecast of a moderate quake in southern California within a year. A major portion of newspaper coverage beginning on April 21 focused upon the "prediction" and its theoretical basis. The announcement generated a continuing concern with local preparedness, partic-

ularly the readiness of local government and emergency relief agencies to cope with a damaging quake. There was little overlap in news media discussion of the Whitcomb forecast and the Palmdale bulge. The nine articles which appeared in local newspapers in May and June containing combined references to the Whitcomb announcement and the bulge generally quoted Whitcomb that there was no causal connection between his hypothesis and the bulge other than some geographical overlap between the uplifted area and the zone of probable impact. An assessment of the scientific merit of Whitcomb's hypothesis was carried out by the California Earthquake Prediction Evaluation Council on April 30. All local newspapers carried reports of this panels' appraisal in early May. The somewhat negative assessment of Whitcomb's experimental forecast appeared to dampen media attention after mid-May. Discussion in local newspapers of the southern California Uplift began to decline in early May also, but not as precipitously as that of Whitcomb (See Figures 4 and 5).

Prediction topics once again became salient in local media in late July and early August of 1976. The occasion for this renewed interest in prediction was the occurrence of a great earthquake near Tangshan, China which claimed the lives of 655,000 people. An earlier quake in Haicheng had been successfully predicted and a timely evacuation was believed to have saved thousands of lives. A great deal of interest in the Chinese prediction program had emerged both in the seismological community and in the local news media after a discovery and public announcement of the Palmdale bulge. The question which arose in late July and early August centered on how such a catastrophe could have occurred without the issuance of a quake warning. Geophysicist Barry Raleigh of the US Geological Survey, who had just completed a study tour of China was extensively quoted regarding a possible prediction of the July 28 tremor. Raleigh reported that Chinese seismologists had warned



FIGURE 4



FIGURE 5

that a major quake could occur in the Tangshan area before 1980 but signs of an imminent tremor, as had manifested themselves in the 1975 quake, had not been observed prior to July 28. On August 1, local papers reported that anticipation of aftershocks and observation of unusual animal behavior at the Peking Zoo had led Chinese officials to issue a quake warning for the same area that was battered just five days earlier. All buildings in Peking were evacuated and foreign visitors were advised to leave the area. The twenty-nine reports which focused on prediction in connection with the Tangshan quake were largely responsible for the sharp rise in total predictions observed in Figure 2 during early August.

December of 1976 marked the highest concentration of prediction related articles in local newspapers for any four week period during the three years of monitoring. Media attention to quake prediction was generated mainly by the quake forecasts of amateur scientist Henry Minturn, including one for southern California to occur December 20. Minturn's announcements were the subject of intense media discussion from November 22 through mid-December. Also contributing to the large number of prediction-related reports was coverage of the American Geophysical Union which met in San Francisco from December 6 to 10. One participant of the AGU conference, Dr. Robert Hamilton, chief of the USGS Office of Earthquake Studies, urged Californians to prepare for an inevitable great earthquake signaled by the southern California Uplift. It was perhaps the strongest appeal for earthquake awareness and preparedness to come from the seismological community to date. While Hamilton did not actually predict a quake, local newspapers (excluding the LA Times) offered sensationalized headlines over reports of Hamilton's remarks. The Minturn forecast generated twenty-four reports in local newspapers from November 25 to December 31; discussions of the Palmdale bulge at the AGU



FIGURE 6

conference as a precursor to a great earthquake brought fourteen articles.

After the Minturn debacle, newspaper coverage of earthquake prediction topics declined markedly and remained minimal over the next two years. In each of the peak periods described above reports on prediction exceeded thirtyfive. In December, 1976, the number of articles featuring prediction topics exceeded fifty. During the remaining two years, the total output of prediction articles for any four week segment exceeded twenty only once, from February 24 to March 23, 1977. These figures compare with an average of 12.6 articles on prediction per four week period. Unlike earlier peaks in newspaper discussion of prediction matters, which featured detailed coverage of one or two events of great public concern, e.g., the bulge, Whitcomb and Minturn, the February-March 1977 peak (see Figure 2) represents a coincidence of several unrelated events. Included were announcements that the most recent geodetic data indicated that the southern California Uplift was more widespread than previously believed; that LA mayor Tom Bradley had appointed a 25 member task force to study city government response to accurate earthquake predictions; and a warning issued by the US National Earthquake Center that more quakes could follow a severe tremor in Rumania which occurred on March 4. One important prediction-related event which received extensive coverage over a lengthy period was a study of the social and economic consequences of earthquake prediction conducted by Colorado sociologists Dennis Mileti and Eugene Haas. The study results first received coverage in mid-December, 1976, in the LA Times and remained newsworthy throughout 1977. Reports of this study were not concentrated in any particular time segment.

Preparedness and Safety

Under the general category of Preparedness and Safety are organizational preparedness, individual and family preparedness and earthquake safety issues

in connection with vital and potentially hazardous facilities, particularly dams, buildings and nuclear power plants. Figure 7 represents all preparedness and safety items in four week segments. Figures 8-12 include each separate category. A review of these histograms separately reveals that the five issues varied quite independently from one another, as objects of local media attention. Individual and organizational preparedness concerns were stimulated by discussions of the southern California Uplift and the wellpublicized predictions of James Whitcomb and Henry Minturn. The safety issues were, for the most part, independent of prediction topics.

Media coverage of preparedness and safety issues intensified during an eight week period beginning in late March and extending to May, 1976. Two prediction related events were responsible for this enhanced media concern, public discussion of the consequences of a great earthquake in southern California prompted by discovery, two months earlier, of the Palmdale bulge, and Whitcomb's announcement of a possible damaging quake within one year. Of the forty articles which appeared in local newspapers with preparedness and safety themes, twenty-four also carried prediction themes. Nineteen of these reports combined preparedness and/or safety themes and the bulge. Nine articles featured preparedness and/or safety issues in connection with the Whitcomb hypothesis. The most prominent preparedness theme during this April-May period was the readiness of organizations and agencies charged with public safety to effectively cope with a major quake disaster. Fourteen articles featured some aspect of organizational preparedness, only three offered suggestions as to what individuals and families might do to protect themselves from a damaging tremor. Nuclear power plants were the focus of eight reports dealing with quake safety and were the most discussed of the three safety issues. Only one of these reports included discussion of a prediction

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JANUARY 1, 1976 TO DECEMBER 31, 1978

FIGURE 7

FIGURE 8

topic--Ralph Nader's proposal that all nuclear power facilities be closed until the danger of a bulge-related quake posed to such plants was thoroughly studied. Other nuclear power-related articles featured the contention by nuclear power opponents that California quake safety standards for such facilities were inadequate. The Humboldt Bay and San Onofre plants were cited as examples of poor siting.

Media discussion of preparedness and safety issues waned after May but increased markedly in November of 1976 and remained a salient media topic through mid-June of 1977. At the beginning of this extended period, two topics predominated; the issue of what to do about the estimated 14,000 unreinforced masonry buildings in the city of Los Angeles which could collapse in a major quake, and the Fil Drukey-authored series on individual preparedness, the first article of which appeared on November 22. Concern about the safety of persons living in or visiting quake endangered buildings emerged with the announcement in February of the existence of the Palmdale bulge. Mention of these quake-endangered buildings gradually achieved salience as the bulge was interpreted as a possible quake precursor and Whitcomb's announcement turned media attention to the consequences of a large damaging earthquake (see Figure 10). When the question of unreinforced buildings was taken up by the Los Angeles City Council in late August, media coverage gradually increased as editorial comment, letters to the editor and political advertisements either praised or criticized the attempt by city lawmakers to compel owners of the endangered structures to post earthquake warning signs. The building safety controversy which focused on whether or not to require sign posting reached a crescendo in late January 1977 when the City Council abandoned the attempt to require warnings under pressure from building owners. Attention to the problem of old buildings declined after the City Council's decision to further study the situation was announced January 25.



FIGURE 9

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FIGURE 10

JANUARY 1, 1976 TO DECEMBER 31, 1978

A second topic, one which contributed most heavily to the large number of articles carrying preparedness themes from November 22 through February 11, was the Fil Drukey series on individual and family preparedness. Drukey, who had no ties with local media or disaster relief agencies, authored a series of ten articles with suggestions on personal and household safety before, during and after a severe earthquake. The series first appeared in the Santa Monica Evening Outlook on November 22, the last segment on December 2; all were featured on the front pages. The San Gabriel Valley Tribune carried the entire Drukey series in a "special earthquake section" on January 13, 1977. In addition to the Drukey series, the special edition contained several other items on preparedness as well as including advertisements by local merchants for quake survival items, e.g., battery powered radios, flashlights, bottled water, etc. This special edition contained eighteen articles. The Drukey series was carried by the Valley News between January 30 and February 11, 1977.

Two announcements in early March, 1977, brought dam safety to public attention; a recommendation by the Seismic Safety Commission that no final decision be made on completion of the Auburn Dam until a study of the structure's ability to withstand earthquakes was conducted and President Carter's decision shortly thereafter to delete funding for the Auburn project along with other federal water projects whose remaining costs, according to the administration, were greater than the economic benefits they would produce. From February 24 to March 23, 1977, seventeen reports appeared in local newspapers touching on some aspect of dam safety, fourteen of these dealt with the Auburn dam controversy (see Figure 11). Organizational preparedness was also a prominent theme during this same period as LA Mayor Tom Bradley's appointment of a twenty-five member task force to draft a prepared-

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DAM SAFETY ARTICLES IN FOUR WEEK PERIODS JANUARY 1, 1976 TO DECEMBER 31, 1978

FIGURE 11

ness program for the city and other aspects of local governmental readiness received coverage. Nine reports on public agency preparedness and significant media attention to the Auburn Dam controversy contributed to the peak of media attention to preparedness and safety evident during March of 1977 (see Figure 7).

A number of topics were responsible for the continued salience of preparedness and safety through mid-June 1977. The Auburn dam controversy remained newsworthy through late April when geological studies were ordered to determine the extent to which nearby earthquake faults might threaten the structure. Except for three summary reports on the Auburn project, the issue of its potential danger in an earthquake declined markedly from May through mid-June. Organizational preparedness and building safety were chiefly responsible for the large number of preparedness and safety reports between May 1 and mid-June. Contributing to the high visibility of preparedness and safety in local media were; the announcement on May 4 that legislation had been drafted to initiate a system of volunteer earthquake watchers similar to a program successfully used in China, passage of the \$205 million Earthquake Hazard Reduction Act on May 12 and a Congressional panel's report critical of the federal disaster relief program released on May 9. Continued discussion of the quake danger posed by unreinforced masonry buildings contributed to the extended salience of preparedness and safety through mid-June. These reports included: announcements on May 1 that Santa Monica would initiate a survey of its approximately 250 quake-endangered buildings; a controversy in LA City Council over continued funding of its survey of old buildings in mid-May; the State Department of Health, concerned with potential damage to 619 health facilities within the geographic limits of the Palmdale bulge, launched a study of the structural integrity of those facilities; and, numerous reports indicating that earthquake danger had been considered as public buildings were planned or existing ones were restored.

The volume of reports falling into the category of preparedness and safety declined sharply in late June and remained unremarkable until mid-September, 1977. Safety issues were responsible for the sharp rise in coverage which peaked in September and gradually declined through November (see Figure 7). Earthquake related concern was the focal point of three controversies involving dams during this three month peak. A US Bureau of Reclamation Study of faulting at the site of the Auburn dam which concluded that faults at the dam site had not been active for 130-140 million years was released in mid-September. Earthquake safety was cited as one reason for a delay in the transfer of the Morris Dam from the Metropolitan Water District to the LA County Flood Control District, announced in local newspapers between September 14 and 16. Coverage of these dam safety controversies persisted through mid-October. Eleven articles on building safety between September 8 and November 2 dealt with a number of topics; the city of Burbank initiated a survey of its estimated 110 quake endangered buildings September 11, a progress report on the Santa Monica survey of old buildings appeared on October 6 and, in mid-October, local papers carried reports of the Seismic Safety Commission study indicating that there were between 100,000 and 200,000 commercial or apartment buildings in California which could collapse in a major earthquake. Several articles dealt with the quake safety of specific structures, e.g., Rinaldi Elementary School, the Olive View Medical Center and the Ruck-a-Chucky bridge. Earthquakes and nuclear power also contributed to the salience of safety issues during this September-November 1977 peak of media attention. The earthquake safety of the Lawrence Livermore nuclear research facility was questioned when geologists discovered active faults at the site. This situation and the operational safety of the Rancho Seco nuclear power facility near Sacramento gained



JANUARY 1, 1976 TO DECEMBER 31, 1978

FIGURE 12

newspaper coverage in late September. One month later, in late October, a fault was discovered at the site of General Electric's Vallecitos nuclear test reactor near Pleasanton. Six articles which appeared between October 22 and 28 contributed to this highpoint in media attention to earthquake safety.

The last significant upturn in media coverage of preparedness and safety occurred in February, 1978 (see Figure 7). Organizational preparedness themes were one reason for this reportage which discussed the readiness of local disaster agencies to respond to a major quake. Many of these reports were critical of preparedness programs. Building safety was again an importan element of this peak but no central themes dominated newspaper coverage. Release of new studies of faulting at the Auburn Dam site, a Caltech experiment with dam stability at the Santa Felicia Dam and the topic of dam inspection programs also contributed to the February, 1978 rise in preparedness and safety reportage.

Occurrence on August 13, 1978, of a damaging earthquake in Santa Barbara ignited renewed concern over the earthquake safety of a proposed LNG terminal to be located at Point Conception. This controversy was largely responsible for an increase in preparedness and safety reports in late August and early September of 1978 (see Figures 7 and 10). The LNG siting controversy was also principally responsible for a November increase in media coverage of quake preparedness and safety.

The Palmdale Bulge

The Palmdale bulge was one of the most persistent earthquake related topics to emerge during the three year period of study. Its interpretation as a possible earthquake precursor had a profoundly sobering impact on local
and national disaster preparedness policy makers and intensified the quest for accurate earthquake prediction techniques. At a superficial level, the bulge or uplift was nothing more than a geological anomaly imperceptible except by use of geodetic tools and of apparent interest only to technical experts. Its emergence as a repeatedly revisited news topic is the central problem of this section.

The initial newsworthiness of the Uplift can be traced to several factors. A news release by the U.S. Department of the Interior dated February 13, 1976, described the Uplift as "astride a large section of California's San Andreas Fault about 40 miles north of Los Angeles" (INT: 3599-76). The announcement further specified that the section of the San Andreas over which the Uplift had risen had remained "locked" since the great southern California earthquake of 1857. A key linkage between the bulge and a potential earthquake was the scientific observation that such uplifts had preceded large tremors in the past. The news release cited two instances of quake occurrences in the aftermath of land swellings; the destructive quake which hit Niigata, Japan in 1964, and the 1971 San Fernando Valley tremor. Some measure of uncertainty was also expressed. Not all uplifts had been followed by destructive earthquakes or any quakes at all. Early media announcements of the bulge's discovery appeared to draw much of their information and a prevailing tone of caution from this press release. Thus, on a basic level, the bulge became newsworthy because of its early interpretation as an earthquake threat to a large populous metropolitan area.

The earthquake history of southern California must also be seen as a contributing factor to the newsworthiness of the bulge. Two earthquakes this century caused deaths and heavy localized damage in the Los Anglees metropolitan area. In 1933, a quake measuring 6.3 on the Richter scale killed 120 people and destroyed much of downtown Long Beach. Thirty-eight years later, a quake of

similar magnitude caused 64 deaths and millions of dollars in property damage to the San Fernando Valley. Nearly all Californians have experienced the small tremors which are ever-present reminders of the potentially turbulent earth beneath their feet.

The local news media played a key role in setting the stage for public reception of the bulge as a matter of community concern with policy implications. The early interpretation in local media that the bulge was a precursor to a great earthquake presaged at least two important inferences: the bulge might provide an important clue to be pieced together with other "quake signals" into a comprehensive prediction program, and second, the prospect of a massive quake would set in motion the close scrutiny of local disaster preparedness programs. Linkage of the bulge with earthquake prediction had been preceded by many articles in local papers, especially the Los Angeles Times, which suggested that accurate quake forecasts might be made routinely in the near future. For example, in April, 1974, George Alexander announced in the L.A. Times that Caltech geophysicist James Whitcomb had accurately forecast the time and place of a small tremor near Riverside. Lengthy feature articles, also by George Alexander in August and November, 1975, projected considerable optimism regarding the rapidly advancing science of quake prediction. For ten days prior to announcement of the bulge, the local media had saturated readers and viewers with the horror of the Guatemala quake which claimed over 22,000 lives. One must speculate that this great disaster not only contributed to the newsworthiness of the bulge, but also to the urgency with which scientists and government officials undertook to monitor the southern California area and fine tune local preparedness programs.

California's earthquake history, prior media concern with prediction and preparedness and daily coverage through February, 1976 of the tragic Guatemala quake contributed to the Uplift's initial newsworthiness. We turn

now to those factors which contributed to the continued existence of the bulge as a news item. An event remains newsworthy if it is subject to new interpretations and developments. The bulge was an anomaly and while the scientific community seemed to favor the hypothesis that the bulge was a manifestation of enhanced stress indicative of an earthquake in the making, other interpretations were also plausible. One alternative explanation was offered by Dr. Wayne Thatcher of the U.S. Geological Survey and Dr. Hiroo Kanamori of Caltech. Based on separate studies, they suggested that the Uplift might represent "mountain building," that is, a permanent deformation of the earth's crust rather than a temporary feature caused by the storage of large amounts of energy (L.A. Times, 5-28-76; San Gabriel Valley Tribune, 12-7-76). It was also hypothesized that the bulge might itself represent the release of subterranean stress rather than being a precursor to a greater release of stress in one or more major quakes (L.A. Times, 1-27-77). Articles detailing explanations of the bulge as other than a precursor to a major earthquake were insignificant in number and did not contribute substantially to the newsworthiness of the bulge.

New developments concerning the Uplift as an earthquake threat significantly contributed to the persistance of the bulge as news. Coverage of these developments in local newspapers fell into two general categories: the announcements of new scientific findings and the recommendations and conclusions of government agencies concerned with the potential earthquake threat posed by the bulge. One month after announcing the Uplift's discovery, local newspapers reported that the Seismic Safety Commission had met, heard expert testimony and concluded that the bulge should be considered a threat to public safety (<u>SGVT</u>, 3-11-76; <u>Herald Examiner</u>, <u>L.A. Times</u>, 3-12-76; <u>Valley News</u>, 4-4-76). In late May and early June, 1976, local newspapers reported the discovery, by U.S. Geological Survey scientists, that the area of Uplift was higher and wider than previously believed. It was also suggested that the San Fernando Valley

quake of 1971 and the 1973 Point Mugu tremor were related to the bulge (L.A. Times, 5-28-76; Herald Examiner, 6-2-76, 6-5-76; SGVT, 6-3-76). In mid-December 1976, it was announced that subsidence of land on the coastal side of the San Gabriel mountains had been discovered and was believed by U.S. Geological Survey scientists to be related to the bulge (Santa Monica Evening Outlook, 12-10-76; SGVT, 12-11-76; Herald Examiner, 12-11-76; L.A. Times, 12-26-76). A number of articles which appeared in local newspapers during February and March, 1977, revealed that subsidence had occurred in the uplifted area itself. Most reports carried Dr. Robert Castle's warning that the observed sinking of land in the uplifted area did not mean that the earthquake threat posed by the bulge was diminished (L.A. Times, Herald Examiner, SGVT, 2-17-77; Valley News, 3-1-77; SMEO, 304077). Another important development in the media history of the bulge was the recording of swarms of small earthquakes along a twenty mile stretch of the San Andreas Fault within the uplifted region. This development gained significance according to Caltech geophysicists Don Anderson and Karen McNally, in that such swarms sometimes preceded large earthquakes (SGVT, L.A. Times, Radio KNX, KHJ, KABC, KNBC, KCBS, SMEO, 9-9-77).

An event continues to be newsworthy if it has implications for action. The generally accepted interpretation, both among scientists and the news media, that the bulge was a precursor to a damaging earthquake set in motion organizations charged with vital services and public protection. The Los Angeles area newspapers acted both to relay information regarding precautions taken by organizations to protect the public from earthquake danger and occasionally as a direct source of practical measures to be taken. The media, through editorials and letters to the editor, sometimes act as critics of public policy and as advocates of action in neglected spheres. The bulge generated just three editorials over the entire three year period of study. Two of them urged that efforts be made to sharpen quake prediction methods and take action on

the problem of old buildings (<u>LAT</u>, 4-8-76; <u>SMEO</u>, 4-12-76). A third was critical of Congressional rejection of the Earthquake Hazard Reduction Act (LAT, 9-22-76).

Media concern with preparedness in connection with the threat posed by the bulge first emerged in March, 1976, with public hearings conducted by the Seismic Safety Commission. At the hearings, as reported by <u>L.A. Times</u> science writer George Alexander, areas of high priority for action were: the estimated 14,000 unreinforced masonry buildings within the L.A. city limits; a review of the procedures for handling earthquake predictions and organizational response if the Uplift became the basis for a prediction; and, a public education program designed to promote quake readiness among individuals and families (<u>L.A. Times</u>, 3-12-76). Other local papers followed Alexander's lead with articles highlighting preparedness and safety should the Palmdale bulge portend a coming quake.

Perhaps the most comprehensive of these action oriented reports appeared in the <u>Valley News</u>. Citing concern over the Uplift as having "provided ammunition for plugging the earthquake preparedness gaps," Arnie Friedman launched a six part series (April 4-13, 1976) detailing measures taken since 1971 and those yet to be initiated to mitigate the quake danger. Friedman acknowledged progress in upgrading the structural strength of public facilities, particularly schools, in legislating more stringent design and construction standards, in the organization and coordination of government agency response to disaster, and in enhanced scrutiny of dam construction. Two areas of improvement were emphasized; the existence of 14,000 unreinforced buildings in the L.A. area, and the still unreliable state of earthquake prediction including uncertainties of public response to such forecasts. Friedman pointed out that legislative remedies had been proposed for both situations. The problem of old buildings could be solved by an ordinance to reinforce or eliminate the dangerous structures.

Federal funds were required for scientific research to improve earthquake prediction techniques and determine the nature of public response to accurate forecasts.

It is difficult to isolate the total scope of official action generated by the Uplift as a possible quake signal. Whitcomb's warning that a damaging quake might occur within a year of April, 1976 and Minturn's forecast in late November along with the Uplift appeared to produce a cumulative awareness of and urgency for preparedness measures in the face of the earthquake threat. By limiting ourselves to those actions which were specifically linked to the bulge, as reported in local newspapers, we can at least point to those areas of public response which received greatest attention and those which received least. The Uplift generated minimal concern with dam and nuclear power safety or individual preparedness. Only two articles, both in the Valley News, mention dam safety in connection with the bulge. A 4-25-76 report cited the Uplift and Whitcomb's announcement as motivating foces behind an order by the Department of Water and Power for a structural stability review of the Bouquet Canyon Dam in the Newhall-Saugus area. A follow-up article on 6-17-76 which also mentioned the bulge, reported results of the review - the structure was declared safe. Despite considerable media concern with nuclear power safety from late March through mid-June, 1976 (See Figure 12), just one report linked nuclear safety with the bulge. The Valley News on 4-9-76 announced Ralph Nader's proposal to the Nuclear Regulatory Commission that all nuclear facilities be ordered to shut down until seismic risk, including that posed by the Palmdale bulge, could be evaluated. Other than media coverage of official pronouncements that the public should prepare for a quake, specific precautions indicating what individuals might do to protect themselves in the event of a quake did not achieve salience in the immediate aftermath of the Uplift's discovery.

Those actions which received most extensive media coverage and thus contributed to the continued newsworthiness of the bulge were: steps taken by governmental agencies to review and fine-tune local disaster preparedness programs, efforts to draft and pass legislation on the local and national levels to mitigate quake hazards and a thrust in the scientific community to develop quake prediction techniques. These actions, all direct responses to discovery of the bulge and its interpretation as a quake precursor were frequently interconnected. The development of a reliable quake prediction system was dependent upon state and federal funding which required the passage of legislation. Legislation was required on the local level to deal with the problem of dangerous unreinforced buildings. The urgency with which preparedness programs and legislation were pursued was dependent upon the credibility of scientists studying the Uplift.

On April 8, 1976, the Seismic Safety Commission released two resolutions declaring the bulge a "threat to public safety" and requesting that action be taken on the local, state, and federal levels "to mitigate the potential disaster, stimulate preparedness and inform the public" (State of California Seismic Safety Commission, Resolution Nos. 1-76 and 2-76). The resolutions requested that all state agencies take precautions to mitigate damage to their facilities. State agencies with assigned emergency responsibilities should be ready to respond to disaster with all available resources under the leadership of the Office of Emergency Services. The OES was to monitor the activities of state agencies within the context of the resolutions and report back to the commission. The SSC urged the Department of Housing and Urban development to make financial resources available over the next ten years for the abatement or strengthening of hazardous buildings in the L.A. metropolitan area. The Seismic Safety Commission further resolved to urge the Federal Disaster Assistance Administration to make funds and technical assistance available under the Disaster Relief Act of 1974 "for the purposes of hazard reduction, avoidance and mitigation of a damaging

earthquake" (Resolution 2-76). These resolutions seemed to set the tone for news media attention to organizational preparedness in connection with the bulge throughout the monitored period as area newspapers reported on the progress of various agencies toward earthquake hazard reduction. On 6-2-76, the <u>Herald Examiner</u> announced that the County Board of Supervisors had ordered the posting of warning signs in all county buildings. The Seismic Safety Commission resolutions were cited in a State Public Utilities Commission order that all major public utilities review their disaster contingency plans and response time (<u>Herald Examiner</u>, 7-29-76; <u>SMEO</u>, 8-4-76). Mayor Bradley appointed a 25 member Task Force to recommend ways in which the city should respond to valid earthquake predictions. The Palmdale bulge was an important factor in the mayor's concern over possible damaging quakes (<u>L.A. Times</u> 3-11-77; <u>Herald Examiner</u>, <u>L.A. Times</u>, <u>SMEO</u>, 3-15-77; <u>Valley News</u>, 3-16-77, 4-17-77). The State Department of Health ordered structural safety reviews for 619 health facilities within the boundaries of the California Uplift (L.A. Times, SGVT, 5-27-77; Valley News, 5-31-77).

In addition to its call for review and upgrading of disaster preparedness plans, the Seismic Safety Commission also called for various measures requiring legislation. The main focus of the commission's resolution was legislation to deal with the danger from unreinforced buildings. The U.S. Geological Survey and academic institutions pressed for state and federal funds to develop an earthquake prediction capability and study community response to accurate forecasts. Presence of the Uplift and an accurate Chinese prediction which saved thousands of lives offered the "threat and promise" to justify the large expenditures sought. On 5-24-76, the U.S. Senate unanimously passed the Earthquake Hazard Reduction Act authorizing \$150 million over a three year period to develop an earthquake prediction program, to establish building codes and improve construction methods in high quake risk areas. The legislation also called for funding to improve warning capabilities and emergency services. The bill's

sponsor, Senator Alan Cranston (Democrat-California) said action on the bill, twice before introduced and rejected, had been spurred by the devastating quakes in Guatemala, Italy, and the Soviet Union, and the "disturbing discovery" of the Palmdale bulge (L.A. Times, 5-26-76; <u>SCVT</u>, 6-30-76). In August, 1976, a measure was introduced in the California Assembly with a \$15.6 million budget to instrument the uplifted area and develop a prediction capability. Both federal and state lawmakers rejected these bills, although the Earthquake Hazard Reduction Act eventually passed Congress on May 12, 1977. Passage of this legislation contributed to the newsworthiness of the bulge as findings from studies it financed were revealed in the pages of local newspapers throughout the remainder of the monitored period.

New developments and an events' implication for collective action contribute to its newsworthiness in a direct manner, that is, the event is featured as newsworthy in its own right. An event may achieve continued media exposure as background for new events. The bulge was frequently mentioned in conjunction with Whitcomb's announcement that a moderate quake might occur sometime within a year of April, 1976. The Uplift was not cited by Whitcomb as an integral part of his forecast. In fact, its mention was typically a disclaimer that it had anything to do with the Caltech geophysicist's announcement (L.A. Times, Herald Examiner, 4-21-76; SGVT, SMEO, 4-22-76; SGVT, 4-23-76). In mid-April, 1976, local newspapers featured various aspects of the Chinese earthquake prediction program and their successful prediction of a major quake in Haicheng province in 1975. It was suggested in these reports that the U.S. should develop a quake prediction capability and that the uplifted area might provide a rare opportunity to develop prediction techniques (Valley News, 4-13-76, 4-16-76; SMEO, L.A. Times, 4-15-76; Herald Examiner, SGVT, 4-16-76). Other occasions on which the Uplift was mentioned but not the main topic included professional meetings, most notably meetings of the American Geophysical

Union, public addresses by scientists, letters to the editor, and coverage of seismological research.

The factors of uncertainty and threat often play an equivocal role in events which become news. While the prevailing media pattern is to pursue objective, factual and final information on an event, the achievement of such certainty often marks the end of an event as news. The bulge, partially due to its anomalous character, endured as news throughout the three year monitored period (see Figure 4). Consider, in comparison, the brief news histories of the two major quake predictions (Figures 5 and 6). Minturn's forecast is particularly instructive. An amateur scientist claiming professional credentials, he burst into public view in late November, 1976, projected the occurrence of several quakes including one which was to strike southern California on December 20, 1976, then plummeted into obscurity when his prediction failed. Such certainty, making a specific event at a specific time the focal point of news audience attention, then the failure of that event to occur marked its demise as news. The Uplift did not become the basis for a prediction or other outcome which might have resulted in a similar fate. As a media event, the bulge retained much of its uncertain character and endured as viable news. At the same time, the news media imposed some degree of certainty on the Uplift by interpreting it as a precursor to a major earthquake and giving scant attention to less interesting alternative explanations.

Threat, like uncertainty, has an ambiguous standing in relation to news events. An event which does not impinge upon the community in some way rarely becomes news. An event which may portend widespread negative consequences, leaving no one unaffected in some way, must be handled in a careful and prudent manner. The early (February-April, 1976) and highly sensationalized media interpretation of the bulge as a precursor to a "great" earthquake, one which could kill and injure tens of thousands of people and cause billions of dollars in property damage, was indeed threatening. Los Angeles area residents were

bombarded with reports of their vulnerability: 14,000 dangerous unreinforced buildings stood in their midst, scores of dams sat ominously above heavily populated neighborhoods, scientists could not say when this quake, which could produce 540 times more energy than the destructive 1971 tremor, would occur, the ability of government to cope with such an emergency was in doubt. The potential public alarm over these revelations was alleviated to some extent by the presentation of information, often in the same article, designed to placate the reader with reassurances. Early reports which described the character of the bulge, its location, its proximity to the San Andreas Fault and its quake potential frequently included the assurance that not all uplifts had been followed by damaging tremors. Alarm over the estimated 14,000 unreinforced buildings which could collapse in a bulge related quake was mitigated by promises of legislation to force rennovation or destruction. There were also assurances from the city Department of Building and Safety that wood frame houses fared well against the ground motion typical of earthquakes. Warnings by agencies including the U.S. Geological Survey, the Seismic Safety Commission, and the California Earthquake Prediction Evaluation Council that the Uplift presented some element of earthquake danger were allayed by assurances that scientists and government agencies were vigorously pursuing the answers to the mystery of the Uplift and preparing the community for any possible emergency.

Without a firm scientific grasp on the implications of the Uplift, disagreements often resulted among scientists. Some seismologists, quoted in local newspapers, tended to emphasize the prospect of a damaging quake resulting from the bulge, others were more cautious and reassuring regarding the quake prospect. Dr. Clarence Allen, a geophysicist at Caltech and frequently cited on earthquake matters, provided a consistent voice of restraint in the interpretation of the bulge and the prospect of accurate earthquake predictions. One week after the Seismic Safety Commission had declared the bulge a threat to public safety, Allen, addressing students at Long Beach City College, stated that

the bulge merited close study but added, "we have no reason to believe a great earthquake is imminent." As for predicting large quakes, "my guess is that we are ten years away" (SMEO, 3-18-76). Perhaps the most alarming statement to emerge from a body of seismic experts regarding the bulge was contained in a report prepared by the U.S. Geological Survey and delivered to the governor's office in April, 1976. It said, "The Uplift occurs along the section of the San Andreas Fault where a major earthquake occured in 1857 and where another great earthquake is inevitable, possibly within the next decade." Again, Allen, acting as a member of the California Earthquake Prediction Evaluation Council, reacted with caution and reassurance. Said Allen, "I don't think we have in hand, right now, any good, solid incontrovertible physical evidence for saying that a major earthquake is more likely in the next ten years than it is in the following ten years" (L.A. Times, 4-18-76). Allen continued to be a voice of restraint and was frequently quoted when the media reported new threatening developments such as the discovery of additional swelling of the uplifted area, in the wake of quake swarms within the boundaries of the uplifted area, and the Nikonov prediction based upon the bulge.

We have analyzed the way in which the bulge became newsworthy, how it remained a viable news event, and how the media handled elements of uncertainty and threat. We turn now to an attempt to explore the manner in which a complex scientific finding is presented to a mass news audience. The scientific community, the news media, and the news consuming public are collectivities with quite different reference groups, expectations, and competencies. Generally, the flow of information is from scientist, scientific institution, or government agency to the media which present the finding and its implications to the public. This "two stage" translation of an event, from scientist to journalist and from journalist to public is often a difficult one. Between the scientist, journalist, and public there is usually a vast difference in scientific training. The

journalist must often cover science stories along with many other topics. His stories must be brief, timely and entertaining. Complex scientific findings must be presented in elementary terms for an audience assumed to have a minimal grasp of scientific assumptions or procedures. The result of these journalistic handicaps and assumptions about the news consuming public is often a series of scientific news reports that are distorted, oversimplified and sensationalized.

There was a considerable difference in the extent and manner in which the southern California Uplift was covered by community and metropolitan newspapers. The <u>Los Angeles Times</u> exceeded all other papers in both extent and depth of coverage. Those articles in the <u>L.A. Times</u> written by science writer George Alexander were detailed, carefully researched, and skillfully presented in terminology which avoided scientific jargon and oversimplification. Consider, for example, Alexander's description of two possible theoretical explanations for the Uplift, dilatency and elastic deformation:

(dilatency) is a process that would cause tiny cracks in the subterannean rock layers to expand under stress and so increase the volume of the region. The stress, of course, would come from the action of the two land masses on either side of the San Andreas Fault trying to move past each other . . ., elastic deformation might be likened to the effect seen in a rug pushed against a wall -- it piles up upon itself. It is tempting to think that this is what is happening in the uplifted area, since there is a more pronounced bulge at the northern end than at the southern, but scientists again caution against jumping to conclusions (L.A. Times, 2-13-76).

All community dailies including Los Angeles' other metropolitan newspaper, the <u>Herald Examiner</u>, carried wire service reports which failed to present a theoretical explanation of the Uplift. <u>La Opinion</u> did not report discovery of the bulge at all. While all papers except <u>La Opinion</u> faithfully reported major developments in the Uplift, the <u>L.A. Times</u> stood above in its comprehensive treatment of these developments. Lacking staff science writers, the <u>Herald</u> <u>Examiner</u> and other English language community papers offered the brief and less detailed reports derived from the Associated Press and United Press International.

While most reports featuring the Uplift were cautious and factual, two notable problems arose. One was the sensationalization of the consequences of a bulge related quake, and second was the tendency to start every presentation from the beginning as if the audience knew nothing. Scientists, trying to piece together the complex puzzle, saw the possibility of a large, perhaps damaging, quake in a coincidence of factors -- an uplift astride the San Andreas Fault in a location where a very large tremor had occurred in 1857. Despite the tentativeness of their association of the bulge with a large earthquake, the media widely interpreted the Uplift as a signal of an approaching "great" earthquake and projected the consequences of such a quake in a highly sensational manner. All local newspapers quoted a U.S. Geological Survey estimate that between 3,000 and 12,000 people could be killed in the Los Angeles area, 48,000 might be injured and \$25 billion in property damage might be sustained in such a quake. The Herald Examiner, after having detailed this scenario, quoted a Caltech seismologist who remarked, "we have not found anything conclusive in the data we have gathered so far that would indicate the San Andreas bulge is a forewarning of a major southland earthquake." The edition carrying this report appeared with the front page headline (in large block letters) "Southland Warned of Major Quake" (Herald Examiner, 4-9-76). The Valley News, citing a 1973 "earthquake vulnerability study made by federal researchers," offered an even more frightening set of consequences: 19,800 dead, injuries requiring hospitalization to 49,500 and 256,000 left homeless (4-4-76). Again, placating statements followed but one must wonder what information the reader is most likely to recall, the projection that 70,000 people will become casualties or that Los Angeles is better able to cope with emergency relief than it was in 1971.

The practice by nearly all area newspapers of beginning each report on the Uplift by reviewing all previous information had two regretable consequences.

Reports had a repetitive character in which the same points were made over and over, leaving little opportunity to develop a more thorough understanding among readers. A second, perhaps more serious drawback to the repetitive character of reports on the bulge was that in the process of uncritically repeating previous information, obsolete and incorrect data were perpetuated. While all newspapers reported the May, 1976 finding that the bulge was higher and more widespread than previously believed, only the L.A. Times reported another more subtle discovery made at the same time. A lengthy feature article by George Alexander which appeared on May 28, 1976, carefully explained a finding by USGS geophysicist Wayne. Thatcher that a systematic review of geodetic data had revealed that the San Andreas Fault had been ruled out as playing a major role in the bulge. In fact, reasoned Thatcher, "if the two blocs of land on opposite sides of the fault are pressing against each other, as this data indicates, then they're really clamping the San Andreas and preventing it from moving." Nevertheless, the association of the Uplift with the San Andreas Fault continued to be stressed without qualifying statements in nearly all local news media. Despite numerous alternative hypotheses that the Uplift may indicate an earthquake of lesser magnitude or perhaps not signal an earthquake at all, the media-favored interpretation that the bulge portended a "great" earthquake to be accompanied by widespread casualties and destruction persisted.

A final point of analysis involves coverage of the actions of organizations concerned with earthquake danger and the interaction between these agencies and the media. In comparison with the politicized controversies, the subjects of a later section, the Palmdale bulge generated few newspaper editorials containing criticism or advocacy of agency or organization actions. Both academic and governmental agencies were the principal sources of media information regarding the meaning of the Uplift and principal architects of organized response to the danger it was believed to present. It will be recalled that a

February 13, 1976 news release by the Department of the Interior which announced discovery of the Uplift by U.S. Geological Survey scientists was followed within three days by articles in all area newspapers except La Opinion which adopted both the details and tone of caution in the agency. So atuned to organizational sources were local newspapers that after its discovery was announced in mid-February, nothing regarding the Uplift appeared on the pages of area news dailies until the Seismic Safety Commission met on March 11, 1976, to discuss the meaning of the crustal anomoly and what, if anything, should be done about it. It was not until early April, 1976, that the media began to probe the implications of a possible major earthquake without directly responding to specific organizational sources. For example, between April 4 and April 13, 1976, the Valley News offered a six-part series touching on may preparedness themes, particularly precautions taken since the 1971 San Fernando tremor. The L.A. Times began to direct public attention to the need for earthquake legislation and a solution to the problems posed by unsafe buildings. Area newspapers remained sensitive to new developments in the Uplift and generally looked to the U.S. Geological Survey and Caltech as news sources. One of the more intriguing findings regarding media response to the bulge (and Whitcomb) was the significant level of attention paid to organizational preparedness and almost negligible concern with individual precautions. Suggestions on what individuals and families could do to protect themselves before, during, and after a quake did not become salient in the media until November, 1976. One possible explanation is that the early newsmakers i.e., those who discovered the bulge, interpreted it as a potential earthquake threat, and pointed to the possible consequences of a bulge-related quake, were acting as representatives of organizations including Caltech, U.S. Geological Survey, the Seismic Safety Commission, and the Office of Emergency Services. Some of these organizations possessed formal channels of communication with vital service or "life line" agencies like the Department of Water and Power, the Public Utilities Commission, and the Department of

Building Safety. While there may be agencies charged with the dissemination of disaster preparedness information to the public, a campaign to actively distribute this information was not undertaken. From late November, 1976, to February, 1977, when media attention to individual preparedness was at its height, it was a private citizen with no organizational affiliation whose series, "Common Sense and Earthquake Survival," substantially performed the task of providing basic preparedness information to individuals. The rapid response of organizations to the perceived threat posed by the bulge and the media's close attention to those actions might also be accounted for by the observation of Tilly (1978) and others that mobilization of resources (in this case the mobilization of preparedness activities) is more rapid when it occurs in the context of formal organizations.

We have shown that Los Angeles area residents were prepared to accept the Palmdale bulge as news by its collective experience with damaging earthquakes and media sensitivity to quake-related matters. Considerable optimism prevailed both among scientists and journalists that reliable prediction techniques were nearly at hand and that the Uplift might provide a field laboratory to develop and polish these techniques. The bulge remained newsworthy for several reasons. As it came under close scientific scrutiny, new developments in the Uplift and their implications continued to be reported in area newspapers. Scientific and government organizations mobilized in an effort to mitigate the dangers posed by the bulge. Local newspapers dutifully reported this organizational action which took the form of close scrutiny of emergency relief measures and preparedness plans, intense scientific study of the uplifted area and lobbying for funding hazard reduction measures. The bulge continued to be newsworthy in its own right and as background for other news events. While the prevailing pattern among journalists is to press for certainty, it has been argued that some level of uncertainty as to the meaning of the bulge contributed to its persistence as news. The highly sensationalized consequences of a bulge-related

quake heightened the drama of the Uplift story but also its threatening effect. A technique used by the media to offset this exaggerated sense of threat was to include placating statements in news items to reassure the audience. There was considerable difference between area newspapers in their coverage of the bulge, from the <u>Los Angeles Times</u> whose science writer George Alexander offered the most comprehensive treatment, to <u>La Opinion</u> which gave scant attention to the Uplift. Finally, it was observed that in its discussion of the Uplift, as compared to other quake-related matters, the media played a minimal role as initiator of interpretations or advocate of action. While not entirely passive in presentation of developments, the media were primarily relayers rather than active interpreters of Uplift information.

Prediction

Most scientists agree that prediction of an earthquake must contain four elements--accurate estimates of time, place, and magnitude and an estimated probability of occurrence as predicted. If we were to hold each "predictor" encountered in the media over the three year period of study to this definition, there would have been no predictions to discuss. The more cautious journalists sometimes used other terms to describe earthquake predictions including forecast, experimental hypothesis, announcement, warning, projection, etc. Most journalists however, used the term quite loosely.

Scientists acknowledged that accurate earthquake prediction was a goal and not a reality. Dr. Clarence Allen's statement that reliable forecasts were at least ten years in the future was frequently quoted in predictionrelated media reports. Unable to satisfy all four elements of prediction, scientists, like journalists, sometimes spoke of predictions when only two criteria were met--usually rough estimates of time and location. The board of scientists known as the California Earthquake Prediction Evaluation Council,

a branch of the Office of Emergency Services, considered three announcements during the study, the Palmdale bulge and those of Whitcomb and Minturn. Numerous predictions both by scientists and nonscientists became the subjects of journalistic accounts before and during our three year period of interest (1976-1978). As background for our more extensive treatment of the Whitcomb and Minturn predictions, the more important of these announcements will be briefly reviewed.

Perhaps the most celebrated of all quake predictions encountered in local media was the accurate forecast of a major tremor by Chinese seismologists for the city of Haicheng on February 4, 1975. The Chinese, who place a high priority on earthquake research, began looking closely at the Haicheng area in 1970 after an uplift was discovered near the city. Scientists and thousands of volunteers monitored such phenomena as rates of crustal deformation and tilt, level of small quake activity, changes in well water and unusual animal behavior. Rapid seismic changes in the first few weeks of 1975 led to an alert. On February 4, just five and half hours before the quake struck, an evacuation order was issued. The prediction and evacuation were credited with saving thousands of lives.

Efforts by American scientists proved fruitful in the accurate prediction of two small quakes, one in New York, the other in California. In 1973, scientists at Columbia University's Lamont-Doherty Geology Observatory successfully anticipated a small tremor (2.5 Richter scale) in the Adirondack mountains based upon the seismic wave hypothesis later utilized by James Whitcomb of Caltech. This was believed to be the first successful earthquake prediction in the United States. On Thanksgiving eve, 1975, a group of earth scientists calling themselves the Pick and Hammer Club sat in a rented hall discussing some unusual data obtained from tilt meters and other instruments in the Hollister, California area. Malcolm Johnston of the US Geological

Survey remarked that the findings were the sort one might see before an earthquake. Another scientist present who was familiar with the data suggested that the quake might occur the following day. Indeed, an earthquake measuring 5.2 on the Richter scale occurred about 10 miles northwest of Hollister the next afternoon.

Whitcomb

In the midst of public concern over the Palmdale bulge and the possible consequences of a great earthquake in southern California, James Whitcomb released his announcement that a moderate quake could strike the Los Angeles area within a year of April, 1976. Although Whitcomb denied any connection between his data and the inferences being made in the media regarding the quake potential of the bulge, early reports included mention of both events. These reports repeated Whitcomb's disclaimer that the Uplift was a factor in his forecast but noted that there was some overlap between the uplifted area and that designated by Whitcomb as the probable location of quake impact. Whitcomb based his hypothesis on a Soviet developed technique known as the P-Wave or Velocity-Bay method.

To understand how and why Whitcomb's quake prediction became newsworthy, we must again point to the heightened sensitivity of southern Californians to earthquake-related news. This sensitivity is a product both of personal experience with many small quakes which occur periodically in the area and media concern with quake phenomena. Leading up to public announcement of Whitcomb's prediction was the intensive coverage of a major quake event in Guatamala and discovery of the southern California Uplift. We have noted that several lengthy articles had appeared by early 1976, most in the <u>LA Times</u>, projecting considerable optimism that scientists would soon make accurate

earthquake predictions.

One factor which made Whitcomb's forecast newsworthy and played only a minor role in the newsworthiness of the bulge was the opportunity for the media to probe the personality of the predictor. In the news history of the uplift, many scientists and agency administrators played important roles but none emerged as sole spokesperson. As the central character of his own news drama, Whitcomb's personality, character, and credibility were closely scrutinized. Whitcomb was not a complete stranger to local journalists when he made his quake announcement public on April 21, 1976. A senior Research Fellow at Caltech, he had received earlier exposure as a predictor, at least to faithful readers of George Alexander's science features in the Los Angeles Times. One such article appeared on April 11, 1974. It credited Whitcomb with successfully predicting the approximate time and place of a moderate tremor which occurred near Riverside, January 30, 1974. Alexander explained that Whitcomb's forecast was the first to be fulfilled in California. Whitcomb, who had predicted the quake based on the Velocity-Bay method, stated that he had not made a public announcement of the forecast because the technique was still in the testing phase. Said Whitcomb, "I want to be very sure of myself before I make them in public." Whitcomb was again mentioned as a successful earthquake predictor along with Malcolm Johnston in an October 12, 1975 article by George Alexander entitled "Progress Made in Predictions." Whitcomb was one of the earth scientists quoted regarding the meaning of the Palmdale bulge when its discovery was first announced (LA Times, 2-13-76).

Shortly after the appearance of reports containing details of the prediction, area newspapers offered "personality profiles" on Whitcomb. In these reports Whitcomb's educational background was probed, along with the motives for announcing his warning publicly and his personal reaction to the quake

prospect. An April 29 article in the <u>LA Times</u> by staff writer Betty Liddick portrayed Whitcomb as a modest and committed researcher, not a hero or "wildeyed scientist eager for the limelight." He was a man who suddenly felt the weight of public scrutiny and hoped that his prediction would not become a test of personality. Liddick revealed that Whitcomb was a graduate of the Colorado School of Mines, had a Masters Degree from Oregon State and a doctorate from Caltech. He became interested in quake prediction while on a Fulbright-Hayes study program in Sweden. Whitcomb had also worked on the Apollo program before coming to Caltech as a research fellow.

Whitcomb reported that the prediction, or "hypothesis test" as he preferred to call it, was made known to his scientific colleagues in a journal article two months prior to its release to the news media. Whitcomb also reported his findings to the American Geophysical Union which met in early April, 1976. The prediction was publically announced via press release in response to news media inquiries and "to make sure that all the qualifiers that go along with it would be on record." Other reasons were given by Whitcomb for public release of the forecast. "I think we're beginning an educational process . . ., we must make our work public with all the uncertainties laid out so that everyone knows the total low down." Whitcomb also pointed out the difficulty of suppressing information in a nation with a free press (LA Times, 4-29-76). Asked at a newsconference if he would be afraid to live near the epicenter of the quake he predicted, Whitcomb responded that he would be unafraid to do so and stressed that only common sense precautionary steps should be taken. He cited his own example of moving heavy hi-fi loudspeakers from their perch on his wall to the floor (SGVT, 4-23-76; Herald Examiner, 5-2-76).

In comparison with the uplift, Whitcomb's announcement stimulated editorial comment and solicitation of public reaction by the news media to a far greater degree. This was due to recognition by the media that the success or benefit of quake prediction was, to a considerable extent, dependent upon whether the public accepted it as believable. Accompanying this recognition of the importance of public acceptance is the sense of responsibility held by media representatives as opinion leaders. The bulge did not become the basis for a prediction nor was the crustal anomaly, whose meaning remained a mystery even to scientists, a point of public controversy. The media, most noticeably the newspapers, failed to keynote any specific course of action in relation to the bulge and served to relay rather than interpret new developments and information. With the release of Whitcomb's announcement, the news media shifted to a more active and interpretative journalism.

Four of six monitored newspapers carried editorial essays or cartoons focusing on Whitcomb's prediction. The <u>LA Times</u> offered three editorial essays, one cartoon and an essay by Whitcomb in a special section called "Futureshock." It was apparent from all of these items except perhaps Conrad's cartoon (depicting a chicken with its head severed running madly about shouting "The earth is quaking! The earth is quaking!") that Whitcomb's forecast was taken quite seriously. An April 22, 1976 essay described the magnitude 5.5 to 6.5 quake predicted by Whitcomb as being equivalent to between 1,000 and 30,000 tons of TNT. It was also pointed out that some 90 earthquakes greater than 5.5 magnitude had occurred in southern California since 1933. The essay carried preparedness themes as well. The 14,000 masonry buildings constructed prior to 1933 "should either be reinforced promptly or condemned." Readers were urged to take common sense precautions to protect home and family. In Whitcomb's own essay, he summarized the

accomplishments made by seismologists in the field of earthquake prediction. He described his prediction as the test of an as yet unproven hypothesis which, because of its uncertainty as to time, location and magnitude was not of great practical use to the public. Perhaps the strongest defense of Whitcomb's public announcement was made in the aftermath of the California Earthquake Prediction Evaluation's critical review of the prediction. "The hoopla and controversy which have swirled around Dr. Whitcomb," wrote George Alexander, "have tended to obscure this fact: in making his prediction public, Whitcomb is giving the average person the rare and privileged opportunity to watch a scientific experiment as it unfolds" (<u>LA Times</u>, 5-16-76). A June 1, 1976 editorial, whose main point was to commend the US Senate for passage of the Earthquake Hazard Reduction Act, mentioned Whitcomb's prediction as an indicator that the expenditure was justified.

The <u>Valley News</u> steered a neutral course editorially. Serving an area which suffered the most recent damaging earthquake and part of the designated impact area for Whitcomb's forecast, the <u>Valley News</u> refrained from criticizing either Whitcomb or Councilman Louis Nowell who threatened to sue Caltech and Whitcomb for alleged damage to property values in the San Fernando Valley, caused by the public forecast. The paper urged valley residents not to panic as a result of the quake prediction (<u>Valley News</u>, 4-25-76, 5-11-76). The <u>Santa Monica Evening Outlook</u> was critical of Whitcomb's public warning citing possible panic and a "countdown syndrome" reaction. The sole editorial essay which appeared on April 26 stressed that Whitcomb was only working on a hypothesis and quoted the Caltech researcher's statement that the uncertainty of magnitude, location, and time of occurrence precluded the test from being of great use to the public. The <u>San Gabriel Valley Tribune</u>'s only editorial comment on Whitcomb consisted of a cartoon entitled "April is

the cruelest month." The cartoon depicts floods, tornadoes, earthquakes, taxes and political speeches as forcing the citizen to take cover beneath a table (4-24-76).

To a lesser extent, the newspapers sought public reaction to the quake prediction. Opinions of both the prediction and the possible quake were solicited by LA Times staff members and presented in a feature article on April 22. Reaction ranged from indifference to considerable criticism of the publicly announced forecast. Said one valley resident, "I think that's (public announcement of the prediction by the media) the most stupid, the craziest thing you people could do. We've got so many panicky people here in Sylmar. You want to bet we're going to have half of Sylmar putting their homes up for sale?" But most reactions were similar to a man who said, "I'm not worried anymore. If it comes, it comes." Public reaction via "man on the street" interviews were also published in the San Gabriel Valley Tribune (4-22-76) and La Opinion (4-24-76). The LA Times also offered a feature article which probed the psychological and sociological impact of the prediction while psychologists believed the forecast too vague and open-ended to produce specific behavioral disorders. It was believed possible that some people, especially children, may experience some increased general anxiety. It was also pointed out that in a quake and its aftermath panic is rare.

The opportunity to probe the personality, motives, and credibility of the predictor and editorial comment stimulated by the controversial nature of the prediction were factors in its newsworthiness. New developments and interpretations played a relatively minor role in maintaining Whitcomb's forecast as a news item. Once released, the forecast was not modified nor variously interpreted. Only three significant developments occurred in the brief news history of the prediction; its assessment by the California Earth-

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quake Prediction Evaluation Council on April 30; the threat by Councilman Louis Nowell to sue Whitcomb and Caltech, citing an alleged threat posed by the prediction to property values in the San Fernando Valley; and, cancellation of his "test" in early December, 1976. These developments will be considered later in the analysis.

Discovery and interpretation of the Palmdale bulge as a quake precursor had already set scientific and governmental organizations in motion, Whitcomb's forecast contributed further to the urgency for action to protect the community. Preparedness and safety themes in connection with the prediction were featured in reports by all monitored newspapers. Most of these articles appeared in April (71%, N = 14). A great majority of these reports (86%) dealt with some aspect of organizational preparedness, continuing the trend begun with public discussion of the bulge. About half of these reports mentioned the actions of agencies in a brief and summary manner, often noting that local disaster relief agencies were prepared for any emergency. More detailed treatment was offered in four Los Angeles Times articles, three of which appeared on April 22. In one, George Alexander interviewed the directors of vital service (utility) agencies in the area. Reassurance was the dominant tone as agency heads emphasized their readiness for any quake emergency. One exception was the city's Building and Safety Department director who was pressing the City Council on the issue of unsafe buildings. Another Alexanderauthored article penned in response to Whitcomb's announcement emphasized individual preparedness. In addition to practical reminders as to where to take cover and how to allay hazards in the home, Alexander recommended acquisition of the pamphlet, "A Citizen's Handbook on Disasters" prepared by the Defense Civil Preparedness Agency. An April 22 editorial repeated several individual preparatory measures and urged a rapid initiative to improve potentially unsafe structures. Many preparedness themes were touched upon

in an <u>LA Times</u> interview with Whitcomb, Caltech Seismology Lab Director Don Anderson and Caltech economist Roger Noll. Building and dam safety were considered areas of special concern. In sum, organizational preparedness continued to be the most salient issue in connection with the Whitcomb forecast. Individual preparedness, while more visible in the aftermath of Whitcomb's announcement than in connection with the bulge, was invoked in just four articles. Concern with old buildings was the most significant of the safety issues with eight mentions. Dam safety received attention in two articles and nuclear safety was not mentioned in connection with the Whitcomb prediction.

Three other themes implying action in response to Whitcomb's announcement emerged. One was the status of real estate values in the predicted impact area. Public release of the forecast prompted an LA City Councilman representing the San Fernando Valley to propose a law suit against Whitcomb and Caltech alleging damage to property values in his district (LA Times, 4-22-76, 4-29-76; La Opinion, SGVT, SMEO, Valley News, 4-23-76). The proposed legal action sponsored by Councilman Nowell received little support in City Council. Bankers and real estate brokers interviewed believed that the forecast would have little effect on property values. Insurance executives reported that the demand for quake insurance had not increased in response to the prediction. The Valley News, which serves Nowell's district, offered little if any editorial support for the legal action. Nor was there much indication that homeowners in the area were sufficiently concerned to take action in response to such alleged losses. A July 25, 1976 LA Times report indicated that the average value of residential property in the San Fernando Valley increased substantially, consistent with appreciation of comparable property in southern California since the forecast had been announced. A second action taken in response

to the forecast was its assessment by a panel of earth scientists known as the California Earthquake Prediction Evaluation Council. The council is an advisory body to the state Office of Emergency Services and had last been convened to discuss the threat posed by the Palmdale bulge. The eight-man panel, after hearing Whitcomb's presentation of theory, data, and prediction concluded that the probability of an earthquake in the designated impact area was no greater than that in other geologically similar areas of the state. Four area newspapers, La Opinion, the LA Times, the Herald Examiner and the Santa Monica Evening Outlook contained reports of CEPEC's review. All carried OES director Charles Manfred's reassurance that the forecast should not be cause for public alarm but warned that it should serve as an incentive for a re-examination of local government preparedness plans. The Whitcomb prediction was also a factor cited by lawmakers and the media as justification for the expenditure of \$150 million in federal funds to develop a prediction capability along with other measures to safeguard the public from damaging earthquakes (Herald Examiner, 4-25-76; LA Times, 5-25-76, 6-1-76).

The Whitcomb prediction was a significant news item with reports appearing almost daily in area papers between April 21 and May 3, 1976. After May 3, articles appeared less frequently (Figure 5) and mentioned the Whitcomb prediction mainly as background for other events and topics. In several cases, the Caltech scientist's forecast was mentioned in articles whose broader context was either earthquake prediction in general or the social and economic consequences of quake prediction (<u>SCVT</u>, 5-16-76; <u>Herald</u> <u>Examiner</u>, 8-30-76, 1-13-77, 4-21-77; <u>LA Times</u>, 12-31-76). Television and radio broadcasts in the latter part of 1976 also included mention of Whitcomb in special programs on quake prediction (KABC-TV, 8-10-76, 8-11-76, 9-2-76; KMPC Radio, 10-29-76; KFI Radio, 12-10-76). Earthquake-oriented legislation

was also a main theme which included mention of Whitcomb's forecast (<u>LA Times</u>, 5-25-76, 6-1-76; <u>SGVT</u>, 8-4-76). Whitcomb's public announcement was also mentioned in a lengthy personality profile of former Caltech scientist Charles F. Richter (<u>LA Times</u>, 1-23-77) and in a review of Alistair MacLean's book entitled <u>Goodbye California</u> (<u>Herald Examiner</u>, 7-30-78). After May 3, only three newspaper reports featured the prediction as the main theme. One of these articles was George Alexander's editorial defense of Whitcomb's "going public" with his forecast (<u>LA Times</u>, 5-16-76). The other two reports announced Whitcomb's cancellation of the prediction due to evidence obtained which tended to contradict his hypothesis (<u>Herald Examiner</u>, 12-10-76; <u>SGVT</u>, 12-11-76).

The rapidity with which Whitcomb's prediction ceased to be a featured news item merits further comment. A number of factors contributed to the decline in newsworthiness. It has been maintained that an event's implications for action are crucial to its survival as news. Public response to earthquake threat has taken a number of forms: scrutiny of preparedness programs, legislation to mitigate quake danger, the development of review procedures to evaluate predictions, and so on. When Whitcomb's forecast appeared on the pages of local newspapers on April 21, action-oriented media reports spurred by discovery and interpretation of the bulge had already appeared in significant numbers. Fourteen articles, mostly reporting the preparatory actions of organizations, were published in connection with the quake threat believed to be posed by the Bulge prior to Whitcomb's announcement. Thus, whatever public uncertainty may have prevailed as to the readiness of local government and the scientific community to respond effectively to quake danger was being substantially addressed at the time of Whitcomb's announcement.

Perhaps most damaging to the prediction's currency as news was the negative assessment it received at the hands of the California Earthquake Prediction Evaluation Council. The conclusion that there was no greater likelihood of a quake in the designated impact area than in other geologically similar areas was reported by all area newspapers. The panel, consisting of Whitcomb's scientific peers, offered abundant public reassurances that area residents had nothing to worry about. Citizens were advised to take common sense precautions against the ever-present danger of a damaging earthquake. To a large extent, the Whitcomb hypothesis was superseded as news by the occurrence on May 6, 1976, of a major quake event in Italy. The intervening effect of the quake which killed over 800 people and caused widespread damage in northeastern Italy is seen as a significant gap in coverage of the prediction from May 3-16. The quake received almost daily attention from May 7 to May 16. The forecast was only sporadically revisited after mid-May and then mainly as background for other quake-related topics.

The types of uncertainties with which the media must deal in a situation involving a public earthquake prediction are several. The credibility of the forecaster must be quickly established. The media will also tend to press for specificity as to location, magnitude and time of occurrence. The media are likely to probe for public reaction and seek reassurances from relevant academic and governmental organizations. Whitcomb's credibility as a predictor was never really an issue. A credentialed scientist, Whitcomb was affiliated with one of the most prestigious academic institutions in the country, one which regularly provided authoritative information on earthquake-related matters. Whitcomb had received publicity in 1975 as a successful earthquake predictor though on a much more limited scale. Whitcomb's public forecast, released just seven months after this first exposure (LA Times,

10-12-75), did not draw criticism from his scientific peers-at least initially. The lengthy interview which appeared in the LA Times on April 29 featuring Whitcomb, Don Anderson of Caltech's Seismological Laboratory, and economist Roger Noll contributed to the impression that Caltech, as an institution, backed Whitcomb and his public announcement. Perhaps the greatest uncertainties resided in the prediction itself. All three elements of the forecast, its time frame, magnitude, and probable impact area were quite vague. This was due, said Whitcomb, to the rudimentary state of quake prediction and the relatively untested nature of his technique. Attempts by the media to clarify the forecast focused primarily on the magnitude and location of impact. The San Fernando Valley quake of 1971 was quickly adopted as a magnitude referent for the projected quake. It will be recalled that the magnitude parameters of the predicted tremor were 5.5 to 6.5 (Richter scale). Thus, use of a 6.4 Richter magnitude quake for comparison tended to promote a "worst case" image of the hypothesized shock. The media attempted to soften the uncertainties of location by careful specification of the 87 square mile area where the quake was to occur. The Los Angeles Times included a map of the probable impact area (4-21-76).

Concern with preparedness in response to the southern California Uplift probably diminished, to some extent, uncertainties in that regard which might have resulted from Whitcomb's announcement. Nevertheless, newspapers were quick to publish assurances by utilities and disaster relief agencies that precautions had been taken to protect the public. The rapid procurement of public response to the forecast via consultation with experts and "man in the street" interviews might be interpreted as an attempt by the media to reduce the uncertainties of their own response.

Uncertainty and threat are related problems which confront the media in their treatment of earthquake and other disaster issues. As it was argued in analysis of the bulge, some degree of uncertainty is necessary if an event is to persist as news. Threat plays a similar role in making an event newsworthy as it presents a problem confronting the community and demanding resolution. The tendency of the media is to reduce uncertainty to the extent possible and offer reassurances in response to threat. Uncertainty and threat are related in that a reduction in uncertainty or ambiguity by careful specification or interpretation alleviates, to some extent, the threatening nature of an event. For example, attempts to clarify the boundaries of the impact area of Whitcomb's projected quake by defining what communities were endangered reduced the threat for neighboring communities outside the vulnerable area. Adopting the San Fernando Valley quake of 1971 as a referent for the predicted quake was quite threatening, given the extensive damage and casualties caused by that quake. Yet assurances were offered that much had been learned from the 1971 quake and many improvements in local preparedness had been made.

The pattern in which threatening information is presented then, followed by attempts to placate the news audience, was a salient feature of media coverage of Whitcomb's hypothesis. This technique for deflating disturbing events may be expressed in the same article as the threatening event or may be contained in a separate item offering encouragement, reassurance or comic relief. Earthquake news during the month of April, 1976, had been grim indeed; the bulge had only recently been judged a threat to public safety, presaging a possible "great" earthquake which could kill thousands. The Seismic Safety Commission and the California Earthquake Prediction Evaluation Council had warned state agencies and the public to take very seriously the prospect of a damaging quake in the near future. Then, on April 21, Whitcomb released his forecast. Humor played an important role in media efforts to downplay

the ominous prospect of a destructive earthquake. In interviews with local citizens, the LA Times and San Gabriel Valley Tribune quoted a man whose wife had suggested that in response to current quake warnings they buy a pair of motorcycle helmets and wear them while they were at home. Another said he would continue to play tennis during any future temblor, "but not to a fault." Conrad's cartoon which appeared in the LA Times on April 23 depicted a chicken running about with head separated from its body shouting, "The earth is quaking! The earth is quaking!" Jack Smith offered a humorous account of the valued belongings people attempt to salvage during a disaster such as an earthquake (LA Times, 5-6-76). Journalists reported hearing jokes about beachfront property in Palm Springs. All these instances represent attempts to inject humor and skepticism into a very disturbing situation. Reassurances with a more serious tone also appeared. In an interview, Whitcomb contended that the quake hazard in California was less significant than the risk one assumed in driving on a freeway. Public utilities officials and disaster relief agencies assured the public, in the pages of area newspapers, that they were prepared for any possible earthquake. Perhaps the most reassuring information came in the form of the California Earthquake Prediction Evaluation Council's rejection of Whitcomb's forecast on April 30, just eleven days after it first received public attention.

Scientific theories, methodologies, and data interpretation are assumed by most editors and network executives to be mysterious complexities to the average news consumer. Indeed, the language of science may seem a morass of mathematical formulae and technical jargon. Since the principal fora for discussion of scientific findings and discoveries are the scientific journal, professional meeting, and university classroom, the task of presenting this information to the public falls on the journalist. The pitfalls in this

process have been discussed in the previous section. There are a number of points to consider in the translation of the Whitcomb forecast from academic to "practical." Was an accurate image of the ability of scientists to predict earthquakes conveyed in media reports? Were the uncertainties, contingencies, and qualifiers, in short, the "ifs" inherent in scientific theory, presented to news audiences? Were there attempts to present the theory upon which the prediction was based in lay terminology?

Despite the many encouraging steps toward accurate earthquake predictions reported during 1975 and 1976 (including accurate small quake predictions in the US and the celebrated Chinese effort at Haicheng), the optimism conveyed by news coverage never approached unrealistic proportions. All area newspapers, at one time or another, carried feature articles exploring earthquake prediction in some detail. The reader of these reports would have discovered that the science of quake prediction was in its infancy, that reliable forecasts were at least ten years away, that large magnitude quakes, the most important ones to predict because of their life and property-threatening potential, were the most difficult of all to forecast. Extensive coverage of the Uplift, which was widely interpreted as an earthquake precursor, graphically demonstrated the limited ability of scientists, faced with suggestive evidence, to designate the time, place and magnitude of the quake believed to be building along the San Andreas fault in southern California. In short, local media presented a reasonably accurate account of scientists' ability to predict earthquakes in the month's preceding the release of Whitcomb's hypothesis.

In an interview with <u>LA Times</u> staff writer Betty Liddick, Whitcomb recounted the steps taken from initial documentation of findings to public release of his forecast. According to this report, Whitcomb had presented his findings at an international scientific meeting in Grenoble, France, in

October of 1975 and a month later to a visiting congressional committee. In February, 1976, Whitcomb's report was published in the journal <u>Science</u> and an abstract was sent to the state Office of Emergency Services about the same time. The findings had been discussed at the American Geophysical Union meetings held just two weeks prior to public release of the prediction. Whitcomb, who had consulted his Caltech colleagues regarding public announcement of the prediction, wrote a news release "in response to inquiries from the press to make sure all the qualifiers that go along with it would be on the record" (LA Times, 4-29-76). Both headlines and the texts of articles detailing Whitcomb's forceast reflected this concern with caution and restraint, e.g., "Caltech Scientist Offers Cautious Quake Prediction" (<u>LA Times</u>, 4-21-76), "Drastic Action Not Advised, Caltech Scientist Cautions" (<u>Valley News</u>, 4-22-76), "Quake Forecast 'Only a Theory'" (SMEO, 4-22-76).

The Los Angeles Times, with an experienced science writer, offered the most detailed analysis of the theory behind Whitcomb's forecast. Other area papers presented greater technical detail than they had in discussions of the bulge but fell short of that contained in the <u>Times</u>. Consider George Alexander's simplified but detailed description of the technical side of Whitcomb's forecast:

The hypothesis upon which Whitcomb has based his projections is called the 'Vp / Vs' anomoly. The expression refers to a ratio between two types of sound waves: 'p' are compressional waves, whose longitudinal motion through a medium might be likened to that of a child's slinky toy. 'S' are shear waves; they are lateral in nature and are suggestive of a sidewinder snake's movement. S waves travel at a constant speed; p waves, however, are affected by different mediums . . ., rock layers along a fault develop many tiny cracks as they are subjected to enormous stress. The voids created by the cracks retard the velocity of the p waves passing through the stressed zone. But as water percolates down into those cracks and fills them, the p waves regain their initial speed. Plotting these velocity changes on a graph, scientists feel that they can foretell when a quake is imminent since tests have indicated that the rock layers usually fracture--and a quake occurs--after they have first been opened and then filled with water (LA Times, 4-21-76).

While none of the other local newspapers, radio or television expanded on this effort to render the complex mechanics of Whitcomb's technique intelligible, all at least mentioned the rudiments of sound wave velocity, their measurement, and the geology of earthquakes.

The interaction of the scientific community, media, and the newsconsuming public is more salient in coverage of Whitcomb than with treatment of the bulge. As noted earlier, newspapers were more active interpreters of the forecast by featuring editorial essays, biographical sketches, conducting personal interviews, and soliciting public reaction. This interaction was most evident in the LA Times where Whitcomb was even given the opportunity to write his own essay on earthquake prediction and explain his warning for southern California (5-2-76). It was Times science editor George Alexander who wrote a spirited defense of Whitcomb and the public release of quake predictions at a point (5-16-76) when the forecast had received a negative evaluation by CEPEC and was generally on the decline as a news item. In a personal interview with Times staff writer Betty Liddick, Whitcomb acknowledged that the switchboard at Caltech's Seismological Laboratory "lit up" immediately after public announcement of the prediction. Direct information seeking from the source of an earthquake warning was more characteristic of Whitcomb's announcement than it was of the bulge. This may be attributed to the more visible responsibility for the prediction in the case of Whitcomb and Caltech. It will be recalled that there were several sources of expert information on the bulge, none of whom could speak authoritatively on all aspects of the situation. Direct information seeking may also have been motivated by the rather abrupt cessation of coverage of the forecast in mid-May, 1976 (see Nigg:1979:29).
In sum, the media responded to Whitcomb's forecast rapidly but with appropriate caution. They were more active interpreters of the significance of the prediction than they had been in their coverage of the bulge. Despite the rapid and comprehensive initial coverage of the forecast, it quickly fell into obscurity when negatively evaluated by the California Earthquake Prediction Evaluation Council and a major quake event grabbed a lion's share of earthquake coverage. The sudden disappearance of Whitcomb's prediction as news left an information void and spurred direct information seeking by elements of the public concerned about the prospect of a damaging quake.

Minturn

The earthquaké predictions of amateur scientist Henry Minturn first received media exposure on KNBC-TV, Los Angeles, on November 22, 1976. Not until December 1st did newspapers offer coverage of Minturn. Early television news reports presented Minturn a forum for public announcement of several earthquakes with minimal scrutiny of his technique or qualifications. Minturn's sudden status as a celebrity was a product of several television interviews in which he predicted three earthquakes, one of which was to strike southern California on December 20. Minturn claimed to hold a Ph.D. in geophysics but was not affiliated with a university, research institute, or other organization. His forecasts differed from those previously discussed in several ways. Rather than specifying a "time window" of say three months or one year as Whitcomb had done, Minturn gave an exact day of occurrence. The locations of the projected quakes were quite indefinite e.g. "south of Mexico City," "north of the Solomon Islands," "southern California." Previous predictions had been geopraphically more circumscribed. Finally, Minturn offered no estimate of magnitude although in several interviews he implied that they would be quite large.

The three months which preceded Minturn's public announcements were noteworthy for minimal coverage of prediction-related events (Figure 2). Perhaps this gap reflects some degree of disillusionment with earthquake prediction in the aftermath of the failure of Chinese seismologists to foresee the great Tangshan quake of July 28 which claimed over 600,000 lives. It might also be plausibly argued that media attention to prediction had simply reached a saturation point after lengthy discussion of the bulge, Whitcomb, and their implications for public safety and community response. It was during this trough of prediction coverage that a rumor of an impending tremor circulated widely in southern California and was reluctantly acknowledged by local media in November (LA Times, 11-4-76, 11-25-76). The rumored quake was to have been very large, over eight on the Richter scale and predicted by scientists at the Jet Propulsion Laboratory in Pasadena. According to some versions of the rumor, the prediction was being withheld from the public to avert panic. The rumors brought intense information seeking which reportedly jammed the switchboards of JPL, Caltech, and several government agencies. There is no evidence, however, that Minturn was involved in the rumored quake.

In contrast to Whitcomb's established reputation and organizational affiliation, Henry Minturn was virtually unknown to the media and the community of seismologists prior to his public forecasts. The decision-making process that brought Minturn to public attention via KNBC-TV is not publically known. Some local media personnel have charged privately that the decision to feature Minturn and thus accord him credibility was made by national network executives over the objections of local newspeople, though the decision to grant him an initial hearing was a local one. We have no evidence with which to confirm or dispute this claim. When he first appeared on KNBC's 11 PM news on November 22, Minturn was introduced as a geophysicist and addressed as

"doctor." He was credited with having accurately predicted a small quake (3.8 Richter) which had been felt over much of the Los Angeles basin that morning. In the course of being interviewed, Minturn issued three forecasts for earthquakes which were to occur on specific dates over the next month (November 29, south of Mexico City; December 7, north of the Solomon Islands, and contingent upon occurrence of the first two, on December 20, in southern California). Minturn based his predictions on the gravitational pull of the moon on "weak arches" in the earth's crust.

Several factors worked in Minturn's favor toward initial newsworthiness. Television is a powerful medium, and is, according to our data, the chief source of public information on earthquake predictions (Turner, et.al. 1979: 114-116). Local newscasters hold positions of prestige and are trusted by news audiences as relayers and interpreters of important events. To be a featured guest in a television interview situation is an honor accorded few citizens. Being interviewed on television made Minturn something of an instant celebrity. By addressing him with the title and respect due a scientist, Minturn's KNBC hosts conferred upon him considerable credibility as well. His manner and person probably worked in his favor. An older man, graying, in suit and tie, he offered the appearance of authority and expertise. His methodology, though discredited by scientific research, probably sounded plausible to most people. The specific dates cited by Minturn were novel for earthquake predictions. Previous forecasts which contained only a time frame of a few months were easily forgotten by most people due to the short period of media coverage. All of Minturn's projected quakes were to occur within a month. Even considering the short time span of news currency, viewers could reasonably expect follow-up reports on the accuracy of the predictions.

It must be emphasized that the factors which contributed to the initial newsWorthiness of Minturn's predictions were not conducive to their continued existence as news. In fact, Minturn experienced an extremely brief news history (Figure 6) spanning a period of just five weeks, from November 22 through December 31, 1976 (two summary items appeared January 31). A brief review of the circumstances under which an event remains newsworthy will help illustrate why Minturn's forecasts were such short-lived news items. Uncertainty as to outcome of an event expected to affect the community adversely contributes to sustained media attention. Minturn's forecasts, at least the time of occurrence component, were stated in rather specific and absolute terms. An earthquake would occur or not occur on December 20. This factor of certainty was more conducive to short term sensationalism than a lengthy vigil in response to an ambiguous threat like the bulge or a prediction with an extended time window. Secondly, events remain newsworthy when they have implications for action. But most aspects of preparedness and safety had already been addressed by the media in response to discovery of the Uplift and Whitcomb's prediction. The one exception was individual preparedness which did mushroom in terms of media attention in the aftermath of Minturn's announcements (this will be discussed later). An event remains newsworthy when new data and interpretations are presented. Much of the newspaper attention to Minturn, in contrast with that of television, was quite critical. Newspaper editors were late in accepting Minturn and his forecasts as news and moved rapidly to discredit him and drop him as a newsmaker. Thus, the interpretations and data presented were designed not to perpetuate Minturn's newsworthiness but to brush him aside as a charlatan. The LA Times response to Minturn is extreme, but not atypical of area newspapers. The Times offered only three reports which directly featured Minturn: George Alexander's lengthy review of his outmoded methodology and questionable credentials

(12-5-76), an editorial critical both of Minturn and the broadcast media which offered him a forum (12-8-76), and finally, an article which reported the Office of Emergency Services conclusion that Minturn's forecast was "useless" (12-12-76). An event which was once the focus of media attention may be repeated in other contexts or as background for new events. Media antagonism toward Minturn, particularly in the aftermath of the failure of his southern California prediction, militated against his being mentioned further in any context. Since he was not a professional scientist and had no organizational affiliation there were no scheduled occasions on which Minturn's forecasts were reanalyzed or discussed.

It has been argued that the media must deal with at least three uncertainties surrounding a quake prediction: the credibility of the predictor, the reliability of the forecast, and its evaluation by relevant publics. Perhaps the most salient uncertainty regarding Minturn was his credibility. Whitcomb, by virtue of his affiliation with a prestigious academic institution, his scientific credentials and history of prediction success quickly established credibility with local journalists. Minturn, on the other hand, had no organizational affiliation and was a complete stranger both to area journalists and earth scientists prior to his television interviews. While television news executives made little effort to check into Minturn's credentials or methods, newspaper journalists, particularly George Alexander of the LA Times, were anxious to determine who Henry Minturn was and what qualified him to predict earthquakes. Based upon an interview with Minturn and extensive research into his background, Alexander concluded that Minturn had neither the academic credentials he claimed nor the expertise to forecast earthquakes accurately (LA Times, 12-5-76). Following publication of this article, other area newspapers adopted more critical postures toward Minturn.

Some repeated the biographical details discovered by Alexander. Despite newspaper denunciations and rapid dismissal of Minturn, individual and organizational requests for earthquake information rose sharply in December, 1976 (Nigg,1979:29). Apparently, the contradiction between favorable television news coverage and sharp denunciations of Minturn in area newspapers left people confused and seeking reassurance from government and academic institutions. Perhaps the most blatant uncertainty regarding Minturn's southern California prediction for December 20 was its expected magnitude. Minturn was silent on this important element of prediction, explaining that his technique was not sufficiently refined to allow estimates of magnitude. In the absence of such an estimate, fears of a very large and damaging quake probably escalated. On December 18, two days before the quake was to occur, the <u>Santa Monica Evening Outlook</u> published a photograph of a billboard in Venice containing only the message "Earthquake, December 20, 1976, 8.9."

Perhaps the most significant threat posed by Minturn, both from the standpoint of newspaper editors and the scientific community, was the alarming ease with which an unqualified person attained a public forum to broadcast his earthquake predictions. Three days after George Alexander's lengthy article appeared unmasking Minturn, an editorial in the <u>LA Times</u> deplored the "bald irresponsibility of broadcasting stations in giving him a wide-open and uncritical forum in which to air his views"(12-8-76). The <u>San Gabriel</u> <u>Valley Tribune</u> (12-1-76) and <u>Herald Examiner</u> (12-5-76) quoted Dr. Peter Ward of the US Geological Survey that Minturn apparently had "learned enough code words to make himself sound authentic" and that the television network which featured his predictions had been "taken for a ride." From the standpoint of the news audience, Minturn's forecasts were taken quite seriously and his methodology probably seemed at least plausible. In addition to the factor

of public confusion over the contradictory evaluations of Minturn by print and broadcast media, the dramatic upsurge in information seeking also reflects the disturbing character of the forecast to area residents. All monitored newspapers mentioned the many calls by citizens to Caltech, the US Geological Survey and government agencies. A majority of callers to the Caltech Seismology Laboratory wanted to know whether or not the quake predicted for December 20 would occur. A large number of callers who had apparently accepted the prediction as credible wanted to know what to do, whether or not to leave town. Many others wanted to know if a tidal wave would follow the quake. Some indignant callers berated Caltech scientists who, with all their expensive instruments and knowhow, could not predict earthquakes as accurately as Henry Minturn (Nigg, 1979:100-103).

Vigorous attempts were made by area scientists and newspaper journalists to deflate the threatening character of Minturn's forecasts. These efforts involved a thorough unmasking of Minturn as the qualified scientist he claimed to be, an assault on his methodology, and attempts by the local seismological community to reestablish an accurate public conceptualization of scientists' ability to predict earthquakes. The most aggresive journalistic assault on Minturn's claim to impressive academic credentials was made by George Alexander in a lengthy feature article published on December 5, 1976. Although Minturn was glib about his education, citing an attorney's advice not to reveal details of his training, Alexander contacted former employers who reported that Minturn had held only technical and clerical positions and had never claimed more than a high school education. Alexander, in the same article, carefully and critically reviewed Minturn's method of predicting quakes, revealing that the lunar theory of earthquakes had been tested by scientists and was found not to have any merit. This article had a significant impact on other area journalists who, after December 5, deleted references to Minturn

as "doctor," "scientist," or "geophysicist" in their reports. Well known local seismologists were quoted regarding Minturn's self proclaimed success in forecasting. Dr. Clarence Allen of Caltech, reacting to Minturn's claim that a quake which occurred on the border of Chile and Peru satisfied a prediction for an area "south of Mexico City," remarked "that's like saying an earthquake in Boston satisfies a prediction for southern California" (Herald Examiner, 12-5-76). Dr. Bruce Julian of the US Geological Survey's National Earthquake Research Center held that Minturn's refusal to specify magnitude voided his claimed ability to predict earthquakes. Julian pointed out that "prediction of a quake of unspecified magnitude in one of the world's most seismically active regions like the Solomon Islands has about a 99.9 percent chance of being right" (LA Times, 12-5-76). Allen repeated his often quoted remark that reliable earthquake prediction was still ten years in the future. "And by reliable, I mean a system with an accuracy rate of 90 percent or above," he added (Valley News, 12-2-76). All area newspapers reported the Office of Emergency Services' rejection of Minturn's forecast as "so vague it is useless." Coverage of Minturn declined substantially after this announcement was carried in local papers between December 11 and 16, 1976. After the OES evaluation, Minturn was the major topic of news reports in just three instances, all of which announced that his prediction had failed (SMEO, 12-21-76; Herald Examiner, Valley News, 12-22-76).

It has been argued that the news media and public played relatively passive roles in issues surrounding the Uplift. The media played an active interpretative role in Whitcomb's prediction, through editorial comment, solicitation of public comment and so on. With Minturn, active involvement by the media moves to a another level--that of conflicting interpretations of an event. Through intense information seeking, the public concerned with the earthquake threat took a far more active part as well. Early reports in the

Herald Examiner, LA Times, and Santa Monica Evening Outlook acknowledged that Caltech and government agencies had received hundreds of calls seeking more information on Minturn's forecasts. These reports seemed to imply that newspapers were reluctantly responding to public desire for information about Minturn rather than finding him newsworthy in his own right. In a blistering editorial denunciation of Minturn's forecast, the LA Times tied their coverage of Minturn to challenging the network's irresponsible act of featuring Minturn in the first place. It also appears that local network news executives responded to their error of providing Minturn a forum, not by publicly acknowledging their mistake, but by simply ceasing to provide any further information on the forecasts or the forecaster. Newspaper editors were faced with a dilemma of responsibility, whether to ignore the furor surrounding Minturn or step in and offer coverage with the attendant risk of lending further credibility to an unqualified predictor. The course chosen was to provide coverage with emphasis upon the evaluations by well known local scientists whose comments served to undermine Minturn's credibility. The Santa Monica Evening Outlook did not mention Minturn by name until December 8 but published a report on December 2 with the headline, "Quake Forecast Said Pointless Until Accurate." In this article Dr. Clarence Allen was quoted as saying that public forecasts should be withheld until some measurable degree of accuracy is attained. The Minturn predictions were accompanied at about the same time by a dramatic upturn in the number of articles devoted to individual preparedness (Figure 4). It will be recalled that the Uplift and Whitcomb's announcement were followed by enhanced media attention to organizational response to the earthquake threat. An impressive statistical association was observed between the announcement of Minturn's forecasts and the rise in coverage of individual preparedness (r = .44). This finding however, must be interpreted with caution. Individual preparedness for the purposes of this analysis,

includes reports and articles containing information designed to aid persons and families in protecting themselves, their homes, and their property from the effects of a damaging earthquake. A substantial number of the newspaper articles which comprised this late 1976 upsurge in individual preparedness were authored by one person. The Fil Drukey pamphlet entitled "Common Sense and Earthquake Survival" first appeared in the Santa Monica Evening Outlook as a ten part series with the first installment published on November 22, 1976. It is highly unlikely that Minturn in any way influenced the introduction of the Drukey series. It will be recalled that Minturn was first interviewed on the 11PM KNBC-TV news also on November 22. An installment of the Drukey series appeared daily in the Outlook until December 2. None of the articles in the series contained mention of Minturn nor were there accompanying editor's notes announcing that Minturn had predicted a quake for the area. Minturn may have played an indirect role in the later appearance of the Drukey articles in the San Gabriel Valley Tribune and the Valley News. The series appeared as a "Special Earthquake Edition" in the Tribune on January 13, 1977 and as ten separate articles in the Valley News between January 30 and February 11, 1977. Publication of Drukey's pamphlet in the Tribune and and Valley News occurred after Minturn had been thoroughly discredited and had dropped from view as a newsmaker. It will be recalled that Minturn played a substantial role in the greatly enhanced frequency of citizen information seeking from November, 1976 to February, 1977. The Outlook, which advertised the Drukey pamphlet for \$1.50, reported on December 9 that over 4000 copies had been purchased. Minturn's role in spurring public information seeking probably contributed to the later republications of the Drukey series as editors felt a responsibility to respond to the greatly enhanced demand for earthquake information.

The question remains as to why coverage of individual preparedness peaked when it did (Figure 9). Even when the Drukey series and its republication are excluded from consideration, the number of articles dealing with individual preparedness was above average between November, 1976, and January, 1977. Media coverage of organizational preparedness followed promptly the discovery of the Uplift and Whitcomb's prediction. One might have assumed that the safety of individuals and their homes would have been accorded high priority as the earthquake threat became salient. Yet, seven months elapsed before the media provided a comprehensive program of practical steps people could follow to avoid injury in a severe quake. The rapid response of organizations and media coverage of this action has been attributed to the interdependence of organizations charged with life-line maintenance, the close relationship between scientific research institutions and government, and the greater facility of mobilization in an organizational context. These organizations maintain communication channels with the media through public relations departments, newsreleases and news conferences. The conspicuous lag in coverage of individual preparedness may have been due, in part, to the lack of organizational responsibility and coordination.

The responsibility for dissemination of home and personal safety information was apparently not centralized in any one organization. Fil Drukey, a private citizen who authored the individual preparedness series, explained that lack of availability of such information was one of the principal motivating factors in her effort. There was indeed a demand for the information seeking from March through June, 1976 and again from November through January (Nigg, 1979:29). Thus the media may simply not have had available a concise set of precautionary steps to offer readers in response to the demand until Drukey came forward with her pamphlet.

Prediction: A Summary

The two events just considered did much to dampen the optimism so prevalent in 1975 and early 1976 among local journalists that accurate earthquake prediction was nearly a reality. Buoyed by the great accomplishment of the Chinese at Haicheng and successes by American scientists with small quakes, journalists in 1976 would suffer disillusionment on the basis of a great disaster at Tangshan on July 28 and local prediction failures by Whitcomb and Minturn. These episodes produced at least two media reactions. One was to downplay, perhaps even suppress, earthquake news which would have been enthusiastically publicized in the first half of 1976. This hiatus in coverage was perhaps based upon the interpretation by some media executives that the public was fed up with hearing about the earthquake danger. However, data from our survey indicated that in the post-Minturn period, people overwhelmingly felt that there had been too little rather than too much coverage of earthquake-related events. A more plausible explanation of the decline in coverage of earthquake news might be found in the desire by embarrassed news executives to avoid another fiasco like that created by the uncritical presentation of Henry Minturn.

A second media response was greater scrutiny of the value of quake warnings in the aftermath of two well-publicized false alarms. Earthquake prediction, in nearly all journalistic accounts, had been regarded as a valued social goal. Lives could be saved and property protected by advance warning of a large tremor. Unsafe structures could be evacuated, the water level in reservoirs could be lowered, emergency services could be mobilized. But studies, most noteably one published by Eugene Haas and Denis Mileti of the University of Colorado, indicated that considerable socioeconomic dislocation might also be an outcome of quake forecasts. The predicted quake impact area

might experience substantial out-migration of homeowners and businesses causing economic decline in the form of lowered property values, declining tax revenues, stoppages of construction projects, and increased unemployment. These projections became available in mid-December 1976 and were widely cited in area newspapers. At least one of the findings is suspect; that property values decline in the predicted quake impact areas. No property value declines were observed in the uplifted region after discovery of the bulge. Nor could City Councilman Louis Nowell, who urged that Whitcomb be sued for his public forecast, demonstrate that the prediction had adversely affected property values in the San Fernando Valley. But these observations rarely appeared in post-Minturn earthquake news reports whose authors were not inclined to emphasize the more negative aspects of earthquake prediction.

Building Safety

On March 10, 1933, an earthquake later estimated to have measured 6.4 on the Richter scale killed 127, injured 4,150 and devastated much of downtown Long Beach. Most of the deaths and injuries were the result of victims being crushed by toppling buildings. Later the same year, the California State Assembly passed the Field Act, requiring all school buildings constructed after October 6, 1933, to meet earthquake safety standards. In 1939, the Field Act was amended to require that all buildings meet the seismic standards established for schools six years earlier. The state legislature left to local jurisdictions the decision whether or not to pursue renovation of existing unreinforced buildings. Fourty-four years after the Long Beach quake, Robert Olson of the California Seismic Safety Commission reported to members of a seminar that there remained between 100,000 and 200,000 commercial and apartment buildings in the state which were in imminent danger of collapse in a major earthquake.

Warnings of the danger of these structures were contained in at least two studies which were repeatedly quoted by journalists. The Los Angeles County Earthquake Commission noted in its comprehensive evaluation of the 1971 San Fernando Valley quake that "thousands of pre-1933 buildings in southern California constitute the most serious threat to public safety because of the probability of their collapse during stong earthquakes in the future. A 1973 southern California earthquake study conducted by the National Oceanic and Atmospheric Administration offered a sobering warning of the vulnerability of unreinforced buildings, older dams and some bridges in the event of a magnitude 8 tremor on the San Andreas Fault or a 7.5 on the Newport-Inglewood Fault. Scientists and structural engineers frequently testified at hearings on the issue of old buildings that action to renovate or condemn such structures was of utmost importance. A legislature response to the problem began to take form in the Los Angeles Building and Safety Department in January, 1976.

A proposal to eliminate or renovate an estimated 300 pre-1933 public assembly buildings (designed to accommodate 100 or more persons) which failed to meet current earthquake safety standards received public hearings before the City Board of Building and Safety Commissioners in late January, 1976. The measure was vigorously opposed by theater and church spokespersons who argued that the measure was discriminatory. The proposed ordinance was referred back to city Building and Safety Department Manager Robert J. Williams for revisions. The revisions, suggested by Building and Safety Commissioners, included restriction of the proposal to areas of "imminent (quake) danger" and elimination of the requirement that plumbing, wiring and other mechanical aspects of the old buildings be brought up to standard. Williams was asked to bring his revised ordinance proposal before the board again in two months. For our purposes, the most important aspect of the con-

troversy over the fate of old buildings at this early stage is that press coverage was minimal (Figure 10). Just two brief articles remotely located in one metropolitan paper and one community daily reported the hearings (<u>Herald Examiner</u>, 1-28-76; <u>Valley News</u>, 1-29-76). Events of the next four months, however, would dramatically alter the newsworthiness of this obscure controversy.

Less than a month elapsed before the US Geological Survey scientists · reported that an extensive and oval shaped area astride the San Andreas Fault had risen by as much as twelve inches. As agreement among scientist emerged that this uplifted region, whose southern edge lay just 40 miles from metropolitan Los Angeles, was possibly a prelude to a large damaging quake, both media and government agencies began to scrutinize quake-vulnerable aspects of their communities. Los Angeles Department of Building and Safety Manager Robert J. Williams again found himself testifying about the danger of unreinforced buildings, this time before the Seismic Safety Commission which was conducting hearings on the potential danger posed by the bulge. Williams estimated that there were 14,000 unreinforced masonry buildings standing within the city limits. Between 75,000 and 100,000 Los Angeles citizens, he estimated, reside in these unsafe residential buildings. Williams characterized those who live in the quake endangered structures as "the poor, the elderly, the disabled, and the disadvantaged." Williams also testified that his department had proposed an ordinance to require owners of 300 old buildings including private schools, churches, movie theaters, and restaurants to strengthen the structures or demolish them. "We anticipate a lot of opposition to this ordinance," he said, "because it's more economical for an owner to hire a lawyer than an architect." With the sobering prospect of a damaging bulge-related tremor, the presence of thousands of dangerous structures took on a new importance and urgency. Williams' testimony not only found a more receptive audience

among the Seismic Safety Commissioners, it also received front page coverage in the Los Angeles Times (3-12-76). The Valley News, which published its own comprehensive front page report on the quake prospect referred to the costly lessons learned after the 1971 San Fernando Valley tremor. Noting that 49 of 64 deaths in that quake were caused by the collapse of the San Fernando Veterans Administration Hospital, author Arnie Friedman informed his readers that thousands of unsafe structures which could collapse within seconds in an earthquake still stood in the city of Los Angeles (4-4-76). <u>Santa Monica Evening Outlook</u> columnist Les Storrs commented that the Uplift had led to the realization that many southern California buildings would not withstand even a moderate tremor. Storr added that many such buildings stood in Santa Monica, West Los Angeles and Venice (4-12-76).

With the public release of Whitcomb's prediction on April 21 and the growing concern with earthquake preparedness, as reflected in the media, the issue of unreinforced buildings emerged as the most salient safety issue. The newsworthiness of the old building situation was closely tied with that of earthquake prediction from March to August, 1976. Ten articles appeared during this period which combined the themes of prediction and building safety. All of them had, as their main topic, the growing quake threat stimulated by discovery of the southern California Uplift and Whitcomb's warning. In several of these reports, local scientists confirmed earlier testimony by Building and Safety Chief Robert Williams that action to relieve the danger posed by the buildings should be accorded a high priority. Dr. Ralph Turner, who had chaired a National Academy of Sciences panel on Earthquake Prediction and Public Policy, said, "most of the people who will be killed will be killed in buildings that collapse, and most of them will be one's we've known for years are not safe." Turner added that efforts to require upgrading or demolition of vulnerable buildings by the Building

and Safety Department had been hampered by a lack of money and legal muscle (<u>SGVT</u>, 4-23-76). A <u>Herald Examiner</u> feature report on the earthquake threat was the first to mention federal legislation to deal with the problem of unsafe buildings. According to the report, the Earthquake Hazard Mitigation Act sponsored by Senator Alan Cranston (D-California) included a provision calling for funds to upgrade quake endangered structures (4-25-76).

After August, 1976, the controversy over legislative action on the pre-1933 masonry buildings emerged as a newsworthy issue in its own right. The process by which this occurred stands in marked contrast to the news histories of the Uplift and Whitcomb's forecast. In both instances, their public announcements received immediate and extensive media coverage. Both enjoyed a period of featured news coverage and then declined, becoming background items for other more current earthquake events. The controversy surrounding unsafe buildings began its news career nearly unnoticed and gained in newsworthiness as a background item for reports featuring the bulge and Whitcomb (whose general underlying theme was the increasing threat of a major quake). The bulge and Whitcomb's predicton had waned as news topics by August, 1976, but there remained a residue of generalized urgency and enhanced awareness of quake danger. The media, which had faithfully relayed the scientific developments and discoveries which produced the greater quake threat, turned its attention toward efforts to alleviate the danger. Citing studies and expert testimony, reports reflected an emerging consensus among engineers and government officials that quake-endangered old buildings presented the most significant threat to public safety. Thus, the pre-1933 building issue became a featured news item and received coverage with each new development.

Media coverage of the old building issue tended to cluster around specific actions by Los Angeles City Council on a proposed building safety

ordinance. The Los Angeles Times offered an advance look at the ordinance as it was being prepared by the Council's Building and Safety Committee. The ordinance would require that pre-1933 buildings (excluding single family residences) be brought up to current seismic safety standards within ten years. During the first year after enactment, Building and Safety Department crews would carry out inspections of all pre-1933 buildings and notify owners if code violation were discovered. Within 30 days after receipt of notice that they were in violation of the ordinance, property owners would be required to post signs warning occupants that the building may collapse in an earthquake (LA Times, 10-23-76). On December 9, the City Council considered the ordinance but voted 11-0 to return it to the Building and Safety Committee for "further citizen input." Council opponents of the measure argued that its enactment would force many small businesses to close and residents to find other housing. Councilman Gilbert Lindsay, who represents the downtown area where many of the old buildings are located, charged that the ordinance would cause great hardship to low income families and the elderly for whom the buildings provided affordable housing. Council President Pro Tem John Ferraro warned that the posting of signs could make it impossible for building owners to obtain insurance, leading to his Wilshire district becoming a "vast wasteland." An overflow crowd reported to be mostly angry property owners packed the council chambers as the measure was being debated. Councilman David Cunningham, who chaired the Building and Safety Committee and was the measure's strongest supporter, called for a 45 day continuance in an effort to prevent a certain defeat for the ordinance (SMEO, 12-9-76, 12-10-76; SGVT, Valley News, LA Times, 12-10-76; Herald Examiner, 12-19-76).

A second clustering of reports on the unreinforced building issue occurred in late January, 1977, after the City Council again took up the ordinance question. One week before a revised building ordinance was presented to the

full council, its provisions were released to the media by members of the Building and Safety Committee. The revised proposal included four points. A field survey was to be conducted, beginning immediately, to identify the quake-threatened buildings as to number, types of occupants and uses. An environmental impact report was to be compiled to assure the legality of the program. A task force was to be established with membership drawn from among city officials, building owners, and engineers. The task force was to develop a code which would apply specifically to older structures and establish guidelines to bring them up to "reasonable code compliance," such as 60-80 percent. Finally, federal legislation would be sought to provide low interest loans for necessary correctional work. The survey was expected to take two years to complete and the environmental impact report about six months (LA Times, Herald Examiner, Valley News, 1-18-77; SGVT, 1-19-77). On January 25, three area papers reported that the City Council had approved the revised building safety plan by a nine to one vote. The ordinance in final form contained no provision requiring owners to post warning signs. A ten person inspection team would begin the survey, according to a Building and Safety Department spokesman, as soon as the council appropriated \$81,000 for salaries and other expenses (Valley News, LA Times, SMEO, 1-25-77). One further council action attracted media attention to the building safety issue in May, 1977. The Finance Committee deleted a \$200,376 appropriation from the mayor's \$1.013 billion budget for implementation of the building inspection program. The money was intended to pay the salaries of ten inspectors and other personnel who were to conduct the two year survey of the unreinforced buildings. Members of the Finance Committee responsible for the deletion argued that action to carry out the survey was premature since it had not been determined who would pay for required building rennovations or demolition. Supporters of the

program argued successfully that the survey was a necessary first step in determining the ultimate fate of the old buildings. The vote to restore funds was nine to five (Valley News, LA Times, 5-19-77).

Editorial comment, characterized by vigorous advocacy, along with publication of citizen's letters, played an important and visible role in the news history of the building safety controversy. Nearly one-third (26 of 89) of all reports on the issue of old buildings were editorials or letters to the editor. The overwhelming majority of editirials and citizen comments (21 of 26, 81%) were in the Los Angeles Times. Early comment on the building issue was made in conjunction with Whitcomb's forecast. "Most of the homes we live in and the buildings we work in have some built-in flexibility that permits them to sway without collapsing in an earthquke," reassured Times' editors. "There are exceptions, including about 14,000 older, unreinforced masonry buildings in Los Angeles alone. These structures should either be reinforced promptly or condemned" (LA Times, 4-22-76). On May 2, 1976, in an LA Times section entitled "Futureshock," Caltech economist Roger special editorial Noll proposed a solution to the problem presented by old buildings. "Substantial progress might be made if government would adopt a structural counterpart to 'truth in packaging.' City building inspectors could be given the authority to require that unsafe structures by conspicuously labelled as likely to collapse in the event of a major earthquake. Possessing such information, those who use these buildings might demand that remedies be taken, and the owners of unsafe structures might respond without being forced to do so."

The old building controversy first stimulated editorial comment as an issue independent of earthquake prediction on October 27, 1976. In a message entitled "A Fair Shake for Safety," the <u>LA Times</u>' editors commended city council's Building and Safety Committee for an effective course of action that

could save a lot of lives." It will be recalled that the recommendation of the committee was to require reinforcement of the endangered buildings to meet current safety standards within ten years. Signs would be posted in the buildings warning occupants that the structure could collapse in the event of an earthquake. Noting that it might cost up to \$5 billion to make the necessary repairs, the editors called on city officials and the California congressional delegation to pursue federal aid in the form of loans and grants. Three letters were published in response to this editorial on November 4, 1976. One, written by City Council's Building and Safety Committee Chair Dave Cunningham, acknowledged the Times' October 27 commentary as "supportive." Cunningham urged other local governments to recognize the importance of establishing building safety ordinances in their communities. - Two other comments were critical of the Times stand in favor of a tough ordinance. A man expressed concern about tenents residing in unreinforced buildings who would be uprooted if the city voted to have the structures demolished. A woman feared that many older buildings would lose their beauty and distinguishing character, or even worse, be destroyed if the ordinance were to pass.

Editorial response to city council's decision to delay consideration of the building ordinance until December 9th was quite critical. In a commentary entitled, "The Threat is Serious," <u>LA Times</u> editors accused City Council of "being altogether too casual about a potential threat to the lives of thousands of people in this community." Acknowledging that the cost of reinforcement was great, the editors urged that federal grants and loans be sought. "With or without aid, though, the ordinance is necessary to help protect the public. That is the overriding consideration, and the City Council must face it squarely" (11-29-76). The lone citizen response to this editorial took exception to the <u>Times</u> position on the ordinance. The writer described the building ordinance endorsed by the Times as "so idealistic in its demands as

to be destructive to the interests of the community." It was the opinion of this person that the buildings in question simply could not be reinforced to meet current seismic standards. Enactment of the ordinance, he held, would result in condemnation and destruction of millions of dollars in property. Since most of the buildings were in lower income areas where property values were stagnant, there was not the potential of investment return to warrant their reconstruction on any scale by private investors, he reasoned. "So unless this community is really willing to tackle the whole problem and cost of urban redevelopment, it may have to conclude that living daily in buildings built to earlier seismic standards is not so bad as an approaching unavailability of housing and business space within a desert of condemned buildings and expropriated landlords waiting for a catastrophic earthquake that has not occurred here in historical times" (<u>IA Times</u>, Letters to the Editor, 12-10-76).

Just prior to public release of details of the revised building safety ordinance (January 18, 1977), the <u>LA Times</u> offered a lengthy commentary urging that a safety program be adopted. Said the editors, "It is time to face the facts about the earthquake threat to Los Angeles, and past time to consider what can be done to head off catastrophe. The facts are unpleasant and even frightening. The responses will be costly, and some people would say they are unrealistic. But the risk is so great that inaction can no longer be tolerated" (1-16-77). Published reactions to this editorial, entitled "It's Coming," were supportive of the <u>Times</u> tough stand. Several writers offered suggestions on the old building problem. One recommended that automatic gas shut-off valves be installed at the inlet to homes, businesses, schools, or wherever a quake might initiate a fire. One writer offerred a plan for compensating the owners of buildings which were condemned due to their quake danger. "The owners of condemned or demolished buildings would be permitted to

continue the amortization of property value depreciation on federal income taxes for ten, twenty, or forty years, perhaps even receiving two or three times its established value in tax write-offs" (1-27-77).

Three other editorials appeared in the <u>LA Times</u> over the remaining two years of our study. The March 4, 1977 quake which killed over 1,300 Rumanians became the occasion for an essay critical of the city council for its weak stand on the building issue and urging congressional action to fund necessary local renovations (3-9-77). The editors urged passage of the Earthquake Hazard Mitigation Act, which would provide \$200 million over a three year period for earthquake research. Part of this money, noted the editors, would be spent to alleviate the quake danger posed by old unreinforced buildings (8-23-77). Finally, the editors directed their attention to the problems city officials must consider in dealing with a credible earthquake prediction. A high priority would be to determine "whether buildings that might prove hazardous in an earthquake should be upgraded, vacated or demolished" (11-8-78).

Los Angeles' other metropolitan daily, the <u>Herald Examiner</u>, contained no editorial comment but did publish two letters from citizens, both of whom supported an ordinance to improve the safety of old buildings (1-25-77; 2-13-77). Editors of the <u>San Fernando Valley News</u> expressed concern with building safety in an April 11, 1978 editorial and on February 2, 1979, urged rapid action on reinforcement of the 8,000 buildings determined by the council-appointed survey crew to be unsafe. The <u>Valley News</u> also featured the survey research findings of the present project which demonstrated that 88 percent of a sample including 977 area residents favored the posting of warning signs in quake endangered buildings or closing them until they could be reinforced. Only 4.3 percent, it was reported, reflected the idea of reinforcement or warning signs. "This indicates a clear mandate for local

jurisdictions to proceed promptly with these measures," said project director Dr. Ralph Turner (10-12-78).

Legislative developments and commentary were responsible for a large majority of coverage of the unsafe building controversy. Other factors in the issue's newsworthiness will be reviewed briefly. One feature article in the Herald Examiner which appeared on the sixth anniversary of the San Fernando Valley quake traced the measures taken to improve building safety since 1933 (2-6-77). In the aftermath of the great Tangshan, China, disaster of July 28, 1976, two community papers quoted State Seismic Safety Commission chair Karl Steinbrugge that buildings which collapsed and killed thousands in China were similar to unreinforced structures presently standing in southern California. Steinbrugge called the buildings "the greatest life hazard which must be one of the prime targets of an effective earthquake hazard reduction program" (SMEO, La Opinion, 8-6-76). At a conference on major earthquakes at Caltech, Dr. Charles Richter attributed 90 percent of the loss of life and damage to property in large tremors to unreinforced masonry buildings (SMEO, 2-16-77). It was reported that earthquake experts had begun to distrust the safety of relatively new medium-sized structures as well as pre-1933 unreinforced buildings. Structural engineer Henry Degenkolb said that there was a type of building design used in southern California between 1950 and 1970, usually in structures of four to twelve stories, "which are not as earthquake resistant as they should be" (Valley News, 9-29-76). A study released by the Association of Bay Area Governments indicated that local governments which fail to upgrade city buildings to current seismic standards may be subjects of future legal action by those injured.

Uncertainty and threat were important factors in the building safety controversy. In fact, the problem may be stated as a relationship between these two elements. The central feature of the old building issue and the

hub of controversy was whether or not the threat of a massive earthquake was sufficiently great to justify dislocation of thousands of area residents and economic hardship for hundreds of merchants and small businessmen. Scientists, journalists and disaster agency officials generally agreed that the threat was indeed sufficient and the necessity to act was urgent. Scientists pointed to mounting evidence that great earthquakes, those with magnitudes of eight or more on the Richter scale, were recurrent, striking southern California at an average interval of 160 years. The year 1976 witnessed a much enhanced quake prospect with discovery of the southern California Uplift and sound wave data which convinced Whitcomb that a moderate tremor might occur in the Los Angeles area by April, 1977. Journalists relayed the concerns of scientists as well as the precautions taken by local governments to deal with the ominous prospect of a locally damaging quake. The urgency for action to alleviate the danger of unreinforced buildings grew as perception of the quake threat grew.

Owners, however, balked at suggestions that their unreinforced buildings undergo council-mandated renovations costing between 50 percent and 80 percent of their current value. City councilmen, particularly those representing districts with concentrations of the older structures, argued that the uncertainties of the earthquake threat must be weighed against the certainty that, if enacted, an ordinance would cause widespread dislocation. Business, much of it small scale and marginal, housed in the old buildings, would be seriously damaged. Churches, branch libraries, restaurants and other assembly halls might not have sufficient budgets or financial backing to build elsewhere. Residents housed in unreinforced buldings were, for the most part, the poor, the elderly, and the disadvantaged. Relocation for them would be, perhaps, the greatest hardship of all.

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The <u>LA Times</u>, the only area newspaper which assumed an active partisanship in the issue, insisted that the threat was great and called for immediate action. The <u>Times</u> editors, in their advocacy of renovation or removal of the old buildings, considered a future damaging quake an inevitability, not as the owners viewed it, a remote possibility. On October 27, 1976, the <u>Times</u> editors, having estimated that the cost of bringing the buildings up to current seismic safety standards might exceed \$5 billion, insisted, "The earthquake threat to older buildings is so great that remedial action must be required." In mid-January the <u>Times</u> restated its case in even more emphatic language:

Fact: Sooner or later, a large and destructive earthquake is going to strike this area. Fact: When that happens, the engineers and scientists agree, about 14,000 buildings in Los Angeles will probably fall down within seconds. Fact: A lot of people, perhaps as many as 100,000, who live, work or otherwise use these buildings would be killed or injured (1-16-77).

As we have seen in many earthquake news items, attempts to placate the news audience frequently followed a particularly unsettling development. With the threatening prospect of a damaging earthquake raised by discovery of the bulge and announcement of Whitcomb's prediction, reassurances followed. Safety programs were reviewed and revised, dams and highway overpasses were strengthened, utility companies assured the public that they were prepared for any emergency and so on. The most frequent type of reassurance in connection with building safety was one which declared wood frame and stucco buildings, typical of southern California, the safest in the event of a strong tremor. Roger Noll, a Caltech economist writing in the <u>LA Times</u>, enumerated the most probable threats to life and property in an earthquake as a few old earthfilled dams, the 14,000 unreinforced buildings, health problems resulting from disruption of utility services, and fires. He then observes that "most California housing and newer commercial buildings will not suffer enough

damage to pose a threat to the occupants, and experience from past earthquakes enables us to put each real threat in perspective" (5-2-76). The fact that an ordinance was proposed to deal with those buildings deemed unsafe offered the news audience assurance that city government was grappling with the problem. Another set of reassurances came in the form of reports indicating that a great deal had been learned regarding structural safety in the aftermath of the 1971 San Fernando Valley quake. New construction techniques made schools, hospitals and freeway overpasses much safer than they had been prior to the quake. Modern high rise buildings, it was maintained, were designed to flex and sway, making them resistant to even severe shaking.

Intensification of the building safety issue in Los Angeles spurred action by two neighboring cities to deal with the problem of quake endangered unreinforced buildings in their municipalities. The solutions to the problem and attendant resistance in Burbank and Santa Monica parallel the experience of Los Angeles. The Los Angeles Times Glendale-Burbank section covered events in Burbank while the Santa Monica Evening Outlook informed readers of building safety developments in Santa Monica. In September, 1977, the Burbank City Council launched a survey designed to identify an estimated 110 buildings constructed prior to 1933. The Survey, conducted by the city's Building Department, was also to notify owners that a proposal was being considered to require the posting of warning signs identifying the buildings as potentially dangerous during a moderate or severe earthquake (LA Times, 9-11-77). The sign-posting proposal's chief proponent, Vice-Mayor Jim Richman, abandoned his effort in February, 1978, when property owners protested and Burbank's Building and Fire Code Appeals Board voted not to pursue the matter beyond the survey (LA Times, 2-5-78).

Santa Monica's effort to ensure public safety against approximately 250 earthquake endangered buildings also took the form of a proposed warningsign law. But faced with opposition from building owners, the City Council voted on April 26, 1977, to conduct a structural stability survey of the old buildings and send officially recorded notices to owners regarding the potentially hazardous condition of their buildings (<u>SMEO</u>, 4-27-77). Eleven months later the <u>Outlook</u> reported that 243 of 249 masonry buildings had.failed the earthquake safety test. The recorded notices were to be sent within a month of the completed survey. The recording process was intended to have a deterrent effect on resale of the buildings and hasten their replacement. No further action was anticipated to require posting of warning signs (SMEO, 3-21-78).

The problem of unsafe older buildings emerged as an issue as several well publicized scientific developments served to greatly enhance public perception of earthquake danger in southern California. Despite considerable data which pin-pointed unreinforced masonry buildings as a primary cause of injuries and deaths in a major earthquake, little legislative headway was achieved. Scientists, structural engineers, government officials and the <u>Los Angeles Times</u> pressed for a vigorous program to require owners to renovate or abandon the structures. However, the legislative outcomes in Los Angeles, Burbank and Santa Monica, essentially surveys to identify the number and uses of the buildings, were feeble responses to a threat deemed by many to be very great.

Political Controversies with Earthquake Related Themes

The analysis thus far has focused upon developments and issues whose main theme was earthquake danger to the southern California area. The events considered in this last section differ from earlier topics in at least one important respect. Earthquake threat frequently plays a significant but not central role in the news histories of these events. Secondly, the issues do not, in every case, directly affect the citizens of southern California. The issues share a characteristic element -- the object of attention is a facility which provides a public benefit but also presents a potential threat to the communities nearby. Controversy emerges between groups over whether the general public benefit derived from operating the facilities outweighs the risk of endangering parts of the community. The issues with which we will deal in this section are dam safety, nuclear power plant safety and the safety factors involved in locating a facility to store a volatile fuel called liquified natural gas (LNG). Since the three year period of study included many individual instances of media concern for safety issues, three specific, well publicized situations will be singled out for review: the controversy over siting an LNG storage facility, the issue of whether or not to operate the Diablo Canyon Nuclear Power Plant, and the debate over building the Auburn Dam. Since these issues will be considered in a comparative and summary manner, analysis will be limited to the more general concern of how the event became and remained newsworthy.

Media coverage of the LNG siting situation began in January, 1978. Two late-January articles in the <u>Herald Examiner</u> offerred some insight into the manner in which the controversy over locating the facility would unfold. It was reported that 82 sites had been studied by the California Coastal Commission for the storage complex and that seven had received staff recommendation

for further study. Those sites included Rattlesnake Canyon (San Luis Obispo County), Point Conception (Santa Barbara County), Deer Canyon (near Point Magu in Ventura County), Camp Pendleton, Tajiquas Canyon, Las Flores-Corral Canyon, and Las Varas. Point Conception was the site preferred by the storage facility's builder, Western LNG Terminal Associates (1-18-78). A second January report revealed the conclusions of a General Accounting Office study: "a serious storm, earthquake, or terrorist attack could cause a major rupture in facilities used to store liquified energy gas and thus result in the deaths of tens of thousands of Americans." Such a catastrophic failure, according to the report, might result in large amounts of highly explosive gas filling nearby sewers or subways, setting off a massive string of explosions. Utility officials, including Western Terminal Associates, attacked the report as inaccurate and intemperate, accusing the study's principal author, Dr. David Rosenbaum, of conducting a vendetta against the industry (1-26-80).

A lull in coverage stretched from late January to the end of April when local newspapers reported discovery of a young and possibly active earthquake fault at the Point Conception site. The fault was discovered by a geologist retained by local ranchers opposed to locating the LNG facility at Point Conception. The Public Utilities Commission, which was empowered to approve the site, ordered detailed geological studies to determine the scope of the problem (LA Times, 4-29-78; Herald Examiner, 4-30-78; San Gabriel Valley Tribune, 5-5-78). The Coastal Commission, whose recommendation of a site was based upon considerations of geology, marine environment, and recreational use, rejected Point Conception in favor of Camp Pendleton. This choice drew criticism from Western LNG Terminal Associates who preferred the Point Conception site and from the Department of the Navy which maintained that locating the facility near the camp would hinder defense training and endanger the base's

large population (<u>SGVT</u>, <u>SMEO</u>, 5-8-78; <u>Valley News</u>, 5-9-78; <u>SMEO</u>, <u>Valley News</u>, 5-25-78; LA Times, 6-2-78, 6-5-78).

Another setback for Western LNG Terminal Associates occurred in the form of Indian protests over trenching at the Point Conception site done in compliance with PUC mandated geological studies. The Indians maintained that the Point Conception area was a place of great religious and ceremonial significance to local tribes. On May 13, a group of about 40 Chumash Indians entered the site demanding to be informed of the plan for the area. They also insisted that an archeological survey be conducted and that Indian representatives be involved in planning for any changes in the site. Heavy equipment used to conduct the trenching operation was shut down on orders from Western Terminal Associates when the Indians occupied the area in protest of the digging. Western executives offerred the Indians access to the Point Conception site for religious services and some authority to prevent destruction of the remains of ancient villages and burial grounds on the property. Reports did not indicate whether the Indians accepted the proposed settlement (<u>LA Times</u>, 5-14-78, 5-15-78, 6-18-78, 7-10-78).

In mid-July, the results of a Coastal Commission staff report received coverage indicating that an offshore site for the LNG facility may prove the most advantageous. The report noted that wind, wave, earthquake faults and local protests had greatly reduced the attractiveness of several on-shore sites. The advantages of an offshore site, according to the staff study, included a greatly reduced risk of earthquake damage. It would be more remote from the population and have less environmental impact. One specific site was suggested, the Ventura Flats area located in the Santa Barbara channel (<u>SGVT, LA Times</u>, 7-16-78; <u>Valley News</u>, <u>LA Times</u>, 9-16-78). On August 1, area newspapers reported that the Public Utilities Commission had unanimously

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approved Point Conception as the site for an LNG storage facility. Approval was contingent upon Western Terminal Associates conducting further wind, wave, and seismic studies. It was noted that final approval was up to the Federal Energy Regulatory Commission whose decision was expected sometime before the end of the year (LA Times, La Opinion, 8-1-78; Valley News, 8-3-78).

But Western LNG Associates' public confidence that the matter had been settled in their favor proved premature. On August 13, an earthquake which registered 5.1 on the Richter scale caused widespread minor damage in Santa Barbara County. Several newspaper reports on the quake mentioned the proximity of the area hit to the site on which the volatile fuel would be stored. An LA Times article revealed that the quake had dislodged 50 to 80 cubic meters of soil from a bluff just a quarter mile from the Point Conception site (5-18-78). Coastal Commissioner Bradford Lundborg was quoted as saying that the earthquake threat highlighted by the Santa Barbara tremor would provide ammunition for the facility's opponents. Lundborg admitted that his own concern over the Santa Barbara quake had prompted him to seek reconsideration of the PUC's approval of the Point Conception site. The commission member said the call for review was also due to removal by the PUC of environmental controls recommended by the coastal panel (Valley News, 8-17-78). Chumash Indian spokesman Johnny Flynn said that the Santa Barbara quake confirmed that the Point Conception site was unsuitable (SGVT, 8-17-78). Terminal proponents, however, continued to express confidence that the site was safe for the facility. Utility spokesman Joseph R. Rensch denied that the quake had altered in any way their resolve to build the storage facility. "Our proposed LNG facility is being designed to withstand earthquakes many times more powerful and closer to our site than the offshore guake of August 13," said Rensch (Valley News, 8-17-78).

Resumption of deep trenching at Point Conception to investigate the scope of the earthquake fault was announced by Western LNG Associates on August 23. This announcement sparked an intensification of the confrontation between the project's sponsor and local Indians who had vowed to resist further trenching. The small group which had occupied the site since May increased to 100. The Indians threatened to interfere with the geological studies despite Western's warning that police would be called in and arrests made. The PUC, on August 24, requested that the trenching operation cease until an archeological impact study could be completed (SGVT, LA Times, 8-23-78, 8-24-78).

With the LNG project at a standstill, information regarding ultimate approval or rejection of the Point Conception site by the Federal Energy Regulatory Commission began to receive local media attention. In a letter to the FERC, Commission Staff Attorney Brian Heisler recommended rejection of Point Conception due to the presence of active earthquake faults and the area's archeological value. Heisler reportedly favored Oxnard for the facility. Utility officials reacted angrily to the statement calling the filing of such a report "unprecedented" and "unprofessional." They argued that geological and archeological studies had not been completed, making Heisler's statement premature. Southern California Gas Company's Chairman Harvey Proctor accused Heisler of ignoring the will of the state legislature as expressed in the 1977 Terminal Act (requiring that volatile fuels not be stored in populated areas). However, press releases by the staff of the FERC continued to contain a tone critical of selection of Point Conception. A final decision on the location of the facility was not made prior to the end of the year (LA Times, 9-1-78, 11-2-78; SGVT, Herald Examiner, 11-2-78).

One of the more remarkable aspects of the LNG controversy is that it generated so little editorial comment. Despite a news history which spanned

an entire year, only two commentaries appeared, both of them in community newspapers. On May 11, a few days after the Coastal Commission had ranked Camp Pendleton as its first siting choice, the Santa Monica Evening Outlook printed a stinging critique of the commission's decision. The Outlook's editors branded the recommendation of Camp Pendleton "absurd." They were also quite critical of the state legislature's ban on locating LNG terminals in populated areas which effectively eliminated, they said, the two most suitable locations for the storage facility; Los Angeles Harbor and Oxnard. "We fear we may be in deep trouble. Irresponsible legislators, by turning the LNG issue into a political football laced with endless and needless red tape, have increased the risk that the LNG decision will be delayed again. This, in turn, means that southern California will become even more vulnerable than it is now to long-predicted gas shortages in the 1980s." A second editorial entitled "Point Conception LNG Site a Must" appeared on July 18 in the Valley News. The editors were also critical of the Coastal Commission's recommendation of Camp Pendleton, pointing to the inevitable resistance from the Marine Corps and the House Armed Services Committee. The PUC was urged to approve the Point Conception site as the safest and most feasible. The editors feared that choice of any other location would increase construction costs and cause delays, possibly resulting in loss of contracts for gas from Alaska and Indonesia. "We hesitate to envision the destructive impact such delays would have on the total southern California picture--including the lethal blow to industrial plants that provide the paychecks that sustain millions of area families." The LA Times, which took the editorial lead in the quake endangered building issue, remained conspicuously silent during the LNG controversy. The nearest approach to advocacy was the publication, side-by-side with announcement of the PUC's approval of the Point Conception

site, of details of the General Accounting Office study warning of the dangers inherent in LNG storage (8-1-78).

While earthquake danger played a significant role in the early newsworthiness of the LNG issue, it was superseded by other events as the controversy developed. The news history of the terminal location is essentially one which came to feature the "human drama" of contending interest groups, most noteably, the utility-backed group formed to gain approval of a site and build the terminal versus the Indians who opposed development of the site. The mechanics of gaining approval for a terminal site also contributed to sustained news coverage. Three governmental bodies, the Coastal Commission, the Public , Utilities Commission and the Federal Energy Regulatory Commission made important decisions regarding choice of a site and news reports tended to cluster around the decisions, pronouncements and interventions of these bodies. Earthquake threat to the proposed facility briefly re-emerged as the most salient factor in the controversy in the aftermath of the Santa Barbara tremor. The quake may have served as an impetus for the PUC's order that trenching operations be resumed at Point Conception on August 23. However, Indian opposition and threatened resistance to continuation of the studies quickly moved the confrontation between interest groups back into the limelight.

In mid-January, 1976, most area newspapers announced that discovery of a young and active earthquake fault just three miles from the Diablo Canyon Nuclear Power Plants might imperil licensing of the facilities for operation. Permission to build the two reactors was granted by the Atomic Energy Commission in 1970. At that time, the nearest fault was believed to have been 20 miles away. But, according to reports, an oil survey crew discovered the fault just offshore from the nuclear plant's construction site in 1971. Subsequent study and mapping by the US Geological Survey demonstrated that the fault was

substantial and active. USGS geologists estimated that the fault could generate a 7.5 Richter magnitude quake. According to Pacific Gas and Electric Company, builders of the reactors, the plants were built to withstand a quake registering 6.75 directly underneath it. Carl Stepp, chief of seismology and geology for the Nuclear Regulatory Commission, with jurisdiction over nuclear plant licensing, was quoted as saying that the fault was a matter of concern to the agency and that permission to begin operation could be delayed (<u>LA Times, SMEO</u>, <u>Herald</u> Examiner, SGVT, 1-15-76; LA Times, 1-18-76).

In late January, David Pesonen, chair of Californians for Nuclear Safeguards, requested that the state Senate Committee on Public Utilities, Transit, and Energy conduct an investigation into the charge that Pacific Gas and Electric Company ingnored a potential earthquake hazard at the site of the Diablo Canyon Plants. In testimony to the committee, Pesonen said, "We must face the fact that either PG and E is unable to find an 80 mile long earthquake fault at the doorstep of its Diablo Canyon atomic plant, or it found the fault and deliberately covered up the discovery" (LA Times, 1-28-76). The hearings, at which Pesonen called for the legislative probe, were being conducted to explore the implications of a nuclear power initiative, Proposition 15. If approved by the voters, it would prohibit the construction of new nuclear plants in California unless federal accident liability insurance limits were lifted and unless the legislature confirmed the effectiveness of safety systems and waste disposal methods. Backers of the measure contended that existing safeguards were not adequate to protect the public from a catastrophic accident. Opponents insisted that safety precautions in effect reduced the chances of a major accident to one in a million. They also argued that enactment of the initiative would be costly and unworkable.
In late April, 1976, geologists announced that the Hosgri fault which had stirred controversy over licensing the Diablo Canyon reactors might be part of a more extensive fault system. The fault system, believed to be a 108 mile long branch of the San Andreas fault, extended from San Francisco to Santa Barbara and was believed to be capable of delivering a 7.5 Richter magnitude shock (SMEO, 4-23-76; SGVT, LA Times, 4-25-76). The discovery provided ammunition for nuclear opponents at licensing hearings conducted by the Nuclear Regulatory Commission in May, 1976. At those hearings, it was pointed out that the newly discovered fault system was capable of generating a larger earthquake (7.5 Richter) than the two reactors at Diablo Canyon were being built to withstand (6.75 Richter). Opponents of licensing the facilities revealed that in 1927 a quake of 7.3 intensity occurred just 30 miles from the site of the reactors. Spokespersons for Pacific Gas and Electric Company, however, held that nuclear power plants in California, including Diablo Canyon, could withstand the maximum credible earthquakes for their locations. Engineers for the utility assurred NRC commissioners that designs for the two plants could be modified to withstand even stronger quakes if ordered to do so by the regulatory body (SGVT, 5-22-76, 5-26-76).

After May, 1976, media coverage of the Diablo Canyon issue and nuclear power safety in general practically ceased. The nuclear power controversy had not disappeared, of course, but Proposition 15 had been settled on June 8 (defeated by a 2 to 1 margin) and the preliminary hearings on licensing the Diablo Canyon facility had ended. Media attention again turned to the nuclear safety issue as opponents of nuclear power took the offensive just prior to resumption of deliberations by the NRC on licensing Diablo Canyon. On April 28, 1977, it was reported that the Nuclear Regulatory Commission's two year old study which had concluded that the risks of operating nuclear

reactors was acceptably small was attacked by a group of scientists. The Union of Concerned Scientists of Cambridge, Massachusetts, attacked the findings as having given inadequate attention to the effects of earthquakes on nuclear plants (LA Times, 4-28-77).

After obtaining NRC internal documents and interviews with staff officials, Paul Steiger of the Los Angeles Times wrote a lengthy feature article on the Diablo Canyon controversy. Based upon this information, Steiger charged that the Nuclear Regulatory Agency made a major effort to find a basis on which the Diablo Canyon plants might be licensed. These moves included challenging the US Geological Survey's assessment of earthquake danger at the site, sharply upgrading the staff's previous view of how large a tremor the plants could resist, and devising a plan whereby Pacific Gas and Electric Company could be granted an interim license to operate under less than stringent safety requirements. In justifying this unusual effort, the NRC's deputy director, Richard Young, explained, "if this (discovery of the fault) had. been at the construction permit stage, the investment by the utility might have been \$30 million. We could have said at that time, we have spent enough staff time and public money on this review and tell the utility, we will not give you a construction permit. But at the operating license stage, we had concurred with the design basis established by the utility at the operating license stage. We had a part in this. And when we look at the operating license stage, where a billion dollars worth of plant was sitting there, designed and constructed on bases with which we had concurred, you can't take the same approach as you could when only \$30 million had been spent." With information revealed by the Times and concern that safety considerations were being subordinated to economic and political factors, the House Interior Committee's Subcommittee on Energy and the Environment called NRC officials

to testify on the Diablo Canyon case on June 30, 1977.

During this hearing, Brent Rushforth, an attorney at the Center for Law in the Public Interest, charged that the history of the Diablo Canyon plants showed "a rather serious failure of the regulatory process." NRC official Edson Case presented a complex argument for interim licensing. The plants could be licensed, he said, if PC and E could demonstrate that the probable risk of damage from a .75g earthquake (which the USCS considered possible at the site) impact during the two years the temporary permit would run was the same as the probable risk of damage from a .4g impact (which the plants were designed to withstand) during the next 30 years, the life of the full term operating license. Subcommittee members, according to reports, seemed unconvinced by the regulatory body's reasoning. Recommendations or actions by the subcommittee, if any resulted, were not reported (LA Times, SGVT, 7-1-77).

In August, 1977, opposition to licensing the Diablo Canyon plants took the form of demonstrations and civil disobedience. A group called the Abalone Alliance along with other anti-nuclear power organizations staged a demonstration against operation of the plants on August 7, Hiroshima Day. Forty-eight persons who entered PG and E property were arrested for trespassing. Approximately 1000 persons attended the demonstration held at Avila Beach (<u>Herald</u> <u>Examiner</u>, 8-1-77; <u>SGVT</u>, 8-2-77; <u>LA Times</u>, 8-8-77).

The controversy surrounding Diablo Canyon surfaced in the media sporadically during the remainder of 1977 and 1978. In March, 1978, it was revealed that 300 defective welds were discovered in Unit 1. PG and E spokespersons reported that the welds would be repaired by August (<u>LA Times, SGVT</u>, 3-12-78). On July 20, 1978, reports indicated that the Advisory Committee on Reactor Safeguards had concluded that the Diablo Canyon power plants were safe enough to allow operation. The final decision, according to the report, would be made

by the committee's parent body, the Nuclear Regulatory Commission (<u>SCVT</u>, 7-20-78). Further protests against operation of the reactors were organized by the Abalone Alliance in August, 1978 (<u>Valley News</u>, 8-4-78). The NRC's Safety and Licensing Board began hearings on the Diablo Canyon plants on December 4, 1978. The hearings were expected to last three weeks and the board's decision was anticipated in two months (<u>LA Times</u>, 12-5-78, 12-12-78; SGVT, 12-23-78).

The LNG and Diablo Canyon controversies have a number of noteworthy parallels. Both issues involved utility companies seeking government approval to build and operate facilities storing volatile fuels. Both situations included lengthy governmental proceedings and opposition to the facilities from environmentalists and political activists. In each case, earthquake threat played an important role in the fate of the facilities. Government hearings and decisions were the occasions on which both controversies intensified and received media coverage. Significant departures in the news histories of these issues were also observed. The Diablo Canyon controversy had a longer yet more sporadic news history than did the LNG issue. One consequence of Diablo Canyon's intermittent coverage was the repetition of important details of the controversy each time a new development received press attention. While some measure of summarization appears to be a journalistic technique, one might plausibly argue, based upon Diablo Canyon and other events with protracted news histories, that the greater the interval between newsworthy developments, the more summarization of important details will occur with each new report.

The Diablo Canyon issue drew editorial comment and published letters from concerned citizens to a greater extent than the LNG controversy. While just four percent (2 of 46) of the reports on LNG siting were editorials, 23 percent (7 of 31) of all articles on the Diablo Canyon plants were commen-

taries or letters to the editor. As will be recalled, the two editorials which dealt with the LNG issue were favorable toward construction of the facility at Point Conception and critical of opponents and lengthy governmental review which delayed site approval. There emerged no consistent trend in favor of or opposed to construction of the Diablo Canyon plants. Nor did any of the local papers which published editorials place their publications clearly in one camp or another. Some opinion lay embedded in feature articles or was left to national and local syndicated columnists. The LA Times, for example, carried a lengthy assessment of the risks posed to nuclear power plants by earthquakes. After careful research and detailed expert commentary, science writer George Alexander implied that opponents of nuclear power based upon earthquake danger had perhaps overreacted (5-30-76). A later Times editorial was critical of anti-nuclear demonstrators who claimed that a "higher law" exempted them from accountability for trespassing at the Diablo Canyon site (12-16-78). The San Gabriel Valley Tribune took no editorial stand, but offerred the opinions of columnists Jack Anderson, who opposed the project (1-27-77), and Angle and Walters who favored licensing the reactor (11-11-78). Two letters to the editor, one in the LA Times (4-22-77) and a second in the Herald Examiner (8-18-78), expressed opposition to allowing Diablo Canyon to operate.

In both controversies the actions of protest groups (in the case of Diablo Canyon, an incipient anti-nuclear movement) served to generalize the issues and draw media attention away from a narrow concern with local events and official pronouncements. It will be recalled that the Chumash Indian objection to construction of the LNG terminal at Point Conception resulted in a shift in media focus from agency hearings and the earthquake threat to the symbolic and archeological value of the site. When protests were staged

at the Diablo Canyon site, area newspapers pointed out that local groups were part of a broader anti-nuclear movement which had organized dramatic demonstrations at Seabrook, New Hampshire and elsewhere. It was also revealed that the concerns of this movement were broader than earthquake threat and included such issues as the disposal of nuclear wastes and arms control. State ballot initiative backers were quick to point to the Diablo Canyon situation as an example of why voters should approve a moratorium on new nuclear power plant construction.

Early evidence of a coming storm of controversy over the Auburn project surfaced on April 3, 1976, when the <u>LA Times</u> reported a move by Senator Alan Cranston to delay expenditure of \$18 million on construction until further safety studies were conducted. Cranston told the Senate Appropriations Committee that "serious questions have been raised about the design of the dam with respect to its ability to withstand an earthquake." The Bureau of Reclamation, which was building the dam, advised Cranston later that an independent engineering firm had been retained to conduct a seismic review of the dam design (<u>LA Times</u>, 4-3-76). The results of this study, as available to United Press International, indicated that an earthquake could cause the dam to crack but would probably not cause it to collapse (<u>Valley News</u>, 7-9-76).

Concern with the earthquake safety factor reemerged in September, 1976, as a House Subcommittee chaired by Representative Leo J. Ryan (D-California) held hearings on the collapse of the Teton Dam in June. The Bureau of Reclamation had also built the ill-fated Teton Dam. Bureau Commissioner Gilbert Stamm was closely questioned by Ryan regarding why construction of the Auburn Dam's foundation was proceeding despite the conclusion by geologists that the current design of the dam would be unsafe even in a moderate earthquake. Stamm argued that design changes would not affect the foundation. Despite

reassurances, scenarios of disaster began to appear in newspaper reports. If the dam were to fail, a 100 foot wall of water would rush down the river below Auburn Dam, top the 340 foot Folsom Dam and the 76 foot Nimbus Dam and strike Sacramento within an hour, causing thousands of casualties. Concern over the earthquake danger posed to the damsite was originally expressed after a tremor measuring between 5.7 and 6.1 on the Richter scale occurred along the Sierra Foothills fault system near Oroville in 1975. The fault segment which passes near the Auburn site was believed to have been inactive. After the Oroville quake, geologists urged the Bureau of Reclamation to reconsider the maximum credible earthquake used in the dam's design (5.5 Richter). The plan, calling for a 685 foot, double curvature, thin arch dam, anticipated a peak ground acceleration of .12g. Engineers and geologists recommended that the design be modified to resist a quake whose peak ground acceleration might reach .4 to .5g (<u>SGVT, Herald Examiner</u>, 9-1-76; <u>Herald Examiner</u>, 9-24-76; Herald Examiner, 9-24-76; LA Times, 9-29-76).

The great bulk of newspaper coverage of the Auburn controversy occurred during March and April, 1977. A number of developments were responsible for this upsurge in reporting. On March 11, it was announced that the state Seismic Safety Commission had recommended a thorough investigation of the earthquake safety of the proposed Auburn Dam (<u>LA Times</u>, <u>SCVT</u>, 3-11-17). The next day, reports revealed that the Auburn Dam was included in a list of 38 federal water projects deemed by the Carter Administration to be greater in cost than the economic benefits they would produce. Environmental impact was also reported to be a criterion for evaluation of the projects. On March 21, most area newspapers reported the discovery by nine US Geological Survey scientists of an active earthquake fault within one mile of the Auburn Dam's foundation (<u>LA Times</u>, <u>SGVT</u>, <u>SMEO</u>, <u>Herald Examiner</u>, 3-21-77). The Brown Administration

reiterated its support for construction of a dam at the Auburn site, provided it could be designed to withstand an earthquake. The Bureau of Reclamation, responding to the USGS findings at the Sacramento hearings, said that the Survey's report appeared inconclusive and did not represent a concensus among those geologists who had examined the fault. Opponents of the project insisted, before the Interior Department panel, that the dam was unsafe, unnecessary, and would destroy fifty miles of wild river (SGVT, 3-23-77).

April, 1977, reports indicated that the private consulting firm of Woodward-Clyde was analyzing data obtained at the Auburn site and would report their findings on the area's seismicity and the dam's ability to withstand quakes in July. It was also announced that the Carter Administration was delaying continued funding for the Auburn project until the results of this study were known. Environmental groups remained opposed to construction of the dam regardless of the study's findings. Preliminary findings, made available to the Interior Department in mid-April, indicated that there were faults west of the dam, under the dam, and in the reservoir areas to the east. A Carter Administration review committee said that the Reclamation Bureau must prove, according to its own guidelines, that all faults were inactive. A committee spokesperson said that the most hopeful outcome would be if the faults under the dam and reservoir were found to be inactive and that the nearest active fault was a mile from the dam (<u>SGVT</u>, 4-13-77, 4-14-77, 4-19-77, 4-24-77; LA Times, 4-16-77, 4-19-77, 4-21-77; Herald Examiner, 4-23-77).

Additional results of the Woodward-Clyde study were released in late June, 1977. There was the potential, reported the consulting geologists, for the occurrence of an earthquake 32 times stronger than previously believed possible at the Auburn site. A spokesperson for the consulting firm said that a quake measuring 6.5 on the Richter scale could cause a 12 inch displacement

at the dam. Over thirty faults were discovered near the project site. The consultants did not mention how many of these were active nor did they comment on whether the dam would have to be redesigned to resist the stronger possible tremors in the area (<u>SMEO</u>, <u>Herald Examiner</u>, <u>LA Times</u>, 6-29-77). The state Department of Water Resources, which conducted its own study of the dam site, reached similar conclusions as those of Woodward-Clyde. The state consultants, however, reported that fault movements under the dam's foundation could cause a thin arch design dam to collapse (LA Times, 7-2-77).

In September, 1977, a Bureau of Reclamation study received coverage. Bureau geologists concluded that faults beneath the dam's foundation probably had not moved for 130 to 140 million years. The foothills system which produced the 1975 Oroville quake was accepted as active, but bureau seismologists held that no earthquake had occurred in the Auburn area in recorded history and there was no scientific proof that the Foothills Fault was active as far south as Auburn (SGVT, 9-9-77, 9-21-77; LA Times, 9-21-77; Herald Examiner, 9-21-77).

The collapse on November 6, 1977, of a small earth-fill dam at Toccoa Falls, Georgia, killing 38 people, had little apparent effect on the Auburn controversy. It was reported, however, that the Coalition for Water Power Review, including 21 environmental groups, called for a sharp reduction in funding for the Auburn dam and other projects in the immediate aftermath of the disaster. In January, 1978, further results of the Woodward-Clyde study were released. The consultants stated that there was a low (1 chance in 10) to very low (1 chance in 100) probability that faults beneath the dam's foundation were active. If those faults were active, a displacement of approximately 9½ inches could be expected under the foundation in a single quake event. Woodward-Clyde did not evaluate the suitability of a thin arch design, planned for the Auburn site, nor whether any type of dam could resist the maximum

credible earthquake possible at the site (<u>Herald Examiner</u>, <u>SGVT</u>, 1-12-78; <u>LA Times</u>, 1-30-78). On February 2, the <u>LA Times</u> reported that Robert B. Jansen, Chief of the Bureau of Reclamation's engineering and research bureau, had appointed a committee to study alternatives to the thin arch dam planned for Auburn. He conceded that the original design was perhaps too dependent upon the integrity of the foundation.

After a hiatus of nearly six months, it was reported that the US Geological Survey had concluded that even stronger earthquakes were possible at the Auburn site than previously believed. Most consultants had considered the largest earthquake possible at the site to be 6.5, but the USGS said 7.0. The Survey also warned that the weight of the water impounded by the dam might trigger an earthquake (<u>LA Times, Herald Examiner</u>, 7-29-78). In September, the Bureau of Reclamation announced that any dam built at the Auburn site must be able to resist a 6.5 Richter magnitude quake with an epicenter two miles from the dam. The Bureau anticipated a foundation displacement caused by such a quake to be one inch. It will be recalled that Woodward-Clyde had considered a $9\frac{1}{2}$ inch displacement possible and the USCS as much as three feet. At a hearing on the matter, Representative Leo J. Ryan told his Government Operations Subcommittee on the Environment that the Bureau of Reclamations proposal was unacceptable (LA Times, 9-15-78, 9-16-78, 10-3-78).

The Auburn dam issue derived much if its newsworthiness from the numerous developments which spanned the entire three year period of this study: hearings held on the project, Carter Administration intervention to stop the dam, and debate by engineering and seismological experts over the extent and nature of the earthquake threat posed to the damsite. Unlike the two other controversies considered, the Auburn dam issue was one in which earthquake danger played a consistently central role. While parallel issues such as federal dam inspec-

tion and one extensively covered dam failure probably contributed to the Auburn dam's newsworthiness, these events were not incorporated into the controversy or media treatment of it. This aspect is in contrast to developments such as Indian occupation of the Diablo Canyon site which deflected news media attention from the earthquake threat. The Auburn dam controversy, as covered, lacked the human interest and generalizing aspects produced by close media coverage of opposition groups. Very little of the character, composition, or ideology of Friends of the River was featured in comparison with the Indians at Point Conception or the anti-nuclear activists of Diablo Canyon. The news history of the Auburn dam project, like that of Diablo Canyon, spanned the entire three year period of study. Like the Diablo Canyon issue, the lengthy period of discussion, with its numerous coverage gaps, saw a substantial degree of summarization upon the occasion of each new newsworthy development.

The Auburn Dam was the subject of just two editorial comments, both of which appeared in the Los Angeles Times. The number of commentaries represents just four percent of the total articles which mention the Auburn project. The first essay was printed on April 21, 1977, at the height of news coverage of the issue. Entitled "If It's Safe Let's Build It," the lengthy statement cited the critical water shortage due to drought as the most compelling reason to complete the dam. The editors urged President Carter to reconsider deletion of the project from the budget. Optimism was expressed that some type of dam would eventually be constructed. A second commentary appeared on October 3, 1978, at a time when most of the studies of the site had been completed. After reviewing the disparate findings, the editors expressed their agreement with Representative Leo J. Ryan's call for Congressional hearings to deal with the highly technical issues and enhance public awareness of the issue. The question which begs to be asked regarding the

presentation of viewpoints on the three controversies is why such editorial indifference to LNG and the Auburn Dam and yet such a lively interest in the Diablo Canyon issue? It appears that Diablo Canyon became the focal point of a broader national debate over the future of nuclear power. LNG and the Auburn projects were essentially local or, at best, regional affairs. The Diablo Canyon controversy involved a more basic issue than either LNG or Auburn; no one advocated that dams and fuel storage facilities in general not be built as was being demanded by anti-nuclear groups. The character and actions of the anti-nuclear forces also became a topic for editorial commentary, as many of the elements which had opposed the war in Vietnam became mobilized in a new movement whose scope became increasingly nationwide after the dramatic events at Seabrook, New Hampshire.

REFERENCE

Nigg, Joanne. "The Emergence of Issues and Collectivities: Community Response to Earthquake Prediction and Its Consequences." Ph.D. dissertation, University of California, Los Angeles, 1979.

CHAPTER FOURTEEN

SOME CLOSING OBSERVATIONS ON THE MEDIA

Media sources provide us with the best on-going source of data on how a community responds to events which impinge on the lives of its citizens. Over a three year period, careful attention was paid to the manner in which the media of southern California relayed, interpreted and sometimes ignored information regarding the prospect of a locally damaging earthquake. Of particular interest to us were actual earthquake predictions and near predictions, preparedness actions initiated in response to enhanced earthquake danger, and safety considerations generated by earthquake threat to vital storage facilities. In this brief concluding section, some general observations will be offerred concerning media treatment of the prospect of earthquake disaster.

The media, particularly newspapers, vary considerably in what is deemed newsworthy based upon available resources, readership, the disaster history of the area served, and sense of editorial responsibility. The newspapers monitored during this study vividly reveal this variety. <u>La Opinion</u>, a Spanish language newspaper oriented to the wider arena of Latin American affairs, offered extensive coverage of the Guatemala quake of February 4, 1976, yet paid scant attention to local earthquake near predictions or the Uplift. The <u>Valley News</u>, serving a readership which suffered the most recent major quake, covered extensively quake preparedness and carried on a vigorous editorial campaign for dam inspection and evacuation planning.

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Perhaps the most significant difference in newspapers with respect to disaster coverage is that made by the presence of an experienced science writer. The Los Angeles Times was the only newspaper monitored which had a journalist whose exclusive domain is the coverage of science topics. The position and its incumbent contributed greatly to the <u>Times</u>'news leadership in disaster coverage. This superiority in reporting earthquake related news was reflected in the wide range of events covered, the greater detail of the reports, consistent attention to an event as it unfolded, and its outcome. Other media disaster situations also tended to offer more coverage of these events, frequently comprehensive, short range coverage of major developments. Reporting based upon the idiosyncrasies of individual journalists, however, lacked the continuity and closure observed when a permanently assigned reporter was present.

Media advocacy and commentary, while certainly related to readership, disaster history and so on, appeared to follow no consistent general pattern. It seems plausible that the <u>Valley News</u>' editorial campaign on behalf of dam safety and evacuation planning reflects the experience of that newspaper's readership with a near dam failure in 1971, or a persisting editorial policy based on that experience. Yet the editorial columns of the <u>Valley News</u> did not contain a single commentary on the Auburn dam issue. The <u>Los Angeles Times</u> carried on what could only be described as an impassioned crusade for action to alleviate the danger of unreinforced buildings in the city, yet took fairly accomodative stands toward construction of the Auburn Dam and Diablo Canyon plants and was silent on the LNG storage terminal. It appears that media advocacy is based more on short range assessments of developments bearing on the immediate community than on broadly based issues. To some extent, feedback by vocal minorities on stands taken probably exercises some influence

on the direction or tone of positions taken by editors.

The focal points of our study--prediction, preparedness, safety, and actual events--were, of course, not discrete media phenomena but were related and influenced one another. One question raised in this regard was to what extent local or remote events became the occasion for media attention to preparedness and safety concerns. Two generalizations seem warranted. Local manifestations of earthquake threat stimulated, to a far greater extent, media concern with individual and organizational preparedness than did remote disasters, even ones of enormous proportions. Secondly, local discoveries and announcements which contained threatening elements impacted some preparedness and safety concerns far more than others. We have documented the close relationship between discovery and interpretation of the southern California Uplift and coverage by local media of organizational preparedness. Whitcomb's announcement, just as agreement on the danger posed by the Uplift was emerging, enhanced this media concern with preparedness steps. We have seen the tremendous increase in newspaper coverage of individual preparedness in the aftermath of Minturn's notoriety. Despite considerable publicity of the highly regarded Chinese earthquake prediction program, neither it nor the great disaster of July 28, 1976, had much impact on coverage of local preparedness activities. Heavy local reporting of devastating quakes in Guatemala, Italy, Rumania and Iran similarly failed to spur a concern with local vulnerability. Of course, earthquake events do influence safety considerations and preparedness. That fact is abundantly demonstrated by the flurry of activities to shore up local weaknesses after the 1971 San Fernando Valley quake. Even a quake as relatively minor as the Santa Barbara quake of August 13, 1978, rekindled the controversy over LNG siting. The point is that local quake events and manifestations of earthquake danger seem to be more compelling factors in actual preparedness activities and the media's coverage of these activities.

Predictions and near predictions, while having considerable influence on media treatment of some aspects of preparedness and safety, had practically none on others. This inconsistency is particularly evident in news coverage of the three safety issues (building, dams and nuclear power) considered in our study. Local journalists heralded the danger of unreinforced buildings almost immediately upon discovery of the southern California Uplift. This coverage peaked to a crescendo with the LA Times campaign urging renovation or destruction of the structures. The Uplift and two highly publicized quake predictions, however, had a negligible effect on nuclear power or dam safety. A feeble though plausible explanation for this observation is that dams and nuclear power plants are often remotely located or so taken for granted that they escape public attention until catastrophe thrusts them into the limelight. It might also be pointed out that actual earthquake events rather than predictions or near predictions tended to enhance the newsworthiness of situations involving dams and nuclear reactors. For example, the Oroville quake stimulated interest in the Auburn dam, and the Santa Barbara quake added interest to the proposed LNG facility.

A final question, one central to our study, was whether or not an extended state of alert was possible and what role the media would play in such an alert. By an alert we do not mean an earthquake prediction specifically, although such a prediction could well be part of an alert. We are speaking of a generalized readiness to respond, both on an organizational and an individual basis, should a damaging earthquake appear likely during a relatively brief period of time. Since our experience during the monitored period involved alerts based upon the Bulge and two earthquake predictions, we shall focus upon media attention to these warnings and readiness activities after their announcement. In this context, we ask the question, how well did the media

perform the function of enhancing public awareness of earthquake danger? In some respects, the media did rather poorly. The widespread and uncritical publicity given to Henry Minturn and his predictions indicated that network news executives were lax in their scrutiny of credentials, or worse, unable to discriminate between a scientific and nonscientific warning. The short time span of news currency also militates against maintenance of an effective alert. Though Whitcomb received extensive initial coverage, within a month media interest had waned considerably. Most newspapers and television networks, in their haste to cover Minturn, failed to mention that Whitcomb had cancelled his forecast on December 10, 1976. Minturn suffered a similar fate, regrettably so, since evaluation and assessment of the Minturn fiasco was clearly called for. On a more basic level, perhaps the orientation of the media towards items which are current, entertaining, and brief is simply not consistent with a lengthy warning which may or may not be born out with an eventual occurrence. Survey data regarding the news audience is not entirely encouraging either. It was revealed that television news programs were the chief source of audience information on earthquake events, predictions, and preparedness. Television news has proven to be the least reliable source for the quality journalism necessary for a sustained alert. The sensational presentation of Henry Minturn for a brief two weeks only to drop him entirely without any type of follow-up was the antithesis of the informed and responsible journalism necessary for a credible extended warning. Survey data also revealed a substantial belief among the public in nonscientific sources of earthquake prediction and information as well as a limited understanding of probability, risk, and cost benefit ratios. Since a credible warning, as part of a general alert, would certainly be scientifically based, is is essential that the media improve audience understanding of these concepts.

There are some hopeful signs regarding a sustained alert. Careful coverage by most area newspapers of the deliberations and recommendations of the Seismic Safety Commission and the California Earthquake Prediction Evaluation Council probably helped establish a valuable precedent for future alerts. The comparison between Whitcomb's careful and qualified announcement and wreckless forecasts offered an important lesson in judgment of credibility for those who critically followed reports of these events. Extensive coverage of these two near predictions, as well as that of the Uplift, permitted the emergence of respected keynoting scientists like Clarence Allen and Don Anderson of Caltech by whom any future warning is likely to be publicly scrutinized. Local newspapers played an important and responsible role in disseminating information on individual and family preparedness by publishing the Fil Drukey series "Common Sense and Earthquake Survival." Such information would be a vital element in an earthquake alert. Both the volume and direction of information seeking by the public were promising signs. A tremendous demand for reprints for the Drukey series by individuals and organizations demonstrated that interest in preparedness was substantial. In the aftermath of the Minturn debacle when media news executives concluded that the public was "fed up" with earthquake information and failed to provide any information seeking directed toward authoritive sources (e.g. Caltech, the US Geological Survey, the Office of Emergency Services) skyrocketed.

The ability to maintain an effective alert in a region as densely populated and seismically vulnerable as southern California is of vital importance. Despite promising developments, there are still shockingly basic improvements which must be made in our understanding of the processes which convulse the earth beneath our feet. Most important is the fact that, for many, the chief sources of information about these processes, newspaper and broad-

cast journalists, apparently know little more than the audiences they seek to inform. But it must be realized that seismology, as well as journalism, has important goals yet to be achieved. The goals of both fields are of critical importance to us as citizens of southern California, since our lives may depend upon their attainment.

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APPENDIX A

ANALYTIC CATEGORIES FOR

MEDIA ITEMS

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PUT LETTER OF ANTICLE OR NEWS 1TEM TYPE IN THIS CORNER (MAY USE MORE THAN ONE LETTER) Paper, TV or Radio Station Name

Date of event and article (especially if different)

Page: FRONT OR OTHER OR LEADOFF OR OTHER

I. Type of article or news item:

A. Earthquake event

B. Earthquake consequences on country (aftermath)

C. Earthquake prediction/hypothesis/future quake

D. Earthquake legislation

E. Earthquakes and power plants (nuclear safety)

F. Earthquakes and dams/flooding

G. Earthquakes and building safety

H. Editorials

I. Public comments or questions/letters to the editor

J. Paid announcements

K. Feature articles (e.g., in View section of the LA Times)

L. Cartoons

M. Earthquakes cited in article, but not the main topic

N. Preparedness suggestions

0. Other

If ADRB!

Magnitude or intensity mentioned

Number of casualties mentioned

Amount of damage (and kind)

Organizations which responded

Public reactions wentioned (panie, fear, calm, helping behavior)

Briefly, any other major points made

Iſ	<u>C</u> :
If	article is reporting that a prediction/hypothesis/forecast is/was made:
	Who made it (including organizational affiliation, if mentioned)
	When is it to occur
	Where is it to occur
	Magnitude or strength of expected earthquake
	Basis for prediction (evidence, theory being tested)
	Was prediction successful (give specifics on earthquake)
	Was prediction calcelled
-	Evaluations or assessments within the article
If	article discusses the science of prediction and its consequences:
	What studies, researchers, techniques are mentioned
	Brief summary of content (one or two sentences only)

Positive or negative evaluations of consequences

Technical assessment of article

<u>If D - G</u>:

Briefly summarize content

Specific persons or organizations mentioned (specify organizational affiliations) Evaluations or assessments within article

If H - K, M - O:

Major topic discussed (If referring to a previous article, note date) Briefly summarize content (or that part which relates to earthquakes, if code M is used Specific persons or organizations mentioned

Evaluations or assessments within article

If L:

Nome of comic strip and artist

Briefly summarize how earthquake was incorporated

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APPENDIX B

HISTORY OF SIGNIFICANT EVENTS

EARTHQUAKES, PREDICTIONS, AND CONSEQUENCES FOR 1974-1978

1974 MEDIA-REPORTED EVENT

April

4-11-74 In November, 1973, Dr. James Whitcomb of Caltech predicted that an earthquake would occur somewhere east of Riverside, California, within three months, and that it would register at least 5.5 on the Richter scale. Two of the three elements in his prediction were correct: the earthquake struck the Riverside-San Bernardino area on January 30, 1974, but the quake's magnitude was only 4.1. Whitcomb's basis for the prediction was "dilitancy," a phenomenon which occurs in subterranean rocks under stress and which reduces velocity in one type of sound wave traveling through these rock layers. (LAT)¹

September

9-16-74 Astronomers John Gribbin and Stephen Plagemann predicted that in 1982 major earthquakes could occur in California and other areas of the world under severe geological strain because of the "Jupiter Effect," in which all nine planets align on the same side of the sun and cause great disruptions. (Newsweek)

1975

January

- 1-11-75 Late last November, USGS scientists informally predicted that an earthquake would occur near Hollister, California. The prediction came true when an earthquake of 5.2 on the Richter scale shook the Hollister area. The basis for the prediction was an anomaly that occurred in the earth's magnetic field and significant changes in the velocity of various seismic waves. USGS director V. E. McKelvey said that all future predictions would be formally reported (Science News).
- 1-26-75 A book entitled <u>California Superquake 1975-1977</u> by Paul James was released on this day. It dealt with predictions from scientists, prophets, psychics, astrologers, fundamentalists, etc. in attempts to tell people how to prepare for the coming catastrophe. (LAT)

See end of history for an index of newspaper titles for these abbreviations.

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January

- 1-28-75 An earthquake occurred in Woodland Hills, California, registering 2.8 on the Richter scale. (LAT)
- 1-28-75 A series of earthquakes occurred from 1-22-75 to 1-28-75 in Brawley, California, in the Imperial Valley, registering from 3.5 to 4.7 on the Richter scale. The Brawley fault is an extension of the San Andreas fault. Scientists will not discount the possibility of a future major quake. (LAT, Palo Alto Times)
- 1-30-75 Don Anderson, head of the Seismology Lab at Caltech, does not feel the earth to be more unstable than usual in spite of the flurry of earthquakes in Northern California and Imperial Valley. (Palo Alto Times)

February

2-7-75 Substantial progress was made in the area of earthquake prediction in four major countries: the U.S., U.S.S.R., China, and Japan; however, the U.S. research and development program is not as advanced as the other three countries. Scientists not only believe it would be very advantageous for Washington to appropriate funding in this general area, but feel it is extremely necessary to have a two-fold program, one dealing with scientific prediction research, and the other with warning systems for major urban areas. (Science)

May

5-1-75

Progress in the area of scientific earthquake prediction was made in the U.S., U.S.S.R., China, and Japan due to the new level of understanding and the current methods being employed. The major techniques used are:

- 1) Plate tectonic theory, which says that when stress builds up along the earth's plate boundaries, frictional forces resist the relative motion of the plates. When the stress increases to the point where these forces are overcome, an earthquake occurs.
- Dilitancy is an inelastic increase in the rock volume that begins when stress reaches about one-half of the breaking strength of the rocks.
- 3) Velocity variations of seismic waves have been found to happen just prior to an earthquake.
- 4) Tiltmeters are used to measure anomalous changes in the form of crustal rocks in a particular region.
- 5) Radon (a radioactive gas) is being monitored in China for its content in well water. (Scientific American)

June

6-16-75

In early February, 1975, Chinese seismologists predicted that a rather large earthquake would occur on February 4, 1975. The event occurred as predicted with a magnitude of 7.4 on the Richter scale. Thousands of lives were saved due to the precautionary measures taken by officials. The Chinese based

their prediction on changes in animal behavior, tilt and electricial resistance changes, and decreases of radon in well water. (Newsweek)

July

7-26-75 Dr. Clarence Allen of Caltech's Seismology Laboratory stated that China's commitment to earthquake prediction may have produced a major breakthrough. The methods used by the Chinese will be valuable to scientists in other countries who are working in the area of developing accurate prediction techniques.(Science News)

August

- 8-22-75 Recent evidence for potentially severe ground shaking raised questions about the earthquake resistance of buildings built prior to earthquake codes of 1933 in Los Angeles. The public should determine the ultimate balance between the risk of earthquake loss and the cost of building repair. (Science)
- 8-26-75 A panel of the National Academy of Sciences, chaired by Dr. Ralph Turner of UCLA, noted that the ability to predict earthquakes posed social, political, and economic problems as troublesome as the seismic event itself. They were issuing recommendations for actions to be taken by governmental and societal groups in their report, entitled "Earthquake Prediction and Public Policy." (LAT)

September

9-1-75

The U.S. has witnessed some recently successful earthquake predictions by members of the scientific community. The first was James Whitcomb's successful prediction of Riverside, California's earthquake that occurred on January 30, 1974. The second was Malcolm Johnston and John Healy's accurate prediction of an earthquake near Hollister, California, that occurred on November 28, 1974. (Time)

9-1-75 Specialists in the area of earthquake research believed the probability for a large earthquake in the San Francisco Bay area to be very high. Robert Wallace, chief of earthquake research for USGS-Menlo Park, said that major earthquakes along the San Andreas Fault occur about every hundred years. At that rate San Francisco can expect an earthquake in about thirty years, since the last major quake was in 1906. Most buildings in San Francisco, including the airport, are unstable. San Francisco would face an enormous problem in the event of a major quake. (Time, Harper's)

October

10-12-75

Barry Raleigh, a USGS geophysicist, was experimenting with a series of water wells located in the San Andreas Fault to try to modify or control earthquakes. Raleigh's method involved pumping water out of the first and third wells in order to increase friction between the underground rock layers, causing those areas around the second well to become strengthened. Once strengthened, scientists may then be able to control the amount of slippage along the fault. (LAT)

10-12-75 Earthquake predictions were said to be becoming a part of the future. Less than a year ago James Whitcomb, Malcolm Johnston, and John Healy accurately predicted quakes for the Riverside and Hollister areas. A special National Academy of Sciences panel, giving serious consideration to the nearness of earthquake prediction, concluded that earthquake predictions would have both advantages and disadvantages. Some positive aspects are the saving of lives and buildings (that will be repaired prior to the event); some negative aspects are the limiting of new mortgages, insurance, and investment by businesses and financial institutions, and the possible migration of a sizeable number of people out of the target area. (LAT)

November

11-15-75 Earthquake preparation has been proposed by various specialists at the federal level. V. E. McKelvey, USGS director, told a conference on earthquake warning and response that even the most fragmentary data about a prediction must be processed in a very careful manner by scientists, initially, and later by other experts who have entered the picture. Eugene Haas, University of Colorado sociologist, told a Senate committee that "an earthquake prediction and warning system may...generate a false sense of security and a tendency on the part of the public to infer that no warning means that no damaging earthquake will occur." He stressed the fact that the social, economic, and political factors involved have been largely ignored.(Science News)

December

- 12-31-75 An earthquake registering 5.8 on the Richter scale struck Western Greece, killing 1, injuring 10, and leaving about 9,000 homeless (LAT).
- 12-31-75 A major earthquake registering 6.8 on the Richter scale struck the New Hebrides Islands in the South Pacific. No damage or casualties were reported due to the sparse population of the area. (SMEO)

1976

January

- 1-1-76 A moderate earthquake of 4.2 on the Richter scale struck Southern California.(SMEO, VN, SGVT)
- 1-4-76 An earthquake of 5.0 hit New Mexico, causing minor damage. (SMEO, SGVT)
- 1-5-76 An earthquake registering 3.2 on the Richter scale struck the state of Washington. There were no casualties or damage. (SMEO)

January

- 1-7-76 More than twenty underwater shocks registering from 6 to 7 points on the twelve-point Soviet scale occurred in the Pacific Ocean. (SMEO)
- 1-10-76 Mexico was shaken by an earthquake of 4.3 on the Richter scale. There was no damage or injuries. (SGVT)
- 1-11-76 Hawaii received an earthquake of 4.0 on the Richter scale. There was no damage or casualties but there is fear of a possible volcano eruption.(SMEO, VN)
- 1-13-76 An earthquake was reported in Iceland and registered from 6.3 to 6.5 on the Richter scale, causing minor damage. (LAT, SMEO, VN)
- 1-14-76 A strong earthquake registering 8.0 on the Richter scale struck the Fiji Islands in the South Pacific. This quake, considered to be the strongest in the world in four years, threatened a tidal wave. (VN)
- 1-14-76 An earthquake registering 4.9 on the Richter scale hit Monterey County, causing no damage or casualties.(SMEO)
- 1-15-76 1-18-76 The operation of the Diablo Canyon Plant could be delayed by 1-18-76 the recent discovery of an active earthquake fault about three miles from the plant. Pacific Gas and Electric Company officials claimed they were ignorant of the fault until construction began. The fault, called the Hosgri Fault, is considered to be far longer and younger than previously believed by scientists. (SMEO, SGVT, LAT)
- 1-16-76 John Nash, clairvoyant, predicted Adelaide, Australia, would be hit by an earthquake and tidal wave on January 19, 1976, between 10:30 and noon. (LAT)

1-19-76 Nash's prediction failed. (LAT)

- 1-21-76 The Japanese island of Hokkaido was struck by a strong earthquake of 7.0 on the Richter scale. Due to sparse population and the location of the epicenter in the Pacific Ocean, there was no damage or casualties. Authorities issued a tidal wave warning. (HE, VN, LAT, SGVT)
- 1-24-76 Mt. St. Augustine erupted three times in Anchorage, Alaska. The eruptions were accompanied by small earthquakes and might trigger tidal waves. (HE)
- 1-25-76 Stanford University scientists Helena C. Kraemer, Seymor Levine, and Bruce Smith thought chimpanzees and other animals could predict earthquakes. They were observing animal movements and other habits several times a day. (SMEO)

January

1-28-76	A Senate committee was asked to conduct a legislative probe regarding the site of the Diablo Canyon Nuclear Plant. (LAT)
1-28-76 1-29-76	A proposed ordinance which would make pre-1934 buildings in the city of Los Angeles conform to quake safety standards was referred back to the Building and Safety Commissioners. (VN, HE)
1 - 29-76	The Oregon coastline was struck by an earthquake registering 5.3 on the Richter scale. There were no casualties or damages. (VN)
February	
2-1-76	Mexico City was surprised by an earthquake registering 6.2 on the Richter scale. Due to the fact that the epicenter was in the mountains, 205 miles southeast of Mexico City, there was no damage or casualties. (HE)
2-1-76	An earthquake hit a mountainous area of Arizona, between Williams and Prescott, registering 5.2 on the Richter scale. There was no damage or casualties. (HE)
2-4-76	A massive earthquake of 7.5 on the Richter scale hit Guatemala causing more than 18,000 deaths and severe damage. (LAT, HE, LO, SGVT, SMEO, VN, Christianity Today, Time Newsweek)
2-6-76	Another quake struck Mexico, this time about 180 miles from Guadalajara. It registered from 5.5 to 6.0 on the Richter scale. (HE, LO)
2-6-76	Guatemala received aftershocks ranging from 5.6 to 6.0 on the Richter scale. (HE, LO)
2-9-76	Recent discovery of an underwater fault could cause damage to the Diablo Canyon Nuclear Plant which is under construction. The Nuclear Regulatory Commission must decide whether or not to grant the plant a license. (Time)
2-9-76	The southern Pacific coast of Mexico was hit by an earthquake of 6.0 on the Richter scale. There was no damage or casualties. (LO)
2-11-76	Waverly Person, geophysicist for the National Earthquake Information Service, predicted that at least a dozen quakes would occur during 1976. One would register 8.0; the others would be minor. The locations of these and the basis for prediction were not specified. (SGVT)
2-13-76	An earthquake of 5.0 on the Rossi-Forel scale (from 1 to 9) struck the Philippines. There were no casualties or damage. (LAT, SMEO)

February

- 2-13-76 Supervisor Kenneth Hahn urged President Ford to use military planes and ships to transport supplies to Guatemala. (HE)
- 2-13-76 Guatemala received 750 aftershocks since the February 4th earthquake. (LO)
- 2-13-76 The Palmdale bulge, a land uplift of about ten inches at its 2-14-76 highest point, just north of Los Angeles in the San Andreas fault area, was the topic of concern for USGS scientists. (SGVT, SMEO, VN)
- 2-13-76 Scientists were mystified by a "bulge" in the Palmdale-Mojave area; the USGS requested federal funding to monitor and research the area. (LAT)
- 2-13-76 Federal earthquake forecasters were in dire need of funds in order to be technically able to predict the next great California earthquake. The proposed budget cut for earthquake prediction research by President Ford would virtually stop their work. (SMEO)
- 2-13-76 USGS geologists found a 105-mile-long fault in Guatemala, extending from Quirigua on the east to an area about twelve miles north of the capital on the west. They believe it to be a possible cause of the quake of February 4th. (SGVT, Science News)
- 2-14-76 U.S. Secretary Waldheim made a special request to governments of the whole world for monetary contributions for the Guatemalan cause. (LO)
- 2-14-76 Evangelist Billy Graham and Daniel Parker, head of the U.S. Agency for International Development, made separate helicopter tours of the Guatemalan countryside. Both men were very surprised at the overall destruction and plan to report to President Ford on the need for more U.S. aid to Guatemala. (LAT)
- 2-14-76 Manila was hit by one of the hardest quakes to strike the Philippines in recent years. (HE)
- 2-14-76 Representative Barry Goldwater, Jr. called for Senate hearings to investigate the lack of coordination (between volunteer and institutional efforts) of Guatemala's aid programs in the Los Angeles area. (HE, LO, SMEO)
- 2-16-76 Guatemala's Counsel Dario Soto Montanegro charged Los Angeles with lack of coordination of volunteer relief aid program. (LO)
- 2-16-76 USGS was studying land swelling in the area surrounding the Palmdale bulge. (HE)
- 2-16-76 Guatemala was threatened with flood due to the landslides following the February 4th quake. (LO).

2-17-76

with more than one million homeless. (LO, HE) 2 - 19 - 76Dr. Harsh K. Gupta of the University of Texas said manmade lakes could accelerate the arrival of an earthquake in an area where pressures were already building up. Dam areas, such as that of Oroville, California, were being studied. (SMEO) 2-19-76 Daniel Parked (AID) asked Congress to approve an emergency loan of \$25 million to help the Guatemalan victims. (LO) 2 - 19 - 76An earthquake of 5.6 on the Richter scale hit Mexico. There were no casualties or damages since the epicenter was in the Pacific Ocean. LO) 2-19-76 An earthquake of 6.0 on the Richter scale hit the southern part of Cuba. There was at least one death and seven persons wounded. (LO, SMEO) 2 - 22 - 76An earthquake of 4.8 on the Richter scale rumbled through most of the Hawaiian Islands. There was no damage or casualties. (VN) 2-27-76 Senators Kennedy and Humphrey presented a bill in which the U.S. would provide more than \$30 million in Guatemalan emergency aid. (LO) 2-27-76 Scientific tapping of geysers for geothermal power might trigger earthquakes. (FP) March 3-3-76 Dr. Barry Raleigh, of the USGS research facility in Menlo Park, went to Hollister, California, to investigate whether Chinese animal-watching techniques could be used in the United States. (Science Digest) 3-4-76 Guatemalan Consul General Montanegro requested that construction materials be sent to Guatemala. (HE, LO) 3-5-76 A federal appellate court was finally convinced that the fault in Louisa County, Virginia, posed no significant threat to four nuclear power plants being built over it. (LAT) 3-6-76 Dr. Brian Tucker of the Massachusetts Institute of Technology said the manner in which shock waves travel through rock may lead to accurate earthquake predictions. (SGVT) 3-7-76 Dennis S. Mileti and Eugene Haas of Colorado, in a preliminary summary of their study, concluded that a prediction of a 7.3 earthquake would result in social and economic consequences.

(SGVT)

The new estimate of Guatemalan deaths was more than 22,000,

3-9-76 A series of strong tremors hit Guatemala, causing further destruction to the already devastated Central American country. (LO, LAT, SGVT, SMEO)

- 3-11-76 An initiative to put "Proposition 15" on the ballot was begun. If passed, it wil set up a board to govern safety measures which pertain to nuclear power plants. (VN)
- 3-12-76 The SSC invited USGS scientists, social scientists, and the OES director to a hearing to assess the consequences of the Palmdale bulge. (LAT, HE, SGVT, VN)
- 3-13-76 An assessment of Oroville Dam by the State Office of Emergency Services said that a "severe breach" would send water sweeping across the city of Oroville and four miles beyond in ten minutes. (SGVT)
- 3-25-76 The State Division of Mines and Geology found that two faults, at least partially active, are bordering the San Diego area. (VN)
- 3-26-76 Senator Alan Cranston asked President Ford for money to be appropriated for quake research along the San Andreas fault. (VN)
- 3-26-76 An experiment in an oil field in Rangely, Colorado, was conducted to test whether or not earthquakes may be triggered by increase of fluid pressure. (Science)
- 3-28-76 Dr. James Slosson, Valley College professor and chairman of the SSC, recommended that the state coordinate earthquake research and make it available to the public.(LAT)
- 3-29-76 GTE developed a laser which bounces its flashes off satellites to measure and possibly predict earth movements. (Time)
- 3-31-76 Dr. Kanamori, Caltech professor and scientist, thinks that silent and unfelt earthquakes are precursors to larger ones. (LAT)

April

- 4-2-76 USGS issued a report on the aftershocks of the Oroville, California quake of August 1, 1975. Because of the proximity of the quake to the dam, USGS developed telemetered seismographs to monitor the area. The sequence of events at Oriville suggested that if the quakes were related to the reservoir, weight-induced stresses were an unlikely explanation. (Science)
- 4-3-76 Dr. Kanamori said that major recorded quakes have not been sufficient to account for all or most of the earth movements that plate-motion studies indicate have taken place. (Science News)
- 4-4-76 In view of the Guatemalan quake of February 4, concern has been voiced by USGS, the Los Angeles County Quake Commission, and other officials about whether southern California is prepared

April	
	to handle the resulting problems if it is struck by a quake of similar magnitude. (VN)
4-6-76	Cuban evangelist and prophet Dulce Maria Garcia predicted that a tidal wave would cover Florida. (LAT)
4 -6- 76	University of Washington researchers planned to use laser beams along the San Andreas fault to detect earthquakes. (HE, SGVT)
4-8-76	The Palmdale bulge uplift was officially cited as a threat to public safety and welfare in Los Angeles and adjacent areas. (Seismic Safety Commission Resolution #2-76)(HE)
4-8-76	Soviet Central Asia was struck by an earthquake of 6.9 (HE, VN)
4-8-76	Thomas Collins, a U.S. Forest Service geologist, claimed that an active fault lay beneath the Humboldt Bay nuclear power plant. Government officials were to decide whether or not the plant should be shut down. (HE, SGVT, SMEO)
4-9-76	Ralph Nader proposed that all nuclear power plants should be closed down until all possibilities of future quakes have been studied. (VN)
4-9-76	USGS scientists, referring to a quake in the San Fernando Valley which registered 4.7 on the Richter scale, said that it had nothing to do with the Palmdale bulge. (VN)
4-10-76	An Ecuadorian earthquake killed at least 7, injured 50, and caused severe damage. (HE, SGVT, LO, SMEO)
4-12-76	The SSC asked state and local agencies to prepare emergency plans to deal with any future strong earthquake in the Los Angeles area. (SMEO, CSM)
4-13-76	U.S. scientists suggested that quakes will be predicted within the next decade. New techniques and anomalous areas like the Palmdale bulge are good probing grounds for most seismologists and geologists. (VN)
4-15-76	Scientists believe the bulge may be a precursor to an inevitable major quake in the Los Angeles area.(LAT, VN)
4 - 15-76	A swarm of more than one hundred tiny earthquakes hit the Imperial Valley. (HE)
4-15-76 4-16-76	Los Angeles was urged to use the Chinese methods to study the Palmdale bulge due to China's successful prediction in Haicheng in February, 1975. (SMEO, SGVT, VN)
4-18-76	A panel of USGS, Caltech, and Stanford scientists, together with CEPEC and OES, told Governor Brown that the uplift along the San Andreas fault suggested a major earthquake within the next decade. (LAT, VN)

- 4-21-76 Whitcomb's study of P-wave velocity of seismic wave changes that pass through the San Andreas fault showed sufficient stress is building up. Therefore, he hypothesized that an earthquake might strike southern California between April, 1976 and April, 1977. (LAT, HE, LO, SMEO, SGVT, CSM)
- 4-21-76 A group of energy opponents called "Californians for Nuclear Safeguards" issued a report saying that public utilities had failed to take adequate steps to safeguard California atomic plants from quakes. (VN, SGVT, LO)
- 4-22-76 Research at Ohio State University's Disaster Research Center found that the public doesn't panic after a major earthquake. They concluded that advanced knowledge of earthquakes would be beneficial in the long run. (LAT)
- 4-22-76 Building structures in Los Angeles were to be assessed for
 4-23-76 earthquake safety as a result of Whitcomb's announcement. (LAT, SGVT)
- 4-22-76 The Civil Defense Preparedness agency responded to Whitcomb's announcement with preparatory booklets for citizens. (LAT)
- 4-22-76 The Countywide Emergency Operations Center, established in 1971 after the San Fernando earthquake, decided to publicize its facilities and services in response to the Whitcomb announcement.
- 4-22-76 Insurance companies expected their customers to be lethargic about purchasing earthquake insurance despite Whitcomb's announcement. (LAT)
- 4-22-76 Most southern Californians seemed completely unworried about Whitcomb's announcement. (SGVT, LAT)
- 4-22-76 Caltech geophysicists stated that they were "cautious" about Whitcomb's announcement. (LAT, SMEO)
- 4-22-76 A USGS scientist discovered a west fork of the San Andreas fault and believed that stronger earthquakes than previously thought could be triggered. (HE, SGVT, SMEO)
- 4-23-76 City Councilman Louis R. Nowell asked the city attorney to file a legal suite against Whitcomb and Caltech for the forecast. His claim was that the "prediction" was imprecise and could cause a reduction in property values in the projected impact area. (SGVT, LO, SMEO)
- 4-25-76 Because of Whitcomb's announcement and the rise in the ground at Palmdale, the Bouquet Canyon Reservoir Dam, in the Newhall-Saugus area, was scheduled to undergo a structural stability review. (VN)
- 4-25-76 Scientists at Caltech and Cal State Fullerton believe better methods are needed to adequately predict earthquakes. (HE)

- 4-25-76 Whitcomb discussed the motivations behind his controversial announcement, deploring the sensational publicity that surrounded it, but reemphasizing that any information must be passed on to the public and to other scientists for preparation and testing. (LAT)
- 4-29-76 Caltech scientists admitted that the institution's reputation was "on the line" because of Whitcomb's announcement, but they concerned that the public must be alerted of any possible quakes. (LAT)
- 4-30-76 City Councilman Louis Nowell charged Whitcomb with inflicting "mental anguish" and causing "irreparable" harm to San Fernando Valley property values. (FP)
- 4-30-76 American scientists who recently visited China admitted that the Chinese are much more advanced in earthquake prediction methods. (FP)

May

- 5-1-76 CEPEC members who heard Whitcomb's review of his methods concluded that the area in question is not more likely than other areas to have an earthquake. Whitcomb admitted the uncertainty of his techniques. (LAT, HE, SMEO, LO, Science)
- 5-1-76 An intergovernmental conference on earthquake risk (set up as a result of the Guatemalan quake) adopted resolutions for the establishment of various seismological centers throughout the world. However, accurate predictions were said to be a long way off. (UNESCO Courier)
- 5-1-76 The injection of water and liquid wastes underground and the filling of large reservoirs could cause increases in seismic activity. (UNESCO Courier)
- 5-2-76 Whitcomb's methods and techniques were described. Some of the flaws of his "prediction" were also presented. (LAT)
- 5-2-76 Earthquakes are seen as a threat to southern California's unsafe dams. The newspaper hoped that earthquake predictions would stimulate preparatory measures and the dissemination of information. (LAT)
- 5-5-76 NASA sent off a satellite to aid in studying the earth's movement. (HE, CSM)
- 5-6-76An earthquake of 6.9 in the Venice and Friuli region of Italy5-7-76killed 819 and injured 72,000. (LAT, HE, LO, SGVT, SMEO, VN, CSM)
- 5-6-76 Psychic Beatrice Lydecker was reportedly using her powers to read the minds of animals, to assess whether they were concerned about the occurrence of earthquakes. No evidence was presented as to her success. (VN)
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May	
5-7-76	The lack of data in southern California on earthquake prediction was disturbing to many geophysicists who worry about the uplift along the San Andreas fault. (Science)
5-9-76	A bill was initiated by Senator Alan Cranston which would appropriate \$150 million over a three-year period for the study of quakes. The bill seems to have clear passage in Congress. (VN)
5-12-76	Dr. Y. Kagan and Professor L. Knopoff of UCLA pinpointed up to 1300 recorded earthquakes (7+ on the Richter scale) which line up along the world's earthquake belts. (SMEO, VN)
5-13-76	Vice President Nelson Rockefeller visited Italy to give Italians "moral support" after the earthquake of May 6. (HE, LAT, SGVT, SMEO, LO, CSM)
5-14-76	NASA launched the satellite Lagoes for the purpose of earthquake detection. (HE)
5-14-76	The SSC requested federal funds for research on the Palmdale bulge. (LAT, VN)
5 -16- 76 5-22-76	Dr. Eugene Haas conducted a study on the social effects of earthquake prediction, especially Whitcomb's. He concluded that the public appears unshaken by the prediction. (SGVT, Science News)
5-16-76	Whitcomb's announcement let the public in on a normally closed process of scientific discovery. (LAT)
5-17-76	The Soviet Republic of Uzbek had a 7.3 quake; damage to property was significant. There were few injuries, due to the evacuation of the area after the April 8 quake. (LAT, SMEO, SGVT, VN, LO, CSM)
5-19-76	China enlisted zoo keepers and farm-animal breeders to participate in China's prediction system based partially on unusual animal behavior. (SGVT)
5-22-76	Structural engineer Stanley Mendes warned that undiscovered earthquake hazards could "very likely" exist at the Diablo Canyon Nuclear Power Plant. (SGVT)
5-23-76	Waverly Person, from USGS, said that earthquake activity so far is normal déspite the five big quakes that have struck recently. (SGVT, LAT)
5-25-76	The NRC issued a formal order requiring Humboldt Bay Nuclear Power Plant to be reinforced against an earthquake. (SGVT)
5-25-76	The U.S. Senate unanimously approved \$150 million for earthquake

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research. (LAT, SGVT)

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5-25-76	Dr. Douglas Hamilton, from the Earth Sciences Association in Palo Alto, said nuclear power plants in California would withstand the maximum earthquakes for their locations. (SGVT)
5-26-76	Peaas, a Soviet research vessel, searched the ocean to monitor tsunamis caused by seismic disturbances of the ocean. (CSM)
5–28–76	The Yunan region of China was struck by two major earthquakes registering 7.5 and 7.6, respectively. The Chinese authorites gave warnings to the people eight minutes before the first shock, enabling many people to be moved to safe areas. (LAT, HE, SMEO)
5-28-76	USGS scientists believe that the Palmdale bulge is wider than previously thought. (LAT, HE, SGVT)
5-30-76	Proposition 15 proponents were afraid that jarring forces of a large tremor would cause the nuclear core to melt, releasing radioactive material into the environment. (LAT)
June	
6-1-76	The passage of the earthquake research bill for \$150 million depends on House approval. (LAT)
6-2-76	County supervisors ordered quake safety procedure notices posted in county buildings due to the existence of the Palmdale bulge. (HE)
67-76	A 6.6 earthquake in Mexico City caused slight damage and injured five. (LAT, HE, SMEO, SGVT, LO, CSM)
6-8-76	California Division of Mines and Geology scientists were studying earth movements with sensitive instruments called accelerographs. (HE)
6-13-76	A review of safety planning for earthquakes was ordered by the Los Angeles County Board of Supervisors in response to recent predictions. (VN)
6-15-76	A study of the Bouquet Canyon Reservoir, in the Palmdale bulge area, proved favorable regarding seismic safety. (VN)
6-17-76	North Dakota and Iowa were called the most earthquake-safe states. (VN)
6-20-76	Earthquake preparedness is the object of study by OES, Senator Cranston, and various community groups. (VN)
6-20-76	Sumatra, Indonesia, had a 7.2 earthquake. (HE, SMEO)
6-21-76	Earth scientists testified before a House Science and Technology Subcommittee that reliable forecasting of earthquakes is due within five to ten years,but a major quake could occur before then. (LAT)
6-25-76	Proposals on earthquake safety were formulated in the northern San Fernando Valley by police, clergymen, businessmen, and relief agency representatives. (VN)
6-25-76	Tens of thousands were saved due to China's correct prediction of a quake in Yunan province on May 28. (LAT)

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May

June	
6-25-76	The University of California's Seismographic Station has placed instruments to measure earth motion five hundred feet into the Hayward fault. (HE)
6-26-76	An earthquake in Jakarta, Indonesia, initially killed 400, and an additional 4,000 were killed in subsequent landslides. (VN, HE, LAT, SMEO, SGVT)
July	
7-1-76	Radon, a gas found in well water, is being used to study the correlation between its content in the water and rock swelling, in the hope of being able to predict quakes with methods similar to those of the Chinese. (VN, HE, SMEO, LO)
7-9-76	Based on a study made by the Bureau of Reclamation, the Auburn Dam (now under initial construction) could crack in an earth- quake. (VN)
7-11-76	The SSC was informed by Caltrans and State water resources officials that steps were being taken to strengthen water, gas, and freeway facilities in response to the Palmdale bulge. (LAT)
7-11 - 76	Two quakes of 7.0 and 7.1 magnitude hit Panama within four hours. (LAT, HE, LO, SGVT)
7-14-76	Bali, Indonesia, had a 5.6 quake and estimated that 489 were dead and 2,555 injured, plus many still missing. There was reported damage to 70 percent of the homes. (LAT, HE, VN, SMEO, SGVT, Radio KNX)
7-16-76	Building and Safety Commission officials said a liquified petroleum gas (LPG) storage facility in San Pedro could be severely damaged in a major quake. (SMEO)
7-21-76	The Los Angeles Department of Water and Power (DWP) announced that the Franklin Reservoir in Los Angeles will be removed from service because it does not meet California's new seismic resistance rules. (LAT, SMEO)
7-25-76	A property boom in San Fernando Valley indicated that real estate values were not affected by Whitcomb's announcement. (LAT)
7–28–76 7–29–76	China was hit by two earthquakes of 8.2 and 7.9 magnitude in the Tientsin-Peking-Tangshan area. Damage and deaths were not known, but sources claim that damage and losses, especially in Tangshan, were very severe. (LAT, HE, VN, SGVT, LO, SMEO, Channels 5,7,11)
7–29–76	The State Public Utilities Commission requested all major public utilities to review their planning in light of the SSC's resolution on the Palmdale bulge as a possible threat to public safety and welfare. (HE, SMEO, Venice/Marina)

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July	478
7-30-76	According to Dr. Raleigh of USGS, China's prediction of a major quake before the 1980's came true sooner than expected; no short-term prediction had been made. (HE, SMEO, LO)
7-31-76	China's quake may have been caused by stresses in plate movement, according to USGS researchers. (LAT, SMEO)
August	
8-1-76 8-2-76	Animal behavior at the Peking zoo was strange, leading the Chinese to predict a new quake. (HE, LO, LAT, SGVT)
8-1-76	U.S. legislation aimed at creating a full-scale earthquake planning and prediction of hazards program was initiated because of China's recent quakes. (HE, SGVT)
8-2-76	The White House opposed new earthquake measures even though USGS said much more funding was necessary. (CSM)
8-2-76 8-3-76 8-4-76	The Chinese expected a new quake soon and urged all foreigners to leave the country. (HE, CSM, LAT, SMEO)
8-5-76	A committee of the National Science Foundation said that routine and reliable quake predictions may be possible within the next decade in some areas of the U.S. (SMEO)
8-5-76	Another quake in the Peking area was now considered unlikely, but the earthquake alert continued. (LAT)
8-6-76	Karl V. Steinbrugge of the SSC said that many buildings in quake-prone areas of California were similar in structure to those that collapsed in China's latest quake. (SMEO, LO)
8-6-76	University of California seismologists employed the technique of massaging the earth of the San Andreas fault with a giant vibrator. The purpose of the experiment was to measure how long it takes a vibration to pass through rock at certain sites in order to find a change in its velocity just prior to a tremor. (VN, SMEO)
8-7-76	Reverend and Mrs. Cerullo called for a prayer session to prepare for a Los Angeles quake. (LAT)
8-8-76	The Chinese government refused foreign aid despite apparent damage by the quake of July 28th. (LAT, U.S. News and World Report)
8-9-76	Peking received its third strong quake (5.0 magnitude) in eleven days; it was accurately predicted by authorities. Alaska was also shaken by it. (LAT, HE, Time, SGVT, VN, LO)
8-10-76	Chinese seismologists feared that a new quake would occur in coming days. (LAT, CSM)
8-11-76	U.S. seismologists were beginning to enlighten the public on how to prepare for earthquakes, especially since the Palmdale bulge discovery. (CSM)

August

8-14-76 A 5.0-7.0 magnitude quake was predicted for Canton province 8-15-76 in China between August 13 and 18. (HE, LAT) 8-15-76 The earthquake alert was lifted in China after sixteen days. (LAT, CSM) 8-16-76 A Philippine quake of 8.3 (plus a 6.3 aftershock) occurred, with nearly 3,105 dead, 2,282 missing, and 688 injured. (LAT, HE, CSM, SMEO, LO, VN, SGVT) 8-16-76 China's province of Szechwan was struck by an earthquake of 7.2, but only slight damage was reported. (LAT, CSM, LO, SGVT, Channel 2) 8-18-76 USGS scientists said that the recent Chinese quakes had been confined to one zone. (CSM) 8-20-76 Turkey's quake of 4.0 killed three and injured twenty-seven. (VN, SMEO, LAT, HE) 8-23-76 China's province of Szechwan was hit by another aftershock which registered around 7.3; only slight damage was reported. (SGVT, SMEO, LAT) 8-25-76 Caltech scientists (Whitcomb included) identified possible earthquake precursors. (CSM) 8-27-76 The Japanese government warned of a major quake due to rising land on the Izu Peninsula. (LAT) 8-28-76 The Building and Safety Committee of the Los Angeles City Council recommended that owners of approximately 14,000 pre-1934 unreinforced masonry buildings be given the option of posting warning signs instead of repairing structures to meet acceptable safety standards. The program was_sent to the City Council for possible approval. (VN, LAT, Radio KHJ) 8-28-76 Reports from the seismology labs at Caltech and the ESSA Coast and Geodetic Survey said that Australia had the fewest tremors among inhabited areas. (HE) 8 - 29 - 76Donald Anderson, a Caltech seismologist, developed a speculative model to explain the increased amount of seismicity in the earth over the past fifteen years. (LAT) 8-30-76 Scientists used a tiltmeter at the San Andreas fault to study plate movement. (HE, LAT) Additional study was being devoted to plate theory. From study 8-30-76

of the movements of the Pacific Plate, many scientists expressed the belief that a great quake would hit California by the end of the century. (HE)

September

9-1-76 A House subcommittee investigating the collapse of the Teton Dam in Idaho was told that foundation work on the Auburn Dam

September	
	was proceeding despite warnings than an earthquake could threaten the structure once it was completed. (SGVT, HE)
9-4-76	Reverend Ray Cerullo of the Life Tabernacle Church said that both the Bible and scientists have declared that a major quake will hit Los Angeles. People should respond by praying. (LAT)
9-5-76	Dr. Ralph H. Turner, UCLA Sociology professor, discussed the social, economic, and political implications of earthquake predictions. He believed that public officials would be better equipped to make constructive and meaningful decisions if they were to understand how citizens would respond to earthquake predictions. (Radio KRTH)
9-8-76	Dr. Mac Doran, USGS, and JPL scientists were using a telescope mounted on wheels to look at quasars in the sky to determine the earth's movement and its relationship to earthquakes. (CSM)
9-10-76	Italy was struck by two strong aftershocks from the May 6 quake, each registering 5.0 or more. (HE, SGVT)
9-14-76	According to USGS scientists and Dr. McIntosh from the National Oceanographic and Atmospheric Administration, sunspots or huge magnetic whirlpools may spark tremors here on earth; they may also affect the earth's rotation. During 1976, devastating quakes have taken place, but the average number of occurrences of earthquakes has been maintained. (The Star)
9-16-76	A second Italian quake (7.5 magnitude) since May in the north- east part of the country killed and injured 80. Extensive damage to property was also reported. (HE, LAT, CSM, L), VN, SGVT, SMEO, Radio KHJ, Channels 2, 5, 7)
9-21-76	Richard Simon, seismologist, is studying the Rose Canyon fault, which extends from La Jolla to Mexico, for quake signs. (HE)
9-21-76	The U.S. House of Representatives rejected the earthquake research bill that the Senate had voted to pass. The aim of this bill was to develop earthquake prediction methods and means of reducing casualties and damage from quakes. (HE, LAT, SGVT)
9-24-76	A search for active earthquake faults around the proposed Augurn Dam was to continue for six more months. (HE, LAT)
9-27-76	Italians were warned by the Earthquake Observatory that another quake might soon occur. (LAT)
9-29-76	A bill exempting state government officials from any financial liability resulting from a mistaken earthquake warning was signed by Governor Brown. (SMEO)

October

- 10-4-76 A series of shocks struck Ecuador (three of them over 4 on the Mercalli Scale) killing nine people and causing considerable damage to property. (LO)
- 10-7-76 Richard S. Simon of the Institute of Geophysics and Planetary Physics discussed the theory of "dilatancy" ant its effectiveness. So far the concept seems to work in the lab, but it isn't holding up in the field. (SMEO)
- 10-10-76 Dr. William A. Prothero, Jr. and other UCSB geologists were developing portable instruments which would be placed on the ocean floor to monitor quakes and locate faults. (HE)
- 10-14-76 The National Guard was to stage an earthquake exercise called "Operation Safeguard." A hypothetical city called Robertsville was prepared near Paso Robles, where victims from Los Angeles and San Francisco would be flown after the quake. The preparatory action was to be staged from November 5 to 7. (SGVT)
- 10-15-76 Dr. Don L. Anderson from Caltech reported that during the three weeks of recording Martian seismicity at Utopian plain, the seismometer in the Viking 2 spacecraft failed to detect anything. (LAT, SMEO)
- 10-23-76 USGS announced the establishment of a five-member earthquake prediction council to review data that could indicate a coming earthquake and to recommend issuance of any credible prediction. (Science News, SGVT)
- 10-23-76 Because of a hoax played by an individual claiming to be a Caltech scientist, Caltech issued a statement regarding a rumored prediction: "No earthquake prediction has been issued by Caltech or any other responsible institution." (HE, SGVT)
- 10-23-76 The Los Angeles City Council's Building and Safety Committee recommended an ordinance requiring all unreinforced masonry buildings in the city to be made earthquake-resistant within ten years of the ordinance's effective date. Among the 14,000 structures affected by the proposed ordinance would be 300 assembly buildings, mostly in the older sections of Los Angeles. These 300 buildings had been labeled as death traps by the above committee in the event of a severe quake. (LAT)
- 10-25-76 The Stanford Medical School was using computers to analyze the restless behavior of chimpanzees, which might help to predict quakes. (LAT, CSM, SMEO)
- 10-29-76 Indonesia was hit by a 7.1 quake which caused more than fifty casualties. (HE, LAT, VN, SMEO, SGVT)

November

11-4-76 An anonymous individual called a Saugus elementary school with an earthquake prediction, claiming to be a Caltech scientist.

November	The prediction proved to be false, but meanwhile the rumor spread, and officials at JPL and Caltech were flooded with phone calls (about 800) regarding the prediction. Some schools took the opportunity to review earthquake procedures with students. (LAT)
11-6-76	A conference on earthquake prediction and its scientific and socioeconomic implications was scheduled for December at USC. (HE)
11-8-76	Multiple quakes hit Itan (6.2), Southwest China (6.3), the Philippines (6.3), and Greece (3.4). Casualties and damage were reported from at least three of the countries. (SMEO, HE, CSM, VN, LAT, LO)
11-10-76	Robert Wiegel, professor of engineering at UC Berkeley) said that the San Andreas fault doesn't produce tsunamis because it slips sideways. (SGVT)
11-11-76	According to Dr. A. Auerbach (UC Medical School) a major quake would leave thousands of people in a state of serious mental trauma. (VN, LAT)
11-14-76	Peking experineced a quake of 6.5 magnitude. (HE, LAT, CSM, VN, SMEO, SGVT, LO)
11-21-76	The Chinese issued a warning for an earthquake of magnitude 6.0 to occur near Tangshan. (LAT, CSM, LO)
11-22-76	Henry Minturn claimed to have predicted that day's earthquake

- 1 s earthquake in Santa Monica. He also made predictions for two future quakes, one for Mexico on November 29, and another for the Solomon Islands just north of Australia on December 7. California was supposed to have a quake on December 20 only if the latter quake occurred. (Channel 4)
- 11-24-76 A quake hit Turkey and killed 4,000 or more people, devastating at least a hundred villages. Its magnitude was 7.6, and it was followed by eight aftershocks. (HE, VN, LAT, CSM, SMEO, LO, SGVT)
- 11-29-76 The Los Angeles City Council voted to put off consideration of a proposed new law that would apply current seismic safety standards to 14,000 buildings, until December 6. (LAT)
- 11-29-76 A 7.3 earthquake hit Chile and Peru, killing at least one and causing some minor damage. (HE, LAT)
- Minturn claimed to have predicted that day's earthquake in 11-29-76 Chile, but was corrected by his own record, which indicated that he had predicted the quake to occur in Mexico. (Channels 11, 4)

December

12 - 2 - 76Henry Minturn predicted two earthquakes: (1) On December 7 in the Solomons north of Australia; (2) On December 20 in southern California. (VN, HE, LAT, SGVT) 12-3-76 A study of potential earthquake hazards at the site of the New Melones Dam was scheduled. The argument against its construction was that plans should be reexamined in view of alleged seismic dangers. (LAT) 12-5-76 Gary Latham, University of Texas geophysicist, was trying to startle goldfish into leaping out of their tanks so he could devise a system to warn people of upcoming earthquakes. (SFE) 12 - 5 - 76USGS and Caltech scientists said Minturn's theory was too vague. CEPEC will review Minturn's method due to the public response to it. (HE, SGVT, LAT, CSM) 12-7-76 KCET-TV aired a special program on Minturn's prediction to determine whether his theories were scientific or speculative. (LAT, Channel 28) 12-8-76 An earthquake occurred on December 7 in the Solomon Islands, thousands of miles from the area indicated by Minturn's prediction; he still considered the prediction a success, however. (SMEO) 12 - 8 - 76A USGS geology professor questioned Minturn's credentials, his over-generalized forecasts, and his reluctance to explain his methods. (DT) 12-8-76 South Africa was struck by a 4.8 magnitude quake, which killed one person and leveled a four-story apartment building. (LAT, VN, SMEO) 12-9-76 Dr. Peter Ward spoke to the American Geophysical Union and called for a quake watch program consisting of citizen volunteers, similar to the Chinese program. He also recommended consideration of social factors in prediction. (LAT, HE, SGVT) 12 - 10 - 76Two million dollars was being spent by USGS on studies to determine whether a sizeable tremor would strike the Palmdale bulge. (VN, LO) 12-10-76 Land running counter to the Palmdale bulge in Pasadena was sinking as the bulge rose; experts believed that more measurement was needed. (SMEO, SGVT) 12-10-76 Robert Hamilton, USGS chief, stated that a major quake would occur along the San Andreas fault in southern California as a consequence of the Palmdale bulge. (HE, SMEO, LO, DF, SGVT)

- 12-10-76 Whitcomb cancelled his Los Angeles quake forecast since data from the Newhall area did not fit his theory. (HE)
- 12-11-76 The Palmdale bulge area was bigger than previously thought. This anomaly was the subject of an American Geophysical Union conference. (HE, SGVT)

12-11-76 Charles Manfred, OES Director, discounted Minturn's prediction 12-12-76 because it was too vague. (LAT, HE)

12-15-76 Professors Dennis Mileti and Eugene Haas, Colorado sociologists, said that reliable earthquake predictions could cause more damage to an affected community than the quake itself. (HE, SGVT, SMEO, LAT, Science News--1-8-77)

- 12-16-76 Robert Hamilton of USGS said California should not ignore or underestimate the earthquake threat. (VN, SGVT)
- 12-16-76 Steven Howard, a child psychologist from the San Fernando Valley Child Guidance Clinic, concluded that the thought of separation from parents frightens children more than the earthquake itself. (VN, SMEO)
- 12-17-76 President Ford's Science and Technology Plan for the next fiscal year was to double funds for earthquake research, from approximately \$25 million to \$50 million. (VN, SMEO)
- 12-19-76 Pacific Telephone in Sherman Oaks was equipped with an advanced emergency operations center, initiated because of recent earthquake predictions. (LAT, VN, HE)
- 12-22-76 Minturn's prediction of 12-20-76 failed, but he still planned to carry on using his present theories. (HE, SMEO, VN)
- 12-22-76 The federal government invested \$5,000 in a study of psychic earthquake predictions to reassure the public about "wild claims." (HE)
- 12-25-76 Minturn's prediction caused a Vietnamese family in San Francisco to sleep outdoors near Fisherman's Wharf. (HE)
- 12-26-76 New geodetic markers were installed across the Palmdale bulge in order to discover any elevation changes. (LAT)
- 12-27-76 The Chinese never released information about the July 28 quake, but foreigners in the area at that time said that Tangshan had been virtually destroyed and perhaps tens of thousands killed. (LAT)

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Lecember	

12-28-76 Marjorie Staves, psychic, predicted that a giant quake would hit California. (LAT)

12-28-76 Greece's western coast had a 5.2 earthquake which caused damage to twenty houses in the town of Preveza. (LAT, SGVT)

12-30-76 The Palmdale bulge worried experts because of its proximity to the San Andreas fault, but scientists did not know what it meant. (LAT)

1977

January

- 1-4-77 Psychic Page Bryant predicted that undersea earthquakes would trigger tidal waves that would smash into the Hawaiian Islands and cause massive damage in 1977. (NE)
- 1-4-77 Psychic Clarisa Bernhardt predicted that in 1977 a series of earthquakes would strike throughout the world, the largest one hitting China. (NE)
- 1-4-77 Dr. S. A. Fedatov of the Soviet Volcanology Institute conducted 1-5-77 extensive research on the volcanic development of rock formations. He predicted two recent earthquakes from his findings. (LAT, HE)
- 1-5-77 A "top secret" report revealed that at least 655,000 were killed, 779,000 injured, and millions left homeless in China's earthquake last July. (LAT, HE, CSM, VN, SMEO, SGVT, Channel 2)
- 1-7-77 Scientists, their information based on findings from instruments aborad two Viking landers near Mars, believed a Marsquake had occurred. (LAT, VN)
- 1-7-77 A committee of government representatives investigated the causes of the Teton Dam disaster. They concluded that the combination of a poor site and mistakes in design were to blame. (HE)
- 1-8-77 Malcolm Johnston and William Stuart, USGS scientists in Menlo Park, successfully predicted an earthquake which occurred January 6, south of Hollister, California, with a magnitude of 3.2. Their predicted quake specifications (i.e., a 3.5 magnitude, to occur sometime during January somehwere south of Hollister on the San Andreas fault) were quite close to the actual quake parameters. (LAT, SJ)
- 1-10-77 The 367th tremor since the major quake in May struck the Friuli region of Italy with a magnitude of 3.9. (LAT)
- 1-12-77 Senator Alan Crsnston proposed \$200 million for the study of earthquake prediction research and disaster preparedness. (LAT, IO)

1-13-77 Henry Minturn's prediction was reviewed by Dr. Robert Stallings, a sociologist at USC. Stallings believed that Minturn's prediction sparked a great deal of publicity because of its timing; it occurred shortly after extensive media coverage on the Palmdale bulge and James Whitcomb's theories. (HE)

1-17-77 USGS scientists--Charles Buffe, Philip Harsh, and Robert Burford--were employing an earthquake prediction model based upon the concept of uniformity. The model was only suitable for quakes of small magnitude; a more complex model was needed for larger temblors since necessary historical information on large earthquakes was very limited. (HE)

1-17-77 The federal government planned to appropriate \$54 million to USGS and NSF for earthquake prediction research. (LAT)

1-18-77 The Los Angeles City Council's ordinance requiring owners of unreinforced pre-1934 masonry buildings to post signs warning that these structures may not be safe in an earthquake received considerable protest from building owners. The ordinance was sent back to the Building and Safety Committee for a reevaluation. (LAT, HE, VN, SMEO, Channels 2, 4)

- 1-23-77 China's massive earthquake last July was said to be the second most destructive quake in history, killing approximately 655,000. The only other earthquake of greater destruction in terms of human casualties occurred in China in 1556, killing 800,000. (LAT)
- 1-23-77 Two government geologists found disturbing evidence that high dams back up enough water to trigger an earthquake that could damage or destroy the dam (SFE, HE)
- 1-25-77 The Los Angeles City Council approved a modified version of the Building Safety Ordinance for the 14,000 pre-1934 unreinforced masonry buildings in the city; they rejected the posting of signs to warn of hazardous structural conditions, exempted one- and two-story dwellings from the ordinance, and approved a study to identify these buildings. (LAT, SMEO, HE, VN)

February

January

- 2-3-77 Dr. Robert Castle, a USGS geologist, disclosed the discovery 2-7-77 of a new tilt in the surface of the earth located in the desert east of Palm Springs and possibly related to the coming quake. Castle said the phenomenon was described as a tile because it had not been determined whether the bulge was rising or sinking. He guessed it went up and was related to the Palmdale bulge. (LAT, VN, SGVT)
- 2-7-77 The federal government planned to spend \$25,000 to set up a computerized earthquake prediction center to determine the accuracy of psychics and amateurs who forecast earthquakes. (HE)

- 2-11-77 The findings of a study on the consequences of earthquake predictions by Eugene Haas and Dennis Mileti, Colorado sociologists, indicated that, due to the necessary precautions taken prior to the event, fewer casualties and less damage to existing buildings would occur if predictions were made, but negative consequences might also occur (e.g., property values might decrease, unemployment might rise greatly, and an overall economic slump might occur). (AD, PS, HE, SMEO)
- 2-15-77 Dr. Hiroo Kanamori developed mathematical techniques to recalibrate the upper end of the Richter scale in order to account for much larger seismic wave lengths. (LAT, SGVT)
- 2-17-77 Several Caltech scientists and other experts shared the general belief that earthquake-prone southern California would not experience a great earthquake, but would have ones of lesser magnitude which would still cause extensive damage. (PS)
- 2-17-77 The Palmdale bulge has diminished during the last three years according to a survey conducted by county engineers. This new information reportedly mystified USGS and Caltech scientists. (HE, SGVT, LAT)
- 2-25-77 A mysterious Milanese woman predicted that an earthquake would wipe out part of Milan on February 27. (VN)

March

- 2-3-77 A massive earthquake of 7.5 on the Richter scale hit Romania, killing more than 1,000, injuring many, and causing severe damage. (LAT, HE, CSM, LO, VN, SMEO)
- 3-9-77 Harry G. Barnes, the U.S. Ambassador to Romania, said a USGS study of past earthquakes in that country indicated another quake might follow shortly. (HE, SMEO, CSM, LAT)
- 3-9-77 New data indicated that the Palmdale bulge extended over a larger area than previously thought. Although the pattern of uplift and subsidence might be cyclical in nature, the bulge still remained a geological puzzle. (HE, VN, SMEO)
- 3-11-77 Governor Brown recommended that a study of earthquake safety be done prior to the building of the Auburn Dam. (LAT)
- 3-11-77 As a result of recent advances in the field of earthquake prediction and concern over the Palmdale bulge, Mayor Bradley appointed a 25-member Earthquake Task Force--composed of earthquake experts, insurance executives, educators, and city officials--to assist him in identifying community problems relevant to prediction. (LAT, VN, HE, SMEO)
- 3-18-77 A series of articles in the <u>Los Angeles Times</u> on dam safety produced a reaction from the White House giving this matter top priority. (LAT)

- 3-19-77 The Philippines were hit by an earthquake of 6.8 magnitude on the Richter scale; at least one person was killed and eight were injured, although damage was slight. (LO, SMEO, HE, LAT, VN)
- 3-21-77 The behavior of tiny mice and kangaroo rats was being monitored by UCLA scientists near the Palmdale bulge to determine whether animals could help predict earthquakes. (LAT, Radio KNX, Channel 4)
- 3-21-77 Nine USGS scientists discovered an active earthquake fault less than a mile from the proposed Auburn Dam site. (LAT, HE, SMEO)
- 3-22-77 Members of the Brown administration and other state officials continued their support of Auburn Dam, saying it should be built if it could be designed to withstand an earthquake. (LAT, HE)
- 3-22-77 Iran was hit by a quake registering 6.0 to 7.0 on the Richter scale. Some buildings were damaged; a few people were injured. (VN, LO, SMEO, HE, LAT)
- 3-25-77 An earthquake of 6.5 magnitude on the Richter scale struck Turkey, killing at least 30 (with the expectation of many more deaths discovered as rescue operations began) and causing severe damage to many buildings. (LAT, LO, SMEO)
- 3-29-77 The California Earthquake Prediction Evaluation Counsil planned to establish guidelines to differentiate between actual scientific predictions and pseudo-scientific ones. (HE)
- 3-31-77 Congress was urged to appropriate additional funds for the construction of Auburn Dam. This was seen as controversial since the dam site was on a possible fault line. (SMEO)

April

- 4-2-77 An earthquake of 7.0 magnitude on the Richter scale was the second major quake within ten days to strike Iran. (LAT, SMEO)
- 4-3-77 An earthquake of 7.5 magnitude on the Richter scale hit Samoa and other Pacific areas; no casualties were reported and damage was minor. (VN, HE, LAT, SMEO)
- 4-6-77 Researchers were studying the behavior of cockroaches because they appeared to be quite sensitive to earthquakes prior to their occurrence. (LAT)
- 4-6-77 President Carter placed the Auburn Dam project in limbo pending further earthquake safety studies. (LAT)

<u>April</u>	
4-6-77	Another major earthquake of 6.5 magnitude on the Richter scale struck Iran; confirmed deaths were set at 350, but officials believed that casualty figures would be much higher. (LAT, SMEO, HE, LO, VN)
4-10-77	Iranian officials warned that further tremors were likely to occur in the near future. (LAT)
4-14-77	A small earthquake of 2.9 magnitude hit the Friuli region of Italy, where a massive quake took a thousand lives in May of 1976. (LAT)
4-17-77	Reuben Greenspan, a San Fernando Valley resident, thought that most earthquakes were triggered by unusual tidal stress from the positioning of the sun and moon in relation to the earth. He promised to accurately predict an earthquake this summer which would include the location, time, and magnitude. (VN)
4-20-77	President Carter signed legislation authorizing \$20 million in relief assistance for victims of the devastating Rumanian earthquake of March 4. (LAT)
4-21-77	Three earthquakes (of magnitudes 6.5, 7.4, and 7.7) hit the Solomon Islands, damaging some buildings, injuring at least one person, and killing at least twelve. (HE, VN, LAT, SMEO)
4-21-77	Dr. James Slosson, former State Geologist and present CEPEC member, raised the question of whether government agencies were ready to handle the possible negative consequences of earthquake prediction. Clarence Allen, a Caltech geophysicist and CEPEC member, stated that there are just as many dangers in issuing predictions as there are inwithholding them. (HE)
4-21-77	Los Angeles Superior Judge Charles S. Vogel stopped the DWR from draining the Littlerock Dam, which the DWR believed was seismically unstable. Citizens had protested the loss of water in the Antelope Valley reservoir during a drought. (LAT)
4-23-77	A U.S. Department of the Interior study prompted President Carter to withhold funds for the \$1.1 billion Auburn Dam project; questions have been raised about the dam's safety. (HE)
4-25-77	The behavior of kangaroo rats and pocket mice at the edge of the Palmdale bulge was being monitored by Durward Skiles and Robert Lindberg, UCLA researchers. The purpose of the study was to see whether the animal exhibited unusual pre-earthquake behavior. (DB)
May	
5-3-77	State Senator Paul Carpenter (D-Cypress) recommended the

77 State Senator Paul Carpenter (D-Cypress) recommended the adoption of a Chinese-style network of volunteer earthquake watchers to keep tabs on animal behavior. Hecredited China's volunteers for saving lives during the 1975 earthquake. (HE, (LAT, DB, CHannel 7)

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5-3-77 USGS oceanographers warned that prior to the development of offshore oil and gas drilling sites, the earthquake risks and possibility of underwater landslides must be taken into account. (HE. LAT) 5-7-77 The Senate Commerce Committee approved a bill establishing a program designed to reduce damage from earthquakes. The measure would authorize the expenditure of \$55 million in 1978, \$70 million in 1979, and \$80 million in 1980 for a National Earthquake Hazard Reduction Program. The bill was expected to reach the Senate floor in about two weeks. (HE) 5-12-77 An earthquake shook the Turkish town of Palu, causing property damage but no casualties. (LAT, HE, SMEO, VN) 5-12-77 An earthquake of approximately 6.0 magnitude struck Peking; no reports of casualties or damage were released. The present quake was described as an aftershock of the big quake of July 28. (HE, CSM, LAT, SMEO) 5-13-77 The \$205 million Cranston-sponsored bill for research to predict earthquakes and reduce their hazards was unanimously A. . . passed by the U.S. Senate. (LAT) 5-18-77 Los Angeles' program to identify and correct earthquake hazards in some 14,000 older buildings suffered a critical blow at City Hall, when the City Council voted to cut off the money for inspecting the pre-1934 unreinforced masonry structures. The vote was subject to reconsideration. (VN) 5-19-77 The City Council voted to restore to Mayor Bradley's 1977-1978 budget the \$200,376 for earthquake building safety inspection that was earlier deleted by the Finance Committee. (LAT, VN) 5-27-77 The State Department of Health planned to investigate the structural safety of 619 hospitals and residential care facilities within the geographic limits of the Palmdale bulge. (LAT, VN) 5-31-77 A team of Columbia University scientists reported detecting more than 200 minor earthquakes in New York and New Jersey. A major earthquake in New York could be twenty times more damaging than a similar one in California due to the age of the east coast's rock formations. (LAT) June 6-2-77 A study using metal rods to monitor the seismic activity along the San Andreas fault near Lake Hughes was being conducted by Dr. David Jackson, a geophysicist at UCLA. (DB, VN, SMEO, Venice/ Marina) • . . .

May

June

6-9-77

- 6-4-77 An earthquake of an unreported magnitude struck the Soviet village of Kirhistan and other central Russian villages. <u>Pravda</u> reported that various villages were damaged by the floodings that occurred as a consequence of the quake. (LO, LAT)
- 6-5-77 California state officials concerned about earthquake safety questioned the design of Auburn Dam. If its elliptical shape impounded, causing the dam to fail, a 2.3 million acre-foot reservoir could flood the state capital within one hour, imperiling the lives of 750,000 persons. (LAT)
 - Dr. Richard Jahns of the SSC said that the interval between major (8+) quakes could be about 250-300 years on a given fault. However, he did not rule out any number of smaller quakes occurring in that interval, especially on the more complex southern section of the San Andreas fault. (VN, Channel 7)
- 6-16-77 According to a lawsuit filed in a federal court in San Francisco, PG & E gave inadequate and misleading information to stockholders and consumers concerning its Diablo Canyon nuclear plant. The suit was filed on behalf of PG & E stockholders by public advocate attorneys Vicki Burr Lawler and Martin J. Lawler. (LAT)
- 6-29-77 The House Interior Committee's subcommittee on Energy and Environment called upon officials of the NRC to testify on the earthquake safety of two nuclear power stations nearing completion in California's Diablo Canyon. (LAT, HE)
 - 6-29-77 According to the consulting firm of Woodward-Clyde Associates, the potential existed for an earthquake 32 times stronger than previously thought possible to occur near the proposed Auburn Dam site. (LAT)

July

- 7-1-77 Attorney Brent Rushworth testified before a House Environmental Subcommittee on behalf of the LA Center for Law in the Public Interest, stating that Pacific Gas and Electric should not be granted a license to operate the Diablo Canyon facility due to earthquake danger (LAT).
- 7-2-77 A Department of Water Resources study team looking into the seismicity at the Auburn dam site questioned the dam's safety in an earthquake (LAT).
- 7-7-77 Dr. David Jackson and his colleagues are conducting research along the San Andreas fault to determine whether a connection exists between earthquakes and resistance to electrical current between two underground points. The researchers are also observing magnetic variation in underground rocks (HE).
- 7-7-77 Geophysicist Durward Skiles and biologist Robert Lindberg of UCLA are conducting research to determine whether animal behavior can be utilized in the scientific prediction of earthquakes (HE).

Worldwide earthquake-related deaths in the first half of 1977 were less than one tenth the number occurring during a similar period of 1976. The number of significant earthquakes was less than half the number recorded in 1976, the USGS reported (HE).

7-19-77 US Geological Survey researchers announced the discovery that the Ventura fault had been active within the recent geological past. The fault was capable of delivering a 7 Richter magnitude quake, but there was no evidence that a major shock was imminent (SGVT, VN, HE).

August

- 8-1-77 Controversy surrounds the licensing of the Diablo Canyon Nuclear Power Plant which sits inoperative three miles from the Hosgri fault. A California anti-nuclear power group called the Abalone Alliance is planning a demonstration for 8-6-77 at the plant (HE).
- 8-2-77 Thirteen buildings in Oroville, California, remained in need of repair, two years after an earthquake that damaged 64 buildings (LAT, SGVT).
- 8-10-77 An emergency preparedness drill was conducted in Westchester to test response time and efficiency of various city departments in the event of an earthquake (LO).
- 8-16-77 A small quake registering 4.4 on the Richter scale struck the Sylmar area. Caltech seismologists describe the quake as an aftershock of the '71 quake (SMEO, SGVT, VN, HE).
- 8-19-77 An earthquake registering up to 8.9 on the Richter scale was reported in the Indian Ocean between Australia and Indonesia. There were no immediate reports of damage or injury and no indications that the quake had raised a tidal wave (HE).
- 8-22-77 Delayed reports indicate that the death toll from the Indian Ocean earthquake and subsequent tidal waves of 8-19-77 now stands at 72. The deaths occurred on the Lesser Sunda islands of Indonesia.
- 8-23-77 The toll from the 8-19-77 Indian Ocean quake has risen to 144 dead or missing and 64 serious injuries (HE).
- 8-25-77 Energy Secretary James Schlesinger is considering a legislative proposal to speed up the licensing and construction of nuclear power plants by allowing advance approval of potential locations. Schlesinger's plan is a departure from the present case-by-case licensing of individual sites (HE).
- 8-26-77 A major earthquake measuring 6.4 on the Richter scale struck eastern Indonesia about 200 miles southeast of Jakarta. There were no immediate reports of damage or casualties (HE).

- 8-26-77 Acquisition of the Morris Dam by the County Flood District was delayed until an independent engineering firm could determine the facility's seismic safety (SGVT, HE).
- 8-28-77 Rumors that Caracas, Venezuela, would be destroyed by a tidal wave prompted many residents to flee the area (LAT).
- 8-31-77 A quake measuring 6.6 on the Richter scale, centered 380 miles northwest of Bogota, Colombia, killed three and injured twenty persons (LAT, LO, SMEO, HE).
- 8-31-77 LA County Supervisors hired an engineering firm to assess the ability of the 47-year-old Morris Dam to withstand an earthquake or other catastrophe before taking control of it from the Metropolitan Water District (HE).

September

- 9-4-77 The Division of Dam Safety and the Citizen's Committee to Save Littlerock Dam were engaged in separate studies to determine the safety of the dam in withstanding an earthquake (LAT).
- 9-5-77 A swarm of more than thirty earthquakes shook the Aleutian Islands. There were no reports of damage or injury (LAT, HE, SGVT, LO).
- 9-6-77 An 8.9 magnitude earthquake occurred 931 miles southeast of Jakarta, Indonesia. The quake triggered landslides and tidal waves, and destroyed many villages. The death toll was reported to be 185 (LAT).
- 9-9-77 Dr. Karen McNally of Caltech recorded some 400 micro-tremors since November, 1976, registering between zero and three on the Richter scale. This aroused some concern about the relationship between these quake swarms and the Palmdale bulge (LAT, SGVT, SMEO, LO).
- 9-10-77 The Earthquake Hazard Mitigation Act was passed by the House of Representatives (LAT, SMEO).
- 9-11-77 Burbank City Council launched a survey to identify an estimated 110 buildings which fail to meet 1933 earthquake standards. The Council was considering directing building owners to post signs (LAT).
- 9-11-77 An extensive network of earthquake faults was found to run through Rinaldi Elementary School, sparking off a controversy as whether to relocate the school or to distribute the students to other schools (LAT, VN).
- 9-12-77 A powerful earthquake occurred west of the island of Crete but was far enough out at sea that land masses were not affected (HE).

- 9-14-77 Steps were taken to insure that the new Olive View Medical Center would withstand even the largest of earthquakes which could be generated by the San Andreas fault (VN, LAT).
- 9-20-77 Geologist Kerry Sieh of Caltech, by digging into an 1800-year-old marsh and gully in the Wallace Creek and Pallett Creek areas of the San Andreas faultline, traced past cycles of disturbance. He identified nine "gigantic" quakes dating from 575 A.D. and an average timespan of 160 years between quakes in the Palmdale-San Bernardino segment of the fault (HE).
- 9-21-77 Federal officials said Tuesday that the Auburn Dam site "in all probability" is free of active earthquake faults (HE).
- 9-22-77 Members of the California Coastal Commission questioned the safety of Standard Oil of Ohio's proposal to build storage tanks at the port of Long Beach because of the seismicity of the area. The final decision by the Commission was postponed while further studies were conducted (LAT).
- 9-25-77 Faults were discovered near the University of California's Lawrence Livermore Laboratory and the adjacent Sandia Corporation Plant (LAT, SMEO).
- 9-28-77 Mechanisms designed to protect the Rancho Seco Nuclear Plant and coolant supplies from earthquake shock were found to be deficient (LAT, SMEO).
- 9-29-77 Results of the seismic and structural safety studies conducted to determine whether the Morris Dam was endangered by earthquakes concluded that the dam was not in danger. These findings were disputed by Dr. George Housner of Caltech. Supervisor Hahn asked for a revised report (SGVT, VN).

October

- 10-6-77 The City of Santa Monica began its survey of pre-1934 buildings (SMEO).
- 10-10-77 A major earthquake measuring 8.0 on the Richter scale struck in the vicinity of the Tonga Islands in the Pacific (HE).
- 10-11-77 Robert Olson, executive director of the State Seismic Safety Commission, reported that 100,000 to 200,000 commercial and apartment buildings in California could be knocked down by a major quake (HE).
- 10-12-77 The County Board of Supervisors voted to accept ownership of the Morris Dam, contingent upon an evaluation of its safety by an outside structural consultant (SGVT, LAT).
- 10-15-77 A US Geological Survey study reveals subsurface conditions in the Los Angeles area are suitable for tunneling at normal subway depths (LAT).

- 10-20-77 Microtremors were recorded near Brawley in two separate episodes. Seven quakes, ranging up to 4.2 on the Richter scale, were reported on October 20 (LAT, HE, SGVT).
- 10-22-77 The Nuclear Regulatory Commission announced discovery of a fault 200 feet from General Electric's Vallecitos nuclear reactor at Pleasanton (HE, SMEO).
- 10-26-77 The nuclear reactor at Pleasanton was ordered shut down until a complete evaluation of all information could be conducted (HE, SMEO, VN, LO).
- 10-28-77 A report by Daniel Shapiro, of the American Society of Civil Engineers, contends that modern high rise buildings and single family homes would weather a major earthquake with little or no damage (SGVT).
- 10-28-77 General Electric sent a delegation of nuclear experts to Washington to convince the Nuclear Regulatory Commission to allow resumption of operations (HE).

November

- 11-4-77 An earthquake registering 6.5 on the Richter scale was centered 100 miles southeast of Adak in the Aleutian Islands. No damage was reported (HE).
- 11-8-77 The collapse of the Toccoa Falls Dam in Georgia prompted Congressman Ryan of California to urge the implementation of a National Dam Safety program (LAT).
- 11-13-77 Extensive repairs were necessary to maintain the integrity of the Pacoima Dam in the aftermath of the '71 San Fernando quake (VN).
- 11-14-77 Forty-eight microtremors were recorded in a 12 hour period near Brawley (HE, LO).
- 11-25-77 A quake measuring 7.5 on the Richter scale struck early Wednesday (11-23), killing 80 and injuring 354 in the area around San Juan, Argentina. One hundred thousand persons were left homeless (LAT, HE, SMEO, SGVT, VN, LO).
- 11-29-77 A half dozen aftershocks occurred Monday in western Argentina, including one which measured 5 on the Richter scale (HE).

December

- 12-6-77 A "very strong" quake struck the area of Tashkent in Soviet Central Asia. Tass reported no damage or casualties (HE).
- 12-8-77 The California Emergency Council put together a statewide earthquake response plan which will be sent to Governor Brown for approval (LAT).

- 12-8-77 The Bureau of Reclamation announced that the much delayed seismic safety study of the Auburn Dam site would be released in early 1978 (VN).
- 12-9-77 Papers presented at the American Geophysical Union meeting Thursday included evidence that large earthquakes have often been preceded by clusters of tiny tremors (LAT, HE, LO, SGVT).
- 12-11-77 Peter Ward of USGS disclosed tentative plans to form a volunteer corps of earthquake spies to watch for signs of impending tremors (HE).
- 12-11-77 Bill Stall speculated that there would be no more nuclear plants built in California. Earthquake hazard in much of the State was cited as one of the reasons Governor Brown opposed such operations (LAT).
- 12-13-77 The Army Corps of Engineers began inspecting 9000 privately owned dams in high risk locations after a five year delay in obtaining funds for the project (LAT, VN, SGVT).
- 12-13-77 California Seismic Safety Commission member, W. H. Perry, criticized state disaster preparedness by public agencies (VN).
- 12-17-77 Bureau of Reclamation geologist Robert Trefzger said computer tests revealed that the proposed Auburn dam could withstand a 6.5 earthquake at a distance of one half mile (LAT).
- 12-17-77 The US Geological Survey announced that spending on research to alleviate the effects of earthquakes would be increased from \$18 million to \$30 million during 1978 (LAT).
- 12-20-77 A 5.5 magnitude earthquake struck southwestern Iran killing 584, injuring 1000, and leaving thousands homeless. It was the third major quake to hit Iran in 1977 (LAT, HE, SMEO, LO, SGVT, VN).
- 12-27-77 Thirty-six teams of scientists, engineers, and technicians were to study the contours and extent of the southern California Uplift. Funds amounting to \$1.4 million are to be administered by the US Geological Survey (SMEO, HE, SGVT, VN, LAT).
- 12-28-77 Southern Iran was again hit by an earthquake measuring 6.6 on the Richter scale (over 500 died in one which occurred 12-20). Damage and casualties were not reported (HE).

1978

January

- 1-4-78 Structural engineer Ken Golick began inspection of 130 buildings in Santa Monica thought to be built prior to 1933 (SMEO).
- 1-8-78 An editorial urged that top priority be given to statewide evacuation plans and other emergency life preserving programs in light of killer quakes in Japan and Romania (VN).

- 1-12-78 The Woodward-Clyde report, studying the safety of the Auburn Dam, revealed that the proposed concrete structure would be unacceptably risky in an earthquake. Engineers on the study, Mr. Holland and Mr. Kendall, recommended a flexible earth and rock fill dam be constructed (LAT, HE).
- 1-13-78 A 7 Richter magnitude quake struck a heavily populated area of Japan. A tsunami warning was issued and lifted two hours later without incident (LAT, LO).
- 1-13-78 A two-day Emergency Preparedness Seminar was held for industries, businesses and public agencies at the San Bernardino Convention Center. Government agencies sponsored the event (SGVT).
- 1-16-78 Earthquakes claimed 13 lives, injured 14, and damaged or destroyed 971 houses on Japan's eastern seaboard. Eleven people were reported missing (HE).
- 1-18-78 The Coastal Commission studied 83 possible sites for an LNG terminal. The field has been narrowed to seven sites: Rattlesnake Canyon, Point Conception, Deer Canyon, Camp Pendleton, Tajiques Canyon, Los Flores-Corral Canyon, and Las Varas (HE).
- 1-18-78 A bill sponsored by State Senator Alquist would provide \$350,000 to the Seismic Safety Commission to study the effectiveness of earthquake prediction in California (LO).
- 1-24-78 The USGS will recieve a \$10 million increase in funds from the Carter Administration to carry on prediction research and hazard assessment (LAT).
- 1-25-78 USGS reported that 2,800 people died in earthquakes in 1977 as compared to 700,000 in 1976 (HE).
- 1-26-78 The General Accounting Office released a report which concluded that a serious storm, earthquake, or terrorist attack could cause a major rupture in facilities used to store liquified gas throughout the US and result in tens of thousands of deaths. The report charged that the federal government had failed to act prudently to protect the public safety (HE).
- 1-28-78 The Los Angeles County Board of Supervisors ordered the Department of the Sheriff, Communications, Health Services, Forestry, and the Fire Warden to review their disaster and emergency procedure plans (VN).
- 1-29-78 UCLA engineering Professor Martin Duke drafted a report at the request of Federal Seismic Safety officials that recommended three stages for protecting life lines from the effects of a major earthquake (LAT).

February

- 2 2 78A study group was formed to investigate the possibility of building either an earth fill or gravity arch design dam at the Auburn site (LAT).
- 2-4-78 USGS held a workshop on aspects of a volunteer quake watch program to monitor earthquake precursors (LAT).
- 2 7 78An emergency preparedness drill, staged by the city of West Covina, revealed deficiencies in the City's disaster plan (SGVT).
- 2 8 78The California Earthquake Prediction Council was generally favorable to the idea of a volunteer earthquake watch program (LAT, SMEO).
- 2 8 78Better building standards, reinforcement of freeways, regular dam inspection, and improved coordination of emergency services are improvements made since the 1971 San Fernando quake, according to Robert B. Rigney of the Seismic Safety Commission. The report was presented at the 4th Annual Emergency Preparedness Seminar (HE).
- 2-9-78 The LA Board of Education's Building Committee will review geological findings on the relocation site for Rinaldi School (LAT).
- 2 16 78Negotiations to buy land for relocation of Rinaldi School were unanimously approved by the Board of Education (VN).
- 2 21 78A 7.5 magnitude quake was predicted for Iwate Province, Japan (VN).
- 2 26 78Arch C. Johnson, a University of Colorado graduate student, studied seismic waves from earthquakes in Hawaii and noted changes in seismic wave patterns prior to the November 20, 1975 quake (LAT, SGVT, LO).

March

- 3 8 78The Red Cross distributed 315,000 brochures on earthquake preparedness to Bay area residents (VN, LO).
- 3-12-78 Design changes at the Diablo Canyon nuclear power plant were scheduled to be completed in August, 1978, at the cost of \$23 million (LAT, SGVT).
- 3-12-78 Dr. Robert Buford, geophysicist with USGS, discussed the urgent need for the study of the Uplift (HE).
- 3 16 78School officials in the Santa Clarita Valley were alerted to the possibility that cracking and structural damage might result from the slowly rising Uplift (LAT).
- 3 18 78A 6.5 Richter magnitude earthquake struck near Acapulco, Mexico. The quake was felt as far away as Mexico City (LO, LAT, SGVT, HE, VN).

- 3-21-78 The LA Board of Education voted to demolish the Childs Mansion despite angry protests by homeowners who wanted to preserve the building as a historical landmark.
- 3-21-78 The presence of earthquake faults was one reason a project to construct a nuclear desalting plant on a manmade island off the coast of Orange County was scrapped (LAT).
- 3-22-78 A strong earthquake measuring 6.5 on the Richter scale occurred yesterday off the Kuril Islands in the Pacific Ocean. No damage was reported (HE).
- 3-23-78 A tidal wave warning was issued for parts of the Pacific coast of Japan after the occurrence March 22nd and 23rd of two underwater earthquakes measuring 6.8 and 7.0 on the Richter scale (HE).
- 3-25-78 Six strong quakes were reported in the Kuril Island area of the northern Pacific in the last four days. The lastest quake, which occurred yesterday, measured 7.3 on the Richter scale and was followed two hours later by a strong quake in the Kazakh region of the Soviet Union. There were no immediate reports of damage or injuries (HE).

April

- 4-6-78 Seismologists at the University of Texas predicted a magnitude 8 earthquake for Oaxaca, Mexico. This prediciton was based upon a decrease in siesmic activity over a five year period (LO).
- 4-10-78 An Environmental Impact Report on proposed construction of a \$500 million Palmdale International Airport warned of possible seismic activity from the San Andreas Fault, just two miles from the project (LAT).
- 4-16-78 Two Columbia University seismologists reported that the Indian Point nuclear power plant in New York sits just 3,000 feet from an active earthquake fault. The researchers estimated that the probability of an earthquake occurring which exceeded designed safety limits was between 5 and 11 percent. Consolidated Edison, which owns the plant, disputed the report (HE).
- 4-17-78 Three strong tremors struck southern Italy, causing five deaths, scores of injuries, and damaging over 500 houses (HE).
- 4-23-78 Andrei Nikonov, a scientist with the Schmidt Institute of Earth Physics in the Soviet Union, released a prediction for a 7.5 magnitude earthquake to occur in the vicinity of the Palmdale Bulge before the end of the year. His forecast was based upon the correlation between the span of time it took for crustal deformations to develop and the magnitude of 25 earthquakes where these deformations occurred. Local seismologists expressed anger and skepticism over the prediction (LAT, SGVT).

4-27-78	A gold mine shaft east of Johannesburg, South Africa, collapsed as a result of an earthquake, killing four and injuring 29 (HE).
4-29-78	A possibly active earthquake fault was discovered by geologists at the proposed site of the LNG terminal at Point Conception. The geologist suggested that the site be given lesser priority (LAT, HE).
4-30-78	A state engineer confirmed the discovery of a possibly active earthquake fault on the site of a proposed liquified natural gas terminal at Point Conception (HE).
May	
5-3-78	Powerful temors in eastern Turkey 300 miles east of Ankara badly damaged 300 buildings near Pulumur (HE).
5-5-78	Dr. Asquith, a geologist of Envicom Corporation, called for a full- scale seismic study at the LNG site at Point Conception (SGVT).
5-9-78	Camp Pendleton was named as an alternative site for the Point Conception LNG terminal (SMEO, SGVT, VN).
5-14-78	Trenching studies for evidence of earthquake faulting at Point Conception evoked protests by local Indians opposed to the location due to the "sacredness" of the area (LAT).
5-23-78	Authorities warned residents in southern and western Japan of a possible tidal wave in the wake of an undersea earthquake in the East China Sea which measured 7.3 on the Richter scale (HE).
5-25-78	The Coastal Commission voted unanimously to recommend Camp Pendle- ton as the site for the liquified natural gas terminal (SMEO, VN).
5-25-78	A <u>Valley News</u> editorial criticized the lack of earthquake evacua- tion plans for areas below dams (VN).
5-26-78	Governor Brown signed legislation which appropriates \$12,000 to the State Seismic Safety Commission to study the feasibility of a comprehensive prediction and hazard mitigation program (VN).
June	
6-1-78	Japanese researchers have developed a cable with four quake recorders which will be installed on the sea floor off Cape Omaezaki. The cable system is designed to detect signs of an impending quake (HE).
6-4-78	In accordance with the Earthquake Hazards Reduction Act passed by Congress last October, plans have been prepared for new federal agencies, the widespread reinforcement of structures, and extensive research on earthquake prediction, control, and hazard reduction (HE).

- 6-12-78 A 7.5 magnitude earthquake hit central and northern Japan killing twenty-one and injuring 340. It was the strongest quake recorded in 1978 (SGVT, HE, LAT, VN, SMEO, LO).
- 6-18-78 A quake measuring 7.3 on the Richter scale occurred in the southwestern Pacific near the Tonga Islands yesterday. No damage was reported and no tidal wave warnings were issued (HE).
- 6-19-78 University of California seismologists challenged the results of satellite studies of the San Andreas fault which indicated that the next temblor would be strong and come sooner than expected. The conclusion was based upon a finding that the fault was shifting faster than previously expected, and challenged because satellite measurements did not account for differences in the rate of movement between northern and southern California (HE).
- 6-21-78 An earthquake registering 6.5 on the Richter scale struck the heavily populated area of Salonika, Greece, killing 40 and injuring 150 people (LAT, HE, LO, SGVT, VN, SMEO).
- 6-22-78 A conference on Earthquake Prediction and Control was held at Caltech. Scientists were somewhat pessimistic about their ability to predict quakes in the near future. More money is needed to detect pre-earthquake ground movements (HE).
- July
- 7-5-78 A strong aftershock struck the Salonika area of Greece, injuring 16 persons (HE).
- 7-10-78 A group of Chumash Indians occupied part of the site at Point Conception to protest additional trenching in the area (LAT).
- 7-10-78 The National Science Foundation reported that an experimental sensing device will be placed 1,500 feet beneath the sea floor off Baja, Mexico, in an attempt to improve earthquake monitoring and to study the earth's crust (HE).
- 7-16-78 The State Public Utilities Commission reported that a liquified petroleum gas stroage facility in San Pedro could be severely damaged in the event of a major quake. The Petrolane Oil Company would restudy construction plans (SMEO).
- 7-20-78 The Advisory Committee on Reactor Safeguards concluded that the Diablo Canyon nuclear power plant was safe enough to operate. The Committee recommended a reevaluation of the projects' design in ten years, which would take into account applicable new information about earthquakes and their effects (SGVT).
- 7-21-78 A community action group, Freeway Action for Children's Environment and Safety (FACES), made a formal request for a grand jury investigation into the matter of the long delayed relocation of Rinaldi School (VN).

- 7-21-78 Dr. Thomas Henyey, a USC geologist, hoped to utilize deep oil well instrumentation to gain greater insight into the meaning of the Palmdale bulge (VN).
- 7-24-78 Visiting Chinese seismologists reported to their Japanese hosts that they predicted and issued warnings of the great July, 1976, quake that killed hundreds of thousands of people in northeastern China. A sudden increase in unusual earth activity elsewhere in China prevented experts from pinpointing the precise location of the most devastating tremor (HE).
- 7-27-78 US Geological Survey scientists, Roger N. Hunter and John S. Derr, arranged over an 18 month period the predictions of nonscientists against a computer programmed to produce purely random guesses about the time, date, location, and magnitude of earthquakes around the world. The computer was more accurate in predicting the quakes than nonscientists. The study was initiated after the furor over Minturn's prediction in 1976 (LAT).
- 7-28-78 School Board members Phillip Bardos and Bobbi Fiedler called for an in-depth study of the health effects of air pollution on school children. The controversy surrounding the relocation of Rinaldi School prompted the study (VN).
- 7-29-78 The federal government released six new studies of the earthquake hazard at the Auburn Dam site yesterday. The studies tended to support the feasibility of a dam at the site (HE).
- 7-31-78 An earthquake registering 5 on the Richter scale struck the city of Parzu, Guatemala, killing three persons (HE).
- August
- 8-3-78 The Public Utilities Commission voted unanimously in favor of locating the LNG facility at Point Conception. Issuance of the construction permit was contingent upon further seismic studies, wind, and wave tests (LAT, LO, VN).
- 8-4-78 A strong earthquake struck Copiapo, Chile, yesterday, killing one, injuring seven and causing considerable damage (HE).
- 8-14-78 At 3:45 PM, August 13th, a quake measuring 5.1 on the Richter scale occurred off the coast of Santa Barbara, causing injury and structural damage in the area. An estimated \$9 million in damage was reported at the University of California, Santa Barbara (SGVT, SMEO, LAT, LO, HE).
- 8-15-78 Santa Barbara County Board of Supervisors and Governor Brown declared Santa Barbara in a state of emergency (LAT, HE, SMEO, SGVT).
- 8-16-78 Damage estimates from the Santa Barbara quake rose to \$12 million with heaviest losses reported by the University of California (HE).
- 8-17-78 The Coastal Commission admonished the Public Utilities Commission for their choice of Point Conception as a future LNG facility, citing the Santa Barbara quake as a warning of what might occur (SGVT, VN, HE, LAT).

- 8-18-78 The US Geological Survey created a special panel of scientists to look into the possibility that the Santa Barbara quake had precursory events. Three events were to be studied: a small temblor prior to the quake, a natural gas bubble, and an earthquake swarm (SGVT).
- 8-19-78 An earthquake measuring 5.5 on the Richter scale occurred 60 miles southwest of Guatamala City causing a tidal wave in Acajutta, El Salvador, killing ten people (HE, SMEO, LO, LAT, VN).
- 8-23-78 Two strong earthquakes struck Costa Rica yesterday measuring 6.0 and 6.5 on the Richter scale. There were no reports of casualties or damage (HE).
- 8-23-78 Western LNG Associates were to resume seismic studies at Point Conception but were later halted by local Indians and their supporters (LAT, SGVT).
- 8-29-78 A quake measuring 2.2 on the Richter scale occurred near Seabrook, New Hampshire, site of the controversial nuclear power plant (VN, HE).

September

- 9-1-78 It was announced that uninsured homeowners in Santa Barbara, Kern, San Luis Obispo and Ventura Counties would be eligible to seek low cost federal loans through the Small Business Administration (SGVT).
- 9-2-78 A series of quakes near Tokyo led experts there to warn that a major quake could hit at any time (LAT).
- 9-4-78 A quake measuring between 5 and 7.5 occurred in southwest Germany. It caused extensive damage but no casualties were reported (LAT, SGVT, LO).
- 9-5-78 A quake registering 6.6 on the Richter scale occurred near Taipei, Taiwan (LAT).
- 9-6-78 Twelve earthquakes have hit Taiwan since last Friday, the largest measuring 6.6 on the Richter scale. Taiwan's weather bureau had warned residents that a severe quake could occur. There were no reports of casualties or damage (HE).
- 9-9-78 Dr. Arnfrid Wuenschmann, Director of Munich's Hellabrunn Zoo, recounted strange animal behavior observed before the September 3 quake (VN).
- 9-16-78 Hearings on the Auburn Dam site were to begin in October (LAT).

9-16-78 A 7.7 magnitude quake occurred near Tabas, Iran, killing over 15,000 residents and destroying over forty villages (LAT, LO, HE, SMEO, SGVT, VN).

- 9-18-78 The USGS panel ruled out the natural gas bubble as a precursor to the Santa Barbara quake (LAT).
- 9-24-78 The death toll from the Iran quake has climbed to 25,000 (HE).
- 9-24-78 In a book entitled <u>We Are the Earthquake Generation</u>, Jeffrey Goodman says much of California will be destroyed by earthquakes by the year 2000 (HE).
- 9-25-78 A group of 20 engineers, architects, and builders in the field of earthquake safety left for China yesterday as guests of the Architect's Society of China. In exchange for prediction information the American experts will instruct the Chinese on various methods of land use planning in active fault areas (HE).
- 9-28-78 The LA School Board voted not to relocate Rinaldi School due to its inability to find an acceptable location (LAT).

October

- 10-12-78 A survey under the direction of UCLA sociologist Ralph Turner revealed that the majority of Los Angeles County residents favor the posting of signs on unsafe buildings (VN).
- 10-15-78 A Congressional appropriations committee, alleging management deficiencies, cut funds for the National Science Foundation's social policy research on predictions, by 80 percent, from \$4.8 million to \$800,000 (LAT).
- 10-16-78 Touson Toppozada of the California Divison of Mines and Geology stated that California is experiencing an unusual lull in earthquake activity. Measurements indicate that the rate of strain building along major faults has not decreased (HE).
- 10-25-78 A study conducted by the Association of Bay Area Governments indicated that local governments could be taken to task for damage and injuries caused by earthquakes. Some cities have ignored plans to upgrade the quality of city structures (HE).
- 10-28-78 The report of the Mayor's Task Force on Earthquake Prediction urged the city to take steps to cope with anticipated economic and social problems resulting from earthquake predictions (LAT, SMEO, VN).

November

- 11-2-78 The Federal Energy Regulatory Commission rejected Point Conception as the site for the LNG terminal in favor of Oxnard (SGVT, LAT, HE).
- 11-28-78 The State Land Commission approved a 30 year lease for the proposed LNG facility at Point Conception (HE).
- 11-30-78 A series of earthquakes occurred near Mexico City, the largest measuring 7.9 on the Richter scale. Three University of Texas

(cont'd) scientists were credited with predicting the quake (LAT, VN, SGVT, LO).

December

- 12-5-78 The Nuclear Regulatory Commission's Safety and Licensing Board began hearings to decide if the Diablo Canyon plant was safe to operate (LAT, SGVT).
- 12-7-78 George Alexander reported results of the survey of Community Response to the Earthquake Threat in Southern California, indicating that people want more information on earthquake hazards (LAT).
- 12-7-78 Completion of the USGS study of the bulge was delayed due to the mass of data and measurement discrepancies (LAT).
- 12-14-78 Given the recent seismic activity in the Pacific, seismologists cautioned that new quakes could occur near Mexico City (LO).
- 12-17-78 A quake registering 5.5 on the Richter scale struck southwestern Iran, killing over 42 people (LAT, LO).
- 12-21-78 The US Geological Survey and Marine-World Africa, USA, were engaged in a joint project to systematically observe animal behavior (LO, HE).
- 12-24-78 A report presented to the American Geophysical Union theorized that the Palmdale bulge may be one manifestation of a "slow" earthquake (LAT).
- 12-24-78 The US Atomic Safety and Licensing Board authorized the Trojan nuclear plant to resume operation during modification to make the facility more earthquake resistant (SGVT).
- 12-29-78 Geological studies at the site of General Electric's Vallecitos Nuclear Center revealed that an active earthquake fault was just 200 feet from the reactor, not 2000 feet as originally reported (LAT).



INDEX OF NEWSPAPER TITLES

AD	Anchorage Daily News
CSM	Christian Science Monitor
DB	Daily Bruin
DF	Daily Facts
DT	Daily Trojan
FP	Los Angeles Free Press
HE	Herald Examiner
LAT	Los Angeles Times
LO	La Opinion (Spanish)
NE	National Enquirer
PS	Pasadena Star News
SFE	San Francisco Examiner
SGVT	San Gabriel Valley Tribune
SJ	San Jose Mercury

SMEO Santa Monica Evening OUtlook

VN Valley News

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COMMUNITY RESPONSE TO EARTHQUAKE THREAT IN SOUTHERN CALIFORNIA

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PART THREE

THE ORGANIZATIONAL RESPONSE

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Final technical report on National Science Foundation grants NSF ENV76-24154 and NSF-PFR78-23887, from 1976 to 1980, including preliminary work under US Geological Survey Grant 14-08-0001-G-347 in 1976. Any opinions, findings, conclusions, or recommendations are those of the authors and do not necessarily reflect the views of the Foundation or the Survey.

> Ralph H. Turner--Principal Investigator Joanne M. Nigg, Denise Heller Paz, and Barbara Shaw Young--Co-Investigators

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Part Three was written primarily by Barbara Young. The chapter on educational institutions was written by Christine Turner. Information for the organizational analysis was gathered by all of the investigators with contributions by Sharon Stevens. Except for reports on early activities, the research on educational institutions was the work of Christine Turner.

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PART THREE .

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CHAPTER ONE

1

EARTHQUAKE RESPONSIVE ORGANIZATIONS AND AGENCIES

Central to explaining how a community responds to earthquake threat is an investigation of the organizational earthquake response in the community. Traditionally, government organizations and agencies have been responsible for the safety and welfare of the community in times of disaster. In the past, earthquake preparedness measures, however, have been principally directed toward post-disaster needs of the community rather than toward earthquake hazard reduction planning. The purpose of focusing on organizational response is to discover whether the near predictions and cautions concerning earthquakes have had any significant effect in increasing traditional emergency response planning and redirecting agencies' planning efforts toward hazard reduction. In other words, we want to know whether the developing ability to predict earthquakes and the major prediction events which have already occurred have had a significant effect on safety, welfare, and emergency planning in Los Angeles County. Part Three of this report is directed toward this effort.

Investigating organizational earthquake response is important for several reasons. First, although governmental responsibility regarding disasters has been directed toward handling disaster-related problems after the disaster has occurred, this has not been carried out with reference to any specific anticipated earthquake. However, with the current knowledge of the southern California Uplift and the warnings that it could be a precursor to a major quake comes the realization of the extent of damage that needs to be planned for and the realization that a major quake could occur

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at any time. Thus, agencies have an opportunity to ask themselves if they really are prepared to handle the potential problems of a major metropolitan community hit by such a quake.

Second, with the possibility of earthquake prediction and with the current near predictions, organizations are faced with what to do between the time of the announcement and the actual quake. This situation places an increasing emphasis on the need for hazard mitigation programs and programs designed to educate the public regarding what to do before, during, and after a quake. Agencies sensitive to the current situation have the opportunity to reevaluate their earthquake disaster programs in order to alleviate potential earthquake hazards and better inform the public.

Finally, the actions organizations take can help define the danger situation for the populace. From the interviews of community residents, it was found that people look overwhelmingly toward government at all levels to deal with earthquake hazards (see Part V of this report). Therefore, assessing the threat as serious and creating organizational plans, or in some cases creating new organizations, to deal with the possibility of a damaging quake may bring the notion that the threat is real to the public sector. The cumulative effect of growing organizational involvement may enhance the interpretation that the situation is serious and create a sense of urgency regarding earthquake preparation. On the other hand, increasing government involvement may communicate a sense of security on the part of the public. Therefore, individual preparedness may be affected by what the public feels organizations are or are not doing to protect public safety (assuming, of course, that they become aware of such actions through the media and other sources).

In order to investigate organizational response to the current situation, data have been gathered through extensive field interviews with key officials in government and service agencies concerned with public welfare and safety

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at local and state levels. Organizations and respondents were selected because of their official function regarding emergency preparedness and through referrals from other agencies. These interviews were conducted primarily between July, 1976, and December, 1978. Answers to three broad questions were sought. First, what is the agency's chief responsibility to the community and how is this related to earthquake preparedness? Second, in what type of earthquake planning has the agency traditionally been involved? Third, did the near predictions have any effect on the agency's planning efforts? Also gathered during this time period was a collection of official documents, letters, government communiques, and organizational minutes from these agencies.

In addition to this material, several multi-organizational county and city earthquake exercises were observed by the researchers. These exercises were held to test various agencies' responses to earthquake related problems presented in scenario form. Of particular interest during these exercises was the functioning of inter-organizational communication---a major problem during the 1971 San Fernando earthquake.

In several instances, continuous contact was maintained with organizations actively involved with earthquake prediction or preparedness. These organizations were selected because of the centrality of earthquake concerns to the organizations' major goals and functions. Background data for these organizations is provided below. They include:

Emergency Preparedness Commission for the Cities and County of Los Angeles Los Angeles Civil Defense Office Los Angeles Task Force on Earthquake Prediction Creative Home Economics Consultants California State Office of Emergency Services California Earthquake Prediction Evaluation Council California Seismic Safety Commission United States Geological Survey

Other government agencies and service organizations interviewed include:

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Local organizations:

Los Angeles Police Department Los Angeles Sheriff's Department Los Angeles City Fire Department California Institute of Techonology Radio Amateur Civil Emergency Services (RACES) Red Cross Girl Scouts, Boy Scouts Various independent school districts Chambers of Commerce

State or non-local organizations:

Senator Carpenter's Office California National Guard Department of Water Resources, Dam Safety Program Division of Mines and Geology

Information gathered from the above organizations is included in the Narrative of Organizational Activity which makes up Chapter Two of this section. The aim of the narrative is to provide a record of organizational earthquake activity since the announcement of the southern California Uplift. The narrative is divided into periods which coincide with the historical sequences developed for the media narrative of this report. Following the narrative is an interpretive section which includes a summary analysis of trends in organizational activity. Emphasis is placed on the type of organizational earthquake response and any association between the current earthquake threat situation and changes in response patterns.

For several reasons it seemed desirable to treat the response by schools separately from the response by other organizations and agencies. Accordingly the final chapter of Part Three consists of a self-contained review of earthquake response in schools throughout the county, an assessment of the relationships between that response and public announcement of the southern California Uplift and other earthquake cautions, and a set of recommendations concerning earthquake preparedness in the schools.

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Background Information on Major Organizations

Emergency Preparedness Commission for the Cities and County of Los

<u>Angeles</u>. The Commission was known originally as the "Los Angeles County and Cities Disaster and Civil Defense Commission" from its inception in 1961 until 1974. It was retitled by the Board of Supervisors' adoption of County Ordinance 10,937 effective August 2, 1974.

The Commission consists of nine members, all of whom must be County residents. Three members are appointed by the Board of Supervisors, three by the Mayor of the City of Los Angeles, and three by the President of the Los Angeles County Division of the League of California Cities. Commissioners serve four-year terms without compensation.

Basically, the duties and functions of the Commission are given in Section 806 of Ordinance 10,937. They are as follows:

(a) Consult with the County, cities and other public authorities and coordinate the development of emergency and disaster plans and programs which are Countywide or affect numerous jurisdictions. Support and promote emergency planning improvements, simplification, and standardization.

(b) Consider and recommend to the Board and the governing bodies of cities and other operating authorities within the County programs and policies deemed advisable or necessary to establish and maintain viable emergency and disaster preparedness programs within this County.

(c) Consider and recommend emergency and disaster preparedness programs and policies in this County to local non-governmental organizations and to appropriate State and Federal agencies and public and private organizations.

(d) Recommend that the proper authority promote training and education programs in all phases of emergency and disaster preparedness within the jurisdictions represented by the Commission or in conjunction with the State or Federal emergency or disaster agencies, or both.

Commission meetings are held monthly with Special meetings when needed.

The Commission also has authority to conduct investigations and hearings.

All sessions are public, and interested citizens are invited to participate

in discussions.



Projects that the Commission has undertaken emphasize preparedness for nuclear attack and major peacetime disasters. These projects are directed toward the following areas:

1. Emergency preparedness planning and training. Objectives include:

--Promote County-wide organizations for emergency planning and operations.

--Develop awareness, understanding, and teamwork among key executive, administrative, planning, and operational officials and personnel in Los Angeles County jurisdictions.

--Promote and recommend updating and revision of County-wide emergency plans.

--Promote and support school emergency planning.

--Determine the value of the current Fallout Shelter Program in the County.

--Identify resource people to support emergency and post-emergency operations.

2. Emergency operations systems and resources, including:

--Help meet long-standing needs in the County for facilities from which emergency operations can be effectively coordinated County-wide a nuclear attack or major peacetime emergency.

--Help tie all available radiological defense resources into a coordinated effort for nuclear attack or peacetime incident.

--Develop policy recommendations on the Attack Warning System.

3. Public education and emergency information, including:

--Help effect liaison between the Commission, other planning and operational personnel, and news media representatives to achieve active and informed news media response before, during, and after a nuclear attack or major peacetime disaster.

--Help achieve an enlightened people who will respond in an emergency to help themselves and cooperate with government.

4. Legislative Programs, including:

--Help halt the growing trend at the Federal level to reduce or restrict Federal funding support to local governments.

--Help ensure adequate Federal funding support programs before, during, and after a major emergency.

--Support other legislation which provides life-saving and restoration benefits before, during, and after a nuclear attack or major peacetime disaster. (Emergency Preparedness Commission Fact Sheet dated 1-31-77.)

Two specific on-going projects in which the Commission has played an instrumental role are the Dam Evacuation Planning Project and the Emergency Public Information-Emergency Broadcast System Project.

The first stems from the Dam Safety Act of 1972 which requires certain dam owners to provide maps showing areas that could be inundated following a dam failure. The Act requires each jurisdiction affected to prepare emergency procedures for evacuation and control of populated areas. The State Office of Emergency Services is responsible for obtaining and distributing the maps and for providing planning criteria and approval of plans submitted by local jurisdictions. There are approximately 90 dams within Los Angeles County affected by this law.

The Commission has been monitoring this program since early 1976 to help effect coordinated planning and ensure compliance with the law. The Commission conducted a survey on the status of the program, urged jurisdictions to develop their plans, and requested the State Office of Emergency Services to complete its provision of inundation maps. It also receives regular reports on the status of a County-wide effort to coordinate dam evacuation planning on a multijurisdictional basis from the County Sheriff's Department.

The second project stems from the Commission's continuing effort to improve the county-wide system for prompt and accurate instructions and information to the public in times of emergency. The Commission has held a series of workshops with technical and program managers from the broadcast media to foster the development of a system of information exchange between the media and emergency response personnel from various governmental and other involved agencies. The objective is to attain the best possible flow of vital information before, during and after a disaster. As a result of these meetings, the Commission has adopted a plan which could provide a system potentially

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acceptable to the governments and the broadcast stations involved and could be a workable solution to the problem of how to handle the Emergency Broadcast System throughout Los Angeles County. The plan calls for:

Utilizing the South Coast Air Quality Management District (SCAQMD) radio alerting system during extraordinary emergencies to provide the media emergency information and instructions to broadcast to the public. Use of the SCAQMD radio frequency could provide a clear channel between the County and City of Los Angeles to the broadcasters. The SCAQMD had agreed to the use of its radio frequency in an extraordinary emergency.

Setting up procedures to provide, over the SCAQMD frequency and other communications links, emergency information instructions that can be relayed or broadcast direct to the public.

Conducting workshops and other programs to acquaint key personnel countrywide on how to use the system.

Monitoring the effectiveness of the system and addressing and resolving any problem areas.

Initial success of the above project is dependent on the cooperation and participation of the County and the City of Los Angeles and the broadcasters, with minimal expenditures to modify or augment existing radio equipment. With this cooperation and support, an expanded, viable, reliable Emergency Broadcast System will be an achievable goal in Los Angeles County. (Emergency Preparedness Commission's Program Report, 1979.)

<u>Civil Defense Office for the City of Los Angeles.</u> Basically, Los Angeles County has been divided into seven "areas" for civil defense coordination purposes since the 1950's. Each area contains a number of cities, with Area B covering all unincorporated sections of LA County. In three areas (Areas D, E, G) the County and cities joined in a formal joint powers agreement to improve emergency preparedness on a cooperative and economical basis in their perspective areas. In doing this, they set up an administrative agency in which participating agencies contribute annually to costs. In the other four areas, however, joint power agreements have not been established and the cities in those areas do not contribute to an area organization.

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There are, however, area coordinators who are responsible for some coordinative work with the cities in the unfunded areas.

Under the area concept of the county, the Civil Defense Coordinator for the City of Los Angeles, Mr. Michael Reagan, is also the coordinator for all of Area A which includes Beverly Hills, Culver City, Santa Monica, Hidden Hills, San Fernando and Los Angeles City.

The Federal Defense Civil Preparedness Agency is, by law, responsible for emergency planning in the event of a nuclear attack. However, since the days of the fallout shelter craze following the Cuban missle crisis, the agency has come under attack from state and local officials who want help with natural disaster planning and from some members of Congress who say the agency should be reshaped into a "super disaster" bureau. In response to these criticisms, the federal agency adopted the "total preparedness" concept stating that the agency would help state and local officials with plans for tornadoes, floods, and earthquakes if they came up with plans to evacuate people in the event of a nuclear attack.

The Los Angeles City civil defense unit is organized under the "dual concept." In other words, it is organized under a nuclear and natural disaster orientation. The unit has one major disaster plan which covers both kinds of crises. Because of this, the unit did not have to change any procedures in order to respond to the earthquake near predictions that were made for the Los Angeles area. The unit did, however, become more active after February, 1976, when the southern California Uplift was first announced and then again with Whitcomb's "hypothesis test." The activity involved primarily an increase in requests for information and for disaster preparedness meetings.

Part of the LA Civil Defense Coordinator's responsibility is to conduct disaster preparedness meetings for both residential and work groups. During an interview with Mr. Reagan, he stated that during the period immediately

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following the southern California Uplift and Whitcomb announcements, he received an increase in the number of requests for such meetings. (For a fuller analysis of these requests, see Part Eight, Chapter One.) Most of these requests were either made directly to the civil defense office or were routed there through other agencies such as the fire department or police department. During this time, he conducted approximately two to three such meetings a week. They usually were about an hour to an hour and a half long and featured one of two films--"Earthquake," about the 1971 San Fernando earthquake, or "Our Active Earth," an education film giving some of the history of earthquakes and some of the do's and don't's in case an earthquake does strike. Mr. Reagan also tells participants what to do before, during and after an earthquake, what kinds of preparedness measures to take, and a little about the coordination efforts between the different agencies responsible for getting help to stricken agencies as soon as possible.

Task Force on Earthquake Prediction. The Los Angeles Task Force on Earthquake Prediction was established in November, 1976, by Mayor Tom Bradley. The purpose of the Task Force was "to explore and evaluate the range of possible city responses to an earthquake prediction and provide recommendations for alternative contingency programs that would be adaptable to the specific magnitude, urgency, and confidence level of a given prediction."

The Mayor's action to establish the task force followed increasing scientific and public interest in earthquake prediction. This interest was heightened by speculation and intensified research relating to the "Palmdale Bulge" and the announcement by Professor James Whitcomb stating that if his hypothesis was correct a similar area to that hit by the 1971 San Fernando quake would experience a 5.5 to 6.5 magnitude quake between April, 1976, and April, 1977. Although the majority of the scientific community feels a

reliable system for earthquake prediction is a decade or so away, it is recognized that several predictions are likely to be made during the developmental stages. As a result, public concerns and business reactions may create a need for a response from local government. With the increased interest in the southern California area, Mayor Bradley felt it was especially important for the Los Angeles area to plan for such a prediction situation.

Because earthquake prediction, as well as earthquakes themselves, can affect all aspects of community life, the Task Force was directed to set up committees to study major areas of concern covering both emergency response and hazard reduction. These included: emergency preparedness, lifelines, hazardous facilities, safety of buildings, legal aspects, governmental coordination, economic stability, social and psychological impacts, and public information. The twenty-five member board met twice a month between February, 1977 and July, 1977. Members included representatives from various city offices such as: the Office of Chief Legislative Analyst, Office of the Mayor, Police Department, Building and Safety Commission, Civil Defense, Bureau of Engineering, Public Utilities, City Planning, Fire Department, Department of Building and Safety, and Department of Water and Power. Non-city members included representatives from the real estate industry, insurance, banking, television media, Los Angeles schools, and the American Red Cross. The scientific community was represented by members of the geological community, seismology, engineering, and sociology. There were also various advisors and consultants from both the business and scientific communities who were available as resource personnel to the Task Force. The final recommendations of the Task Force were presented to the Mayor in October, 1978 (see narrative).

<u>Creative Home Economics Consultants</u>. Creative Home Economics Consultants (CHEC) is an association of home economists and business professionals established by three women in July, 1976. Ruth Brent is an author-lecturer

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who has traveled extensively with her husband in the Marine Corps. Out of her personal experience in many danger zones, she developed a blueprint for survival. Harriet Paine and Shirley Smith are both home economists and teachers who have worked for the electric company and local food chains as consultants. In their presentations Brent capitalizes on her personal experiences, Paine utilizes her knowledge of food preparation while Smith, the mother of two young children, emphasizes preparedness with regard to children.

CHEC's first presentation was given on July 26, 1976, in a program sponsored by the Downey City Council entitled "Disaster Preparedness in the Home." The program was open to the public and was held in the Downey Auditorium.

In opening the program, Mrs. Brent emphasized a sense of urgency generated by the southern California Uplift and James Whitcomb's hypothesis announcement. She stated that in researching the subject of earthquakes, their group found many books on mortality figures, locations of quakes and information about what to do during an earthquake but nothing on how to protect life and property at home prior to an earthquake occurring. The major theme throughout their program and book is that one should take steps to inform people about preparedness so as to develop their capacity for self-sufficiency. At the Downey Conference, Brent expressed that the notion of self-sufficiency is a "good old American ideal of each family taking care of itself. Why should the government take all the responsibility for taking care of us? Government agencies are going to be overburdened with citizens who cannot take care of themselves. So let's don't add to their burden; let's become self-sufficient." Their program, then, stresses post-disaster emergency preparedness, rather than any systematic hazard mitigation plan.

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Mrs. Brent began her presentation by explaining what to do when the earthquake first occurs, then explained and demonstrated the usual procedure of standing in a doorway. Next, she outlined several steps to be taken after the earthquake. These steps, such as checking utility lines, using a flashlight, using a battery radio for disaster instructions, closely followed the instructions usually outlined in Civil Defense and Red Cross pamphlets.

Their unique approach to disaster preparedness stemmed from a detailed discussion of food and family preparedness by Mrs. Paine and Mrs. Smith. Harriet Paine was next on the program, discussing an organized system for stocking up food for the family and unique ways of preparing food prior to and after a disaster. Mrs. Paine suggested preparing a forty-eight hour getaway kit and a thirty day food supply. This, she suggested, was one way "one would be self-sufficient and in line with the old American custom of looking out for ourselves. The speaker went into great detail on how and where to store food, a system of food rotation, how to purify water, what to have in a first-aid kit and how to prepare hot meals using regular household items. Most impressive to the audience was her demonstration of fooddrying techniques.

Shirley Smith's presentations centered around preparing one's children for an earthquake. She suggested that parents should develop plans and share them with their children. She stressed that a family survival plan will help in three ways: "It will assure you of better protection and selfreliance in case of an emergency. Secondly, it will provide you with an adequate supply of food, water, clothing and medical supplies strategically placed in protected areas. Thirdly (again stressing the theme of selfsufficiency), each family member will be informed of his own responsibilities and be ready to act." She suggested doing earthquake drills and delegating tasks to each family member. All three presentations were illustrated by

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three large tables of exemplary survival equipment, containing everything from ziplock bags for disposal of wastes to expensive camping equipment.

Following the initial conference, CHEC representatives began contacting mayors of cities in the Los Angelesarea in order to promote their program. They published a book on earthquake preparedness entitled, <u>How to Survive</u> <u>an Earthquake</u>. They made this book available at all their subsequent presentations and by mail order for \$2.50. The 34 page pamphlet contained most of the information presented at their seminars as well as extensive checklists which included food and first aid supplies and a list of duties for household members in the event of a damaging earthquake.

During the latter half of 1977 and 1978, the CHEC group increased their efforts to sell their presentation to various groups. Membership in the group changed to include three new members--Sandy Stave, Vicki Pellerito, and Libby Lafferty. Ruth Brent was no longer active in the group. The presentations themselves became more professional and CHEC members began to charge \$300 to \$500 for their seminars. According to Shirly Smith, this was basically to cover costs incurred by the group. Although they tried to get government funding to support their organization, they were unsuccessful.

Office of Emergency Services. The Office of Emergency Services was established as part of the Governor's Office in 1950, as the California State Office of Civil Defense. In 1956, when the agency became more involved in natural disaster operations, the name was changed to California Disaster Office. In 1970, adoption of the State's Emergency Services Act changed the agency name to Office of Emergency Services. As such, the director of OES is appointed by the governor and serves a dual capacity as state director of civil defense and emergency planning.

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The basic responsibility of OES and its staff is to warn, inform, and coordinate mutual aid during a disaster, and to help distressed local governments in the wake of the disaster. During an emergency, it functions as the immediate staff and coordinating organization of the Governor to carry out the State's responsibilities under the Emergency Services Act and applicable federal statutes. The director coordinates the emergency activities of all state agencies in connection with the emergency.

OES is primarily responsible for disaster response and traditionally has emphasized emergency response rather than hazard mitigation. OES is also responsible for issuing disaster warnings of all kinds. As the art of earthquake prediction becomes more sophisticated, OES will also be responsible for issuing earthquake warnings. Basically, it is the only lead agency responsible for earthquake response. For instance, there are lead agencies for most other disasters such as the Division of Forestry, Fire Marshall's Office, Department of Health, and the Air Resources Board. OES, then, is also responsible for coordinating the earthquake disaster response of other agencies.

The official structure under which OES works is a statewide system of mutual aid in which each local jurisdiction relies first on its own resources, then calls for assistance from its neighbors--city to city, city to county, county to county, and finally through one of the regional offices of the Office of Emergency Services, to the State. A Master Mutual Aid Agreement, developed in 1950, has been adopted by 398 of California's 411 active incorporated cities, and by all 58 counties. This creates a formal structure within which each jurisdiction retains control of its own personnel and facilities but can give and receive help whenever it is needed. The State is signatory to this agreement and provides available resources to assist local jurisdictions in emergencies. The state is divided into six mutual aid regions, with

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four regional offices staffed by the Office of Emergency Services to coordinate these activities.

Through this mutual aid system, the Governor's Office receives a constant flow of information from every geographic and organizational area of the state. This includes direct notificiation from a state agency or department, or from a local government official, that a disaster exists or is imminent. In some cases it also includes information that makes it possible to anticipate an emergency and lessen its damaging effects by advance preparations, or even to prevent a situation from developing to disaster proportions. The statutes do not contemplate that the OES staff personally accomplish disaster relief. There are just over 100 personnel statewide, and of these, approximately one-third work on federally funded projects such as Community Emergency Planning and Radiological Defense. The remaining personnel support mutual aid and emergency service assistance activities at the headquarters and regional offices. Some of these activities include:

1. On-site assistance and evaluation of a jurisdiction's current emergency response capability;

2. Disaster planning guidance;

3. Disaster recovery services (financial);

4. Subsidized training programs including simulations of emergency operations in natural and man-made disasters and training for local government staff and state emergency response personnel;

5. Mutual aid and disaster services such as agricultural assistance, housing reconstruction, medical and health, etc.;

6. Approval of dam inundation-evacuation plans for jurisdictions within California;

7. Public information and education, including pamphlets, films, and television and radio public service announcements.

As was mentioned above, OES's role has traditionally been geared toward response after a disaster. For example, the OES <u>Emergency Operations Guidance</u> <u>Manual published in 1975 did not include hazard reduction measures</u>. The guide

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was written to help cities and counties set up emergency operating procedures. It was divided into two parts--pre- and post- emergency plans for earthquakes. The guide stressed the need for coordination and separation of functions among key officials in local government. However, plans were geared toward handling problems resulting from an earthquake. Little if any attention was paid to reducing hazards before the quake.

In the last several years, however, OES officials have realized the importance of educating the populace concerning what to do before and during an earthquake as well as after the quake. As one official stated, the impetus for this viewpoint has partially come from studies such as Earthquake Prediction and Public Policy, sponsored by the National Academy of Sciences. OES officials feel that if the public is prepared for a quake, their job concerning response after the quake will be much easier. A new dimension is added when one considers earthquake prediction. The question now becomes what can be done between the time of the announcement and the actual quake. With the possibility of earthquake prediction and with the announcement of the southern California Uplift area as a possible precursor to a major quake, OES has increased its efforts toward earthquake hazard mitigation. Because a number of tools to reduce earthquake hazards are at the disposal of local governments (such as building codes and land use planning), the director of OES has periodically sent letters to city and county officials. These have tried to communicate a sense of urgency regarding earthquake preparedness and have encouraged local government to increase their hazard mitigation efforts. OES has also developed radio and television public service announcements which have been distributed to most stations throughout California. These spots inform the public what to do before, during, and after a quake, A similar series was originally released in 1972 and again in 1974. The current series, released in 1976, is done in an entertaining "cartoonish" manner and

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covers a larger number of preparedness measures.

California Earthquake Prediction Evaluation Council. Stemming from an awareness of increased work on earthquake prediction and the certainty of future damaging quakes in California, responsible scientists and public officials realized the need for officials to take appropriate action to protect the public's safety. However, because the art of accurate earthquake prediction is still in its infancy, decision-makers need guidance concerning whether to respond to a quake prediction and how to respond if necessary. To achieve this goal, the California Advisory Group on Earthquake Prediction was formed on March 26, 1974. Under the direction of the Office of Emergency Services, this group was to advise the OES director on the validity of predictions of potentially damaging earthquakes. The group's name was later changed on April 14, 1976, to the the California Earthquake Prediction Evaluation Council (CEPEC). CEPEC is made up of nine earthquake scientists. These scientists are from the fields of geology, seismology, and geophysics. They are appointed by the Director of OES and their tenure is determined by the Director. The ninth scientist is the State Geologist who serves as Chairman of the Council. The Chair's tenure is concurrent with his or her term of office. The Council usually meets three times a year but meetings can be called at any time by the Chairman at the request of any member or the Director of OES.

In developing procedural guidelines for CEPEC, members worked on the premise that,

the best compromise between a scientist's freedom to make his view public and society's need to be protected from costly responses to false alarms is to evaluate predictions as soon as possible after they are made. If a prediction is not well-grounded in evidence, that conclusion, reached in time, is likely to obviate the costs of a needless social response. If, on the other hand, a prediction is endorsed by knowledgeable members of the scientific community, undertaking an appropriate response to that prediction would then become an urgent

task (Earthquake Prediction Evaluation Guidelines, p. 111, February, 1977).

The Council, however, did not adopt formal guidelines until February 22, 1977. Prior to the announcements of the Southern California Uplift and James Whitcomb's hypothesis test, there were no predictions which necessitated a formal evaluation by CEPEC. However, with CEPEC's evaluation of the Southern California Uplift and, more importantly, Whitcomb's announcement, it became evident that formal guidelines were needed both to standardize evaluation criteria and to inform predictors of the expectations of the council. Basically the guidelines established the functions of the Council as follows:

Predictions and similar information coming to the attention of the Council, either directly or indirectly (e.g., by appearance in the public media), are screened by the Council Chairman prior to being accepted for evaluation. The Chairman, in consultation with OES, determines whether to present a prediction statement to the full Council for formal evaluation or to declare it to be without sufficient merit to warrant Council deliberation.

When a prediction statement has been accepted for evaluation, a meeting will be scheduled as soon as feasible. The Council's test of scientific validity is primarily to evaluate the accuracy and completeness of the predictor's data, the logic and applicability of the scientific method used and the predictor's accuracy in applying them in arriving at the announced results.

Normally, the Council will evaluate only scientifically-based predictions of damaging earthquakes (Richter magnitude 5.5 or greater). However, public concern or other circumstances outside of the prediction statement itself may make it advisable for the Council to consider a specific prediction despite the statement's failure to meet established criteria (OES letter dated 3-15-77 to Supervisors, Mayors, and Directors of City and County Emergency Organizations).

Seismic Safety Commission. From 1969 to 1974, the California Legislature had a joint committee on earthquake safety. The final report of this committee recommended that a group be established at the state level to continue work on earthquake hazard reduction. As a result of this and a similar recommendation by the governor's earthquake council, the California Legislature created the Seismic Safety Commission and Governor Brown swore in the first members

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The Seismic Safety Commission Act, however, allowed only two years for the Commission to work on California'a seismic safety problems. After initial staffing and organizing, the Commission decided that two years was barely enough time to examine pressing seismic problems much less develop and implement solutions. In light of this, Senate Bill 1340 was introduced in January, 1976, passed both houses, and was signed by the governor on April 14, 1976. It provided four more years, through 1980, for the Commission to work on the complex earthquake problems confronting Californians.

The Commission is comprised of seventeen commissioners who serve in a voluntary capacity. They represent a very broad range of professions and include several legislature members. The professional disciplines which are represented include: structural, electrical and mechanical engineering, geology, local government, planning, architecture, and governmental research.

Basically, the Seismic Safety Commission is a general policy, factfinding type of agency. It was established to continue work on hazard reduction and to develop long-range strategies and programs to cope with earthquake hazard throughout the state. It was set up to review agency activities, make recommendations to the governor, and report to the governor and legislature on seismic safety. It is an advisory commission both to the governor and the legislature and was set up independently so that it would have direct access to the legislature. As such, the Commission actively participates in the legislative process. Part of its responsibility is to review, and at times initiate, proposed legislation, make amendments to, and support seismic safety legislation.

The Commission is also responsible for providing assistance, information, and coordination regarding earthquake-related problems. Such assistance has ranged from calming excited citizens concerned with earthquake predictions to

assisting organizations such as the State Energy Resources Conservation and Development Commission by providing a workshop on earthquake safety related to nuclear power plants. Other general responsibilities include: studying long-range goals and priorities, requesting state agencies to prepare standards and criteria, recommending changes in existing programs to include the reduction of earthquake hazards, reviewing reconstruction efforts, and helping to coordinate various programs.

In order to do a better job of analyzing and coordinating programs related to seismic safety, the Commission formed the Interagency Advisory Committee on State Seismic Policy and Programs. This committee is comprised of individuals from state agencies having statutory or regulatory interests in earthquake safety. Committee members perform an important liaison function between the Seismic Safety Commission and their parent organizations. By holding monthly meetings, the committee can quickly bring current issues and problems to the attention of the represented state agencies. These agencies include: Department of Education; Department of Health; Department of Housing and Community Development; Department of Insurance; Department of Transportation; Department of Water Resources; Division of Mines and Geology; Energy Resources Conservation and Development Commission; Military Department; Office of Emergency Services; Office of Planning and Research; Office of the State Architect; and State Fire Marshal's Office.

Although concerned with earthquake emergency response planning, the Seismic Safety Commission is primarily a hazard reduction agency. In keeping with this, the Commission initiated several long term projects to be investigated on a continuous basis. These include:

1. The art of earthquake prediction and response to such prediction;

2. Dam safety, including the probable performance of dams during an earthquake, the safety inspection process, the dam inundation mapping program and the implementation of such information in local land-use

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planning for areas of potential inundation;

3. Hazardous structures within California;

4. The use of post-earthquake studies to improve hazard mitigation programs for future quakes;

5. Examining the effects of required seismic safety elements for the cities and counties of California and evaluating their impact on land-use decisions;

6. Evaluating the implementation of the Hospital Act of 1972 designed to insure that hospitals would be able to remain sufficiently operational after an earthquake to perform all necessary services for the public;

7. And review and evaluation of the quality of earthquake engineering being employed to guide decisions on proposed Liquid Natural Gas (LNG) facilities.

United States Geological Survey. The United States Geological Survey, under the Department of the Interior, is responsible for studying geologic hazards throughout the United States. In light of this, the Office of Earthquake Studies, USGS, conducts a variety of earthquake-related studies. These include studies of geologic assessment and evaluation of hazard potential.

As required by the Disaster Relief Act of 1974, the Director of USGS is responsible for the warning of geologic catastrophies where possible. Stemming from this legislation, USGS formed an Earthquake Prediction Council responsible for reviewing data concerning possible future quakes and for recommending the issuance of a prediction if deemed necessary. The Council was established in October, 1976. It consists of five USGS scientists and is the first federal group of its kind. Basically, the Council evaluates prediction evidence from USGS scientists only. If warranted, the Council sends a recommendation to issue a prediction to the USGS Director. If requested by a state or federal official, the council also will review predictions by non-USGS scientists. The Council, however, primarily focuses its attention on potentially destructive quakes of magnitude 5.5 or greater and does not evaluate evidence for potentially non-damaging quakes.



Another segment of the Office of Earthquake Studies is the USGS National Earthquake Information Service (NEIS) in Golden, Colorado, established in 1966 to refine and expand the presentation of seismic data to the scientific community and the general public. Originally, NEIS was part of the National Oceanic and Atmospheric Administration. In 1972, it moved from Maryland to Colorado. Then in 1973, as part of a series of actions to consolidate the federal program in solid earth physics, NEIS became part of the US Geological Survey.

The major function of NEIS is to provide scientists, the public, and disaster-relief agencies with data on important earthqukes that occur in the United States and worldwide. Originally, the operation was basically a data processing one. However, with the addition and expansion of communications and computer systems, the operation has transformed into an informationcentered one. NEIS now keeps records on all earthquake predictions made by the public as well as earth scientists. A rating system is used to judge the accuracy of the predictions and the success rate of the predictor (USGS news releases 8-31-76 and 11-23-76).

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CHAPTER TWO

NARRATIVE HISTORY OF ORGANIZATIONAL EARTHQUAKE RESPONSE ACTIVITY FROM JANUARY 1, 1976 TO DECEMBER 31, 1978

Period One: January 1, 1976 to February 3, 1976

Period One is used as a baseline period immediately preceeding the announcement of the southern California Uplift. The one significant organizational earthquake response event that took place was the introduction and passage of Senate Bill 1340. This bill amended the Seismic Safety Commission Act. It extended it an additional four years, through 1980, allowing more time for the Seismic Safety Commission to work on California's complex earthquake problems.

Period Two: February 4, 1976 to April 20, 1976

This period begins with a major earthquake in Guatemala causing widespread death and destruction. This was quickly followed by the announcement by the US Department of the Interior describing the discovery of the "Palmdale Bulge" or southern California Uplift.

Looking at organizational earthquake response, this period began with a program sponsored by the University of California, Los Angeles. On February 25, UCLA's Department of Engineering held a class seminar on disaster preparedness. Approximately thirty graduate students attended, along with four professors. The panelists included: Eldon Bush, Director of Los Angeles Red Cross; Robert Neiman, Los Angeles County Emergency Preparedness Director; James Haigwood, Office of Emergency Services; and Buck Galbraith, Aerospace

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Industry. Topics included: 1) plan for agencies to respond to a major disaster; 2) problems in coordinating public and private agencies; 3) what can and should be done to increase public awareness; 4) allocation of resource problems; 5) need for new disaster legislation.

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During the remainder of this period, most significant organizational activity focused directly on the southern California Uplift. On March 17, 1976, the first briefing concerning implications of the "Palmdale Bulge" was held in the Governor's office. Those who attended included representatives from the US Geological Survey, OES, OES Earthquake Prediction Advisory Panel, Acting State Geologist and the Seismic Safety Commission. Summarizing the reasons for the meeting, Dr. McKelvey, Director, USGS, stated that he felt it incumbant upon USGS to advise California officials of the significance and possible implications of the recent land uplift in southern California. He expressed the opinion that a <u>great earthquake</u> will occur in this area, possibly within the next decade, due to evidence suggesting that the area of the San Andreas Fault has been locked since the great earthquake 120 years ago and that strain has been accumulating since.

The USGS conclusions can be summarized as follows:

1. Over 4500 square miles of Southern California have risen 5 to 10 inches since the late '50s or early '60s.

2. Destructive earthquakes at San Fernando, California, in 1971, and Niigata, Japan, in 1964, were preceded by land uplifts of less than 5 inches. Uplifts, however, have been observed without subsequent earthquakes.

3. The uplift occurs along the section of the San Andreas fault where a great earthquake (M 8) occurred in 1857 and where another great earthquake is inevitable, possibly within the next decade.

4. While some evidence can be interpreted as precursory to a major earthquake in this region, there is <u>no basis now for predicting the time</u> <u>it will take place</u>. The sum of the evidence, however, justifies a warning that a great earthquake will take place in this area and also justifies preparedness actions. 5. If an earthquake similar to that occurred today in this region, the probable losses (Orange and Los Angeles Counties) are estimated as follows:

40,000 buildings would collapse or be seriously damaged,

3,000 to 12,000 people killed,

12,000 t0 48,000 people hospitalized,

\$15 to 25 billion damage.

Failure of one of the larger dams could leave 100,000 homeless and tens of thousands dead.

6. It is possible but less certain that one or more damaging earthquakes may take place within this region prior to a great earthquake.

Dr. McKelvey emphasized that although the Survey is confident as to the probable location and expected magnitude of the anticipated earthquake, there is, at the present time, no basis for predicting the time of occurrence, other than in very general terms. Furthermore, at this time, other precursor phenomena have not been observed which could confirm the inevitability of an earthquake. However, the USGS, California Division of Mines and Geology, and several universities have initiated additional studies and installed additional instrumentation for more data gathering in the uplift area. Hopefully, a predictive capability will be developed in advance of the earthquake, but the Survey recommended emergency plans to be developed on the assumption there will be no further advance notice.

If data become available supporting an earthquake prediction in California, the evidence will be evaluated by the USGS and transmitted through the Office of Emergency Services to the Governor. Bob Olson, Director, Seismic Safety Commission, concluded that it should be assumed the Uplift is associated with a future earthquake and should be treated as a threat, accompanied by a high degree of scientific uncertainty. It would, therefore, be prudent to take simple initial actions designed to improve State and local government's ability to respond to earthquakes. Further, the State may wish to consider requesting Federal disaster funds through FDAA for this purpose.

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On March 30, 1976, the first of several letters from the Office of Emergency Services was sent to local government officials. The letter contained details of the March 17, 1976 meeting stating that although the significance of the uplift is not fully understood, USGS scientists are concerned that it may be a precursor to a major quake. Therefore, OES urged each official to review and update earthquake emergency preparedness and response plans. Maps of the Uplift area were included.

A similar letter was sent on April 5 to all state agencies delineating the area affected by the bulge and urging Agency Secretaries and Department Directors to ensure that their earthquake preparedness and response plans are up-to-date.

Also during this time, OES contracted with John J. Hennessy Motion Pictures to produce four 30-second network broadcast quality TV spots on earthquake safety. Two will deal with the relatively automatic response actions people should take during an earthquake. One will deal with safety actions appropriate to the immediate post-earthquake environment. One will treat the nature of earthquake movement and the reasons for taking the response actions described by the other three PSA's. This is the third series of TV spots OES has produced and released. The first was in 1972, then again in 1974.

On April 8, the Seismic Safety Commission (at its regular meeting in Sacramento) adopted Resolution 1-76, "finding that the 'bulge' in southern California is a threat to public safety and requesting State and local agencies to take steps to mitigate the potential disaster, stimulate preparedness, and inform the public." This resolution was adopted to draw attention to a potentially serious problem and to urge governmental agencies to take appropriate steps. It put State agencies on "notice" in lieu of the official word from the Governor that an emergency existed.

On April 14, the California Earthquake Prediction Evaluation Council (CEPEC) met at Stanford University to evaluate the data leading to the discovery of the southern California Uplift. The conclusion of the Council was:

The Council has concluded that the area of concern, the so-called Palmdale "Bulge," definitely warrants further detailed study but that there is no reason at this time, on the basis of the data presented, to conclude whether or not a major earthquake will occur at any specific time in the future. However, in our judgement, the uplift is probably a manifestation of the gradual buildup of earthquake producing stresses, and it should serve to give us a renewed sense of urgency in preparing for the large earthquake that some day inevitably will occur in this region.

Finally, on April 20, the OES Advisory Panel on State Government Response to Earthquake Prediction met in Sacramento to evaluate implications of CEPEC's decision relative to the "Palmdale Bulge" for state and local earthquake planning. At this meeting, OES established a liaison between its Sacramento headquarters and the USGS office in Menlo Park. Policy and scientific liaison representatives were named for both organizations. Through this arrangement, pertinent information will be passed through OES to other state agencies and local governments in California.

Also on this date, OES sent a second letter to local government officials. This letter included eleven earthquake planning recommendations for local government to consider. It also included actions that local government officials should pass on to their citizens via the mass media. These actions included measures to be taken before, during, and after an earthquake; while at home, at work, out in the community, or at school.

Period Three: April 21, 1976, to July 27, 1976

On April 21, 1976, the local press ran a story stating that Professor James Whitcomb, a Caltech geophysicist, had "predicted" that a moderate earthquake would strike southern California within a year. Although this was actually a hypothesis test that Whitcomb was conducting and that he had

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reported at a professional meeting, the media covered the story as if it were a prediction.

Stemming from this announcement, CEPEC met on April 30 at Caltech to evaluate the hypothesis Whitcomb was testing. He felt that if the Vp/Vs anomaly hypothesis were correct, data indicated a 5.5 to 6.5 magnitude earthquake during the one-year period from April, 1976, to April, 1977. After evaluating the data, CEPEC concluded:

After limited study of the data, theory, and methods of analysis involved, the Council did not conclude that the probability of an earthquake in the area in question is <u>significantly</u> higher than the average for similar geologic areas of California. Nevertheless, the data are sufficiently suggestive of such an increased probability as to warrant further intensive study and testing of the hypothesis presented by Dr. Whitcomb. It remains possible that a moderate or major earthquake could occur in the area at any time, as is true for many other similar geologic areas of California.

This was the first time that CEPEC had met twice in one month (April 14 and 30). Usually the Council plans meetings only twice in one year. However, with the announcement of the southern California Uplift and Whitcomb's hypothesis test, Council members felt it necessary to evaluate both situations. During these meetings it became quite evident that CEPEC needed to establish some guidelines with which to evaluate earthquake predictions, to help both Council members and scientists or others presenting data to the Council. This became a top priority item for later meetings.

Also during the latter part of April, the Seismic Safety Commission continued its efforts to encourage local governments to step up their earthquake preparedness actions by sending a letter to the Southern California Association of Governments. In this letter, they included a copy of Resolution 1-76 and asked SCAG to distribute the resolution to all its member cities. The Commission also began to receive word from various agencies regarding actions the agencies had taken. For instance, Housing and Community Develop-



ment reported they had sent the SSC resolution to all their southern and northern area supervisors for immediate action. The Department of Real Estate stated that they had updated their Emergency Plan for the Los Angeles office and the Department of Education stated that in response to Resolution 1-76 they had sent earthquake safety information to school officials in the "bulge" area. This information included a school earthquake planning checklist and recommended safety procedures. Also at their July meeting, the Commission heard from several other agencies such as the Department of Transportation (CALTRANS), Department of Water Resources, and the Southern California Gas Company, regarding actions they had taken in response to Resolution 1-76 and Resolution 2-76. The latter resolution was adopted by SSC on May 13. Basically, it went a step further than the earlier resolution in that it requested federal departments and agencies and Congress to take steps to mitigate the potential disaster posed by the southern California Uplift.

During May, the Office of Emergency Services sent a third letter to the local jurisdictions. This brought local officials up-to-date as to the current status of earthquake prediction technology, and advised them as to the outcome of the CEPEC evaluation of the Cal-Tech hypothesis test. The letter also included information on the activities of the Advisory Panel on State Government Response to Earthquake Prediciton and their development of guidelines for a California Earthquake Prediction Response Plan. It invited input from local jurisdictions.

Also at this time, OES contracted with Blanc Communications Corporation to produce ten 30 second public service radio spots on earthquake safety to be distributed throughout California at a later date.

On July 9, a Disaster Resources Conference was held at the Veterans Administration Hospital. The purpose of the conference was to acquaint federal, state and local representatives and those from private industry with

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the proposed State Emergency Resources Information System. The plan for the system grew out of the realization that during the 1971 San Fernando quake needed equipment and resources were not used because authorities did not know they existed. The need to create a system to identify all private and public resources available for disaster aid became more pressing with the announcement of the Palmdale bulge. The system itself is aimed at creating a comprehensive computer bank of all facilities, equipment, and trained personnel that could be used in responding to a disaster or emergency. The proposed system would provide to all public agencies a continually updated directory of all public and private resources available from state and local agencies, industrial and private segments, and from Federal agencies including the military. However, funding from the Federal Defense Civil preparedness agency is still pending.

In conjunction, OES completed its linkup with the Department of Water Resources Computer Center to be able to assess DWR's Earthquake Magnitude and Epicenter Calculation program. This will enable OES to initiate its earthquake response activities much more quickly than presently, possibly relying on Palmar Observatory (Anchorage), UC Berkeley and Cal Tech.

Also during July, the Creative Home Economics Consultants (CHEC) gave their first presentation at the earthquake preparedness conference sponsored by the Downey City Council. The conference, entitled "Disaster Preparedness in the Home," was open to the public. The opening statement was made by Don Robinson, Downey City Council. He mentioned both the southern California Uplift and James Whitcomb's hypothesis as signifying an urgent need for earthquake preparedness. The CHEC presentation followed, stressing self-sufficiency and emphasizing individual and family preparedness.

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Concerning requests for information, the Los Angeles Civil Defense Office had a drastic increase in the number of requests for earthquake information from both individuals and organizations during this period of time. Mr. Mike Regan, Civil Defense Coordinator, attributed this increase at least partially to the media coverage of the southern California Uplift and Whitcomb's hypothesis test. In answer to these requests, Civil Defense staff have sent out numerous packages of materials covering all aspects of earthquake preparedness. The Civil Defense office also received an increased number of requests for neighborhood block meetings and organization and work group meetings on earthquake preparedness. Basically, these meetings are an hour to an hour and a half long and are usually conducted by Mr. Regan. He covers subjects such as: what to do in case of an earthquake; public services available to stricken areas; and coordination efforts between agencies to provide services to an area as soon as possible. He also shows one of two earthquake preparedness movies during these presentations.

Period 4: July 28, 1976 to November 21, 1976

This period begins with the most devastating earthquake of this century striking Tangshan, China on July 28. Approximately 655,000 people died and nearly 800.00 were injured.

Little organizational earthquake activity took place in the first part of this period. However, on September 23 the Emergency Preparedness Commission sponsored its second county-wide earthquake disaster exercise entitled "Operation Ring of Fire." This was to provide government agencies within LA County an opportunity to train their personnel, examine their emergency procedures and coordinate their efforts with other jurisdictions. The scenario used called for several earthquakes of increasing magnitude throughout Los Angeles and

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Orange Counties causing extensive damage throughout the Los Angeles area. Although a stronger earthquake is very possible, a maximum 6.5 earthquake was proposed in order to make the exercise "credible." Also, county resources are believed to be pushed to the limit by such a quake and the sheriff's department felt it would not be useful to give participants a situation they could not deal with.

The exercise was conducted at the County's Interim Emergency Operating Center (EOC) and from city and other EOC's. The EOC was established in 1973 as a central coordinating facility and can be staffed quickly by trained sheriff's personnel and representatives of other county departments and service agencies working together as a team to coordinate and support the multiagency emergency response operations. When activated, it serves as a central disaster information point, provides contacts with cities through sheriff's stations, and disseminates information and instructions for the public. It also serves as an information and coordinating link with the State. In this exercise more than 800 individuals from 14 County departments, twelve cities, the Red Cross, utilities, OES, California Highway Patrol and the Radio Amateur Civil Emergency Services (RACES) participated in the exercise.

RACES is a volunteer group of about 600 ham radio operators. They have two regular sheriff's department sergeants assigned to them. These volunteers go through a training program and must remain active in the organization, or they are dropped. As active members, they are allowed to wear departmental uniforms and have their own special sleeve patch which is emblazoned with a red lightning streak and the words "Disaster Communications." They have some equipment in each of the substations for RACES, but they are trying to get the cities to set up their own facilities for RACES in order for the communication flow to be free of hazardous conditions during emergencies.

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After the 1971 earthquake, the county came up with a plan to tie the various cities together into one, large communication network. At that time, the only communication system that was available was the telephone system, which was quickly knocked out. In this plan, RACES is to provide a supplemental communication link between each community's EOC and the Sheriff's Communication Center (the county EOC). The RACES personnel only go into operation when the individual cities' EOC's become "operational." The Sheriff's Department encourages the cities in the county to get involved in the county plan and for those who do, the department helps the cities recruit volunteers to be RACES personnel.

At the same time as the county-wide exercise was taking place, the Los Angeles Police Department held their own earthquake drill(using a slightly modified scenario. They hold several such drills each year. At this particular one, the LAPD set up their mobile command post at the Hollywood Bowl. The participating police officers were "volunteers" specially trained in emergency procedures. They participate in several such exercises each year in addition to their regular duties. The mobile unit was set up so that it could be staffed by others who were first on the scene until the specially trained personnel arrived. This was the first time the LAPD used "ham" radio operators in their exercise. However, these were off-duty police officers rather than civilians as in the Sheriff's RACES program.

Also in September, the <u>Southern California Earthquake Response Planning</u> <u>Guide</u> was completed. This guide was intended for use by city managers or administrators, department heads, emergency services coordinators, and other emergency response planners. It was developed in conjunction with the Federal Disaster Assistance Administration and the California Office of Emergency Services, and was funded by the former group. The guide was developed to

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provide state and local agencies, both public and private, with guidance for developing their individual earthquake response plans. The information contained in the guide "should assist in the development of a coordinated set of response plans for conducting emergency operations in accordance with a commonly accepted concept of operations and using a common information base" (Southern California Earthquake Response Planning Guide, pg. 1).

The materials in the guide cover several major topics:

1. the magnitude of the problems and functions that will be required to save lives and property including law enforcement, firefighting, search, rescue and first aid, and possible evacuation of areas threatened by dam failure;

2. functions required to cope with the problem of caring for injured people, including medical care, emergency welfare services, other needed assistance, animal control and related problems;

 the problem of providing essential services to the affected areas;
 a system for managing operations and guidance or contingency planning, mutual aid, and planning issues.

The guide also provides checklists for planning emergency actions that will be necessary immediately following a major earthquake. It does not, however, consider pre-impact preventative measures to reduce risk, nor does it consider long term rehabilitation and recovery measures that will be required over a period of months and years following a major quake.

Beginning with the September meeting of the Emergency Preparedness Commission, efforts were made to update the current status of the dam evacuation planning taking place in the county. At this meeting, Jim Haigwood, OES, reported that there are 97 dams in the Los Angeles County of which 82 are required to submit dam inundation maps under the requirements of the Dam Safety Act. The act provides that OES send the dam inundation maps to the appropriate public safety agency in each jurisdiction and that that agency then be responsible for the preparation of evacuation plans and other emergency plans necessary in a dam failure situation. To date, 68 maps have been received from dam owners and reviewed and approved by OES. Two others are

are currently being reviewed and 7 were returned by OES for changes and resubmission. Captain Alley of the Sheriff's Department reported that although they had not sought or wanted Dam Evacuation Planning responsibility, it had been relegated to them. Therefore, the Sheriff's substations would be coordinating the plans among and between the jurisdictions by dam inundation area. The Commission itself has been monitoring this program to help effect coordinated planning and insure compliance with the law. EPC receives regular reports on the status of the County-wide effort to coordinate dam evacuation planning on a multijurisdictional basis.

The October EPC meeting was focused primarily on the status of the safety of dams program. Representatives from the LA Department of Water and Power, LA Flood Control District, Metropolitan Water District and the California Department of Water Resources gave reports on Dam safety and preparation of dam inundation maps. First, Gordon Duklith, California Department of Water Resources, briefly summarized the dam safety program. He stated that his office had developed computer programs to analyze a dam's seismic response to various earthquake magnitudes. If a dam is found to be unsafe, the burden to upgrade it rests totally with the dam owners. The responsibility of the Department of Water Resources (DWR) is to evaluate dam safety and issue operating certificates. Since the current testing procedures were not available until the last few years, Duklith stated that DWR had established a priority system for dam testing. Those dams which were constructed of concrete (rather than earthfill) were tested first. These are usually the oldest dams and the least flexible in their response. He said that most of these dams have now been tested, but none of the earthfilled have. Also, those dams which are nearest to faults were given priority testing, as were those that were nearest to densely populated areas. Duklith said that seismic investigations are quite expensive and time consuming--about \$200,000 per dam.

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His office is presently involved in some research on less expensive testing. Duklith also mentioned that the work in his office has greatly increased since the San Fernando earthquake, and especially since the Oroville earthquakes of one year ago. He said that after the Teton Dam collapse, his agency was also flooded with calls about specific dams in various areas. He feels that these events have sensitized the public to dam safety. He said that any time earthquake predicitons are made, public interest and concern are generated; but usually this just "causes problems" for his office because people have to be reassured. He mentioned the Palmdale "bulge" and said that the publicity surrounding it caused especially widespread concern and anxiety.

Mr. J. M. Wool, Los Angeles Department of Water and Power, next reported that his department has investigated all of the hydrolic filled dams owned and operated by DWP and that none of them would operate satisfactorily in a "maximum quake." All of their dams are being operated at reduced levels at the present time. He said that there are six people who are designated as a full-time surveillance team; their job is to rotate to different dams and perform different safety tests every few months. Besides these engineers, there is an entire Water Operations Division with many of the technicians actually living at the dam sights. These engineers perform two inspections of the dams every 24 hours along with inspection of seepage monitoring devices allowing seepage to be measured twice a day. If a "flow" is detected, the technician contacts the district office and a surveillance team is then sent to the site. The team then evaluates the seriousness of the problem, reports to DWP staff, and if necessary, alerts proper authorities.

Mr. Al Swanson, Los Angeles County Flood Control, then reported that his agency is responsible for the regulation of 18 dams--9 concrete and 9 embankment. They are also involved in a dam safety program and, like DWP, have resident operators at the dam sites on a 24-hour basis. They now have a task 54%

force composed of geologists and engineers who evaluate the data on the dams' seismic response tests. He stated that a re-analysis of all of their dams was undertaken after the 1971 San Fernando quake. Presently, they only have a few remedial steps left to bring up their dams to current safety standards.

Concerning dam evacuation planning reports, Caroline Pratt, EPC, reviewed a report which her office had prepared synthesizing the plans being made by local governments. To date, Pratt said that Pasadena was the only city in the county to have their inundation plan approved by the Office of Emergency Services. A summary of the report is as follows:

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4 cities--well into planning effort
30 cities--waiting for contact from the sheriff's department
2-3 cities--involved in planning but far from completion
15 cities--not planning at all
4 cities--not aware of the law
4 cities--didn't know what to do or who to contact
22 cities--not affected because they are not in inundation areas
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Captain Alley, Sheriff's Department, reported that his office was involved in a "limited coordinating function." He said that station commanders had reviewed all the requirements for the dam evacuation planning program and have been meeting with Gardener Davis from OES and the Civil Defense Coordinators in their respective areas. They were now ready to contact the independent cities in their jurisdictions to invite them to participate in the area planning. Any independent city that did not want to participate would be responsible for coming up with their own evacuation plans and submitting them to OES.

The remainder of this period brought an increase in the number of requests for earthquake information to several agencies. An earthquake safety pamphlet was distributed to all customers in the September billing of the Pacific Telephone Company. It suggested that if people wanted more information, they contact one of several agencies such as the Office of Emergency

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Services, the Seismic Safety Commission, or the US Geological Survey.

During October, the Seismic Safety Commission received an unusually large number of requests for earthquake information as did OES. OES reported that earlier in the year, the number of requests they had received averaged approximately 5 per week. However, in October these requests increased to about 500 for the month, averaging 20 per day, with about 50 phone calls for the month. Also, USGS reported a similar increase in requests. A summary is given below:

1976	Letters	Phone calls	Total
First Quarter	98	60	158
Second Quarter	78	94	172
Third Quarter	67	86	153
October (only)	500	400	900
Total			1383

(Interview with C. Castro, USGS Public Relations Officer, Menlo Park, 1-10-77)

The number of requests for information on earthquake and earthquake prediction continued to increase in November and December. For instance, OES received more than 700 requests in November with an increase to 1000 request for December. OES officials attributed most of these requests to three sources--the telephone brochure, the public service spots, and the wellpublicized earthquake prediction by Henry Minturn on November 22. Concerning the public service spots, the first of four television announcements was released to 61 stations throughout California in September. The second set was distributed in October with the third in November. The ten radio PSA's were also released to approximately 400 radio stations during this time.

Also in October, an earthquake prediction council responsible for reviewing data that could warn of an earthquake and for recommending the issuance of a prediction was established by the US Geological Survey. The council consists of five USGS scientists and is the first Federal group of its kind in the United States. According to Dr. V. E. McKelvey, Director,

USGS, the formation of the council is a response to the Disaster Relief Act of 1974. The Act designated the USGS Director responsible for the warning of geologic catastrophies where possible. Basically, the Council will look at prediction evidence from USGS scientists. If warranted, the council would send a recommendation to issue a prediction to the USGS Director. He would then issue the authorized prediction. If requested by a State or Federal Official, the Council will also review predictions by hon-Survey scientists. The Council will focus its attention on potentially destructive quakes of magnitude 5.5 or greater. Members include Dr. Jerry Eaton, USGS, Menlo Park, designated as Chair of the Council. Other members are Drs. Robert Wallace, Peter Ward, Robert Page, and Jack Evernden, all from the USGS Office of Earthquake Studies, Menlo Park (USGS News Release, 10-18-76).

UCLA's Extension Program offered a non-credit seminar entitled "Earthquakes: Prediction, Risk and Survival" on October 2, 1976. The program was designed to inform the public about earthquake prediction, living with risk, and optimizing preparedness and survival. Seminar speakers included Dr. Barry Raleigh, USGS, Menlo Park; Dr. Ralph Turner, Department of Sociology, UCLA; John Wiggins, Risk and Safety Analyst, J. H. Wiggins Co.; and Charles Manfred, Director, Office of Emergency Services. There were approximately 41 participants who attended the day-long seminar. Participants were asked for their organization affiliation. The following organizations were mentioned: LA Fire Department, LA Civil Defense, Red Cross, Cal Trans, SOHIO, National Institute for Mental Health, LA County Sheriff's Office-Emergency Operations Bureau, Disaster Planning Committee of a major hospital, Geology Department, LA Public Library-Science and Technical Department, and Quake Watchers.

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During the very end of this period, several earthquake preparedness presentations were given. First, in November the Emergency Preparedness Commission sponsored a seminar on earthquake preparedness for county supervisors designed to convey what could happen to Los Angeles in a major earthquake and how government would respond. It was hoped the seminar would point out gaps in the governmental response system to emergencies. Attendees were primarily government 6fficials, civic groups, and press representatives.

The Creative Home Economics Consultants were also active. In November, CHEC representatives, at the request of the Los Angeles Civil Defense officer, presented their program at an Emergency Preparedness Commission meeting. They then gave their presentation to 12 city agencies at City Hall. This presentaiton was arranged through Mike Regan of the Civil Defense. The purpose was both to inform city personnel about earthquake home preparedness and to convince Mr. Regan to incorporate the CHEC presentation into his community preparedness meetings. Also, CHEC sent out letters to 60 mayors in the Los Angeles area, explaining their program and suggesting that the mayors might be interested in setting up conferences in their own communities. However, they only received 2 or 3 responses from these letters. CHEC representatives also met with the Division Head of Curriculum and Instructional Services for the Los Angeles County school system. They agreed to prepare an instructional program for home economics teachers regarding what to do during and after an earthquake.

Period Five: November 22, 1976 to February 2, 1977

On November 22, Henry Minturn announced his forecast that an earthquake would strike the Solomon Islands on December 6 followed by a major quake in southern California on December 22.

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On November 23, USGS National Information Service issued a news release stating that they were keeping records of all earthquake predictions made by the public. To date their file contained 171 predictions from 32 authors. None of the authors, however, had achieved a high-enough rating to merit any sort of consideration. Interested parties were invited to participate in the program by sending their predictions directly to the Denver facility.

In early December, due to media publicity concerning Henry Minturn's earthquake "prediction," Roger Pulley, Earthquake Programs Coordinator, OES, requested information from Minturn concerning the basis for his prediction. Upon receipt of the information, Tom Gay, State Geologist and chairman of CEPEC, reviewed it but decided it did not merit Council deliberation. This process followed CEPEC guidelines for evaluation of a prediction that does not meet the damaging earthquake or scientific criteria but has caused widespread public concern.

During the remainder of Period Five several organizations made presentations to community groups. On December 10, in an address before the Commonwealth Club of California in San Francisco, Dr. Robert Hamilton, Chief of the USGS Office of Earthquake Studies, stated "Californians should not ignore or underestimate the earthquake threat, nor should irrational fear of earthquakes be allowed to be a diversion from rational preparations." He then discussed some aspects of the act of earthquake prediction, both in the US and other countries. He also mentioned the Southern California Uplift as a <u>possible</u> precursor to a major quake. Then, in late December, an earthquake preparedness meeting was held for city government officials. Twenty-five people attended, representing the eight cities within the El Cerritos College School District and four other districts. Participants were first sent a questionnaire asking what problems they foresaw in coordinating earthquake preparedness

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measures. These problems were then addressed at the seminar by representatives from the Red Cross, Civil Defense, Sheriff's Department and the EOC Coordinator. The main issues addressed were problems associated with evacuation routes, storage of food and medical supplies, and mutual storage of equipment.

In January, CHEC representatives made their presentation to the Industrial/Business Emergency Preparedness Seminar in San Bernardino. It was also at this time that CHEC members published their workbook, <u>How to Survive an</u> <u>Earthquake: Home and Family Preparedness</u>. This booklet is available at their presentations or by mail for \$2.50. Also, Harriet Paine of CHEC offered a six-week adult course on home preparedness at El Cerritos College. School officials were convinced that this was a "timely course" especially since the Minturn "prediction" in December.

January was also the month when OES released the last of a series of four public service announcements to be aired on various stations throughout California.

Period Six: February 3, 1977 to May 12, 1977

Period Six begins with the announcement by Robert Castle, USGS geologist, that a 13-centimeter tilt, possibly related to the southern California Uplift, was discovered in the desert east of Palm Springs. This announcement marked the start of continuing reports of changes in the Uplift.

Looking at organizational earthquake response activity, the period began with the Emergency Preparedness Commission sponsoring the "Third Annual Emergency Preparedness Seminar for Government Officials" at the Montebello Golf Course, Montebello, California, on February 9th. This seminar was directed toward key officials from government, industry, schools, medical fields, and the media. Approximately 420 representatives participated in the

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half-day seminar. The program was designed to increase knowledge and understanding of potential disaster situations and methods of dealing with them. Speakers included: Kenneth Long, Chief Engineer and General Manager, LA Fire Department; Robert Winston, Board of Supervisors, Butte County; Sherman Block, Undersheriff of LA County; Gilbert Leonard, Chairman of the Legislative and Policy Committee and past president of the US Civil Defense Council; Gilbert Smith, President of LA County Division League of California Cities; and Dr. George Fischbeck, Television Channel 7 News Commentator. Exhibits and materials on disaster response systems and equipment were displayed for participant inspection.

Then, on February 10, the EPC Public Information Committee held its third news media workshop devoted to establishing a better working relationship between the news media and emergency service personnel (previous ones were held in November '76 and January '77). Of special concern was the manner in which immediate post-emergency public safety announcements are made and methods of handling pre-emergency public information. It was decided that a public service information packet would be developed. This would probably include both written and videotaped public information spots for TV.

Also during February, El Cerritos College in Norwalk sponsored an Earthquake Preparedness Seminar for the community. Approximately 200 people attended--65 percent from the community with the remainder from First Aid and Early Childhood classes at the college. The program included the film "Our Active Earth" about the 1971 San Fernando earthquake and three speakers. These were: Mr. Bodel, Red Cross; Mr. Pratt, Area E Office of the Civil Defense; and Ms. Lafferty of the Creative Home Economics group. The CHEC presentation, an updated and more professional version of the one they presented at the Downey Conference, included an hour-long slide presentation.

By the end of the month, requests for earthquake information began to trail off. OES reported a decrease to only about 10-15 per week. OES officials, however, did not attribute this decrease to a general lack of interest in the subject. Rather, they felt because of the wide distribution of information to local communities (films, booklets, etc.) those interested were able to obtain earthquake information from a variety of sources instead of going directly to OES.

On February 22, the California Earthquake Prediction Evaluation Council, at its regularly scheduled meeting, adopted the Earthquake Prediction Evaluation Guidelines. According to the guidelines, the Council functions as follows: predictions and similar information coming to the attention of the Council, either directly or indirectly (e.g., by appearance in the public media), are screened by the Council Chairman prior to being accepted for evaluation. The Chairman, in consultation with OES, determines whether to present a prediction statement to the full Council for formal evaluation or to declare it to be without sufficient merit to warrant Council deliberation. When a prediction statement has been accepted for evaluation, a meeting will be scheduled as soon as feasible. The Council's test of scientific validity is primarily to evaluate the accuracy and completeness of the predictor's data, the logic and applicability of the scientific method used, and the predictor's accuracy in applying them in arriving at the announced results.

Normally, the Council will evaluate only scientifically-based predictions of damaging earthquakes (Richter magnitude 5.5 or greater). However, public concern or other circumstances outside of the prediction statement itself may make it advisable for the Council to consider a specific prediction despite the statement's failure to meet established criteria.

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On February 23, Los Angeles Mayor Bradley's newly formed 25 member Task Force on Earthquake Prediction held its first meeting. Rachel Gulliver Dunne, President of the Building and Safety Commission, was appointed to chair the Task Force. Mrs. Dunne explained that the purpose of the Task Force was to develop a report for the Mayor with regard to critical questions on earthquake prediction and how the city could and should respond to an earthquake prediction. The ultimate goal is "to establish a preparedness document to mitigate possible effects of an earthquake. As well as social and economic effects of earthquake prediction" (Task Force Minutes 2/23/77). Sub-committees were agreed upon. They include: Emergency Preparedness; Economic Stability; Governmental Coordination and Legal Aspects; Hazardous Facilities and Lifelines; Public Information; Safety of Buildings; and Psychological and Social Impact. The Task Force was directed to meet twice a month.

At this and several subsequent meetings of the Task Force, various members of the "earthquake disaster" community addressed the group. Charles Manfred, Director of the State Office of Emergency Services, outlined the operation of OES and defined its position and policy as it relates to earthquake prediction. He reported that OES is monitoring the development of earthquake prediction technology and has established the California Earthquake Prediction Evaluation Council to advise the Governor on scientific aspects of specific earthquake predictions. He also stated that USGS has also set up an earthquake prediction evaluation committee. When the Governor or OES is advised by these bodies of a scientifically credible prediction, it will be their responsibility to issue an official warning to local governments and to provide advice on appropriate precautions.

Dr. J. Eugene Haas, University of Colorado's Institute for Behavioral Sciences, addressed the third meeting of the Mayor's Task Force. He presented a slide show and summary of the Haas-Mileti study, "Socioeconomic Impact of

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Earthquake Prediction on Government, Business and Community." He stated that major disruptions can be expected with the first scientifically endorsed prediction. He stressed that government emergency planners should be prepared for persons moving out of areas predicted for a major quake, for declining property values, and for increased unemployment. Next, Dr. Clarence Allen, Caltech, addressed the Task Force on the range of possible prediction scenarios that he considers likely to occur within the next five years. This information will be combined with other concerns of the subcommittees to produce a range of scenarios to be used as a base for recommendations to the Mayor.

On March 2, the Los Angeles Civil Defense Office conducted a city-wide emergency preparedness drill posing a 6.9 magnitude earthquake. This drill was different from the recent ones held by the police and sheriff's departments in that the earlier ones were conducted primarily for those two law enforcement agencies. The current one involved agencies such as: welfare, supplies, engineering, schools, etc. This drill was set up by the Civil Defense and Disaster Board. This group is comprised of nine general managers from nine city departments. They are: Chief of Police, City Administrative Officer, Civil Defense, Fire Department, Building and Safety, Water and Power, Communications, City Attorney, and the City Medical Officer. It was one of about 10 drills conducted each year focusing on a variety of emergency-disaster situations.

Also in March, the Office of Emergency Services sent a fourth letter to local jurisdictions. This gave local officials updated USGS data indicating that parts of the Palmdale bulge may have dropped as much as 7 inches since 1973. The letter also briefly mentioned Minturn's (but did not mention name) prediction. The establishment and precedures of CEPEC were also discussed. Then, on March 28, OES released a news announcement informing the public that a panel of scientists had established guidelines for a centralized evaluation

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of earthquake predictions in California. CEPEC's procedures were discussed briefly and its members'names listed. Council members include: Tom Gay, Acting State Geologist; Clarence Allen, Professor of Geology and Geophysics, Caltech; Bruce Bolt, Director of UC Berkeley Seismographic Stations and Professor of Seismology; James Brune, Professor of Geophysics, UC San Diego; Jerry Eaton, Seismologist, Office of Earthquake Studies, US Geological Survey; Robert Kovach, Professor of Geophysics, Stanford University; Roger Sherburne, Seismologist, California Division of Mines and Geology; James Slosson, Professor of Geology and member, State Seismic Safety Commission; and Ta-Lian Teng, Proffessor of Geophysics, University of Southern California. The Earthquake Prediction Evaluation Guidelines were also published at this time.

April was a month in which the Creative Home Economics Consultants were particularly active. First, they presented their program to the California Home Economics Association Convention held in San Diego. Next, CHEC representatives held four home preparedness workshops for the public at junior high schools throughout the Downey area. These workshops were jointly sponsored by the City of Downey. They also participated in an in-service workshop for home economists and vocational education teachers in Downey. They also presented their program for the general public at Pierce Community College and in Santa Barbara for the Southern California Emergency Services Association.

Also in April, the University of Redlands sponsored a one day seminar entitled "Earthquakes: Prediction and Consequences of Predictions." Participants included: Dr. James Whitcomb, Cal Tech; Dr. Darrell Wood, USGS, Menlo Park; Dr. Thomas Bache, Systems Science and Software, Inc.; Dr. Ralph H. Turner, Department of Sociology, UCLA; Dr. Robert Olson, Director, Seismic Safety Commission; and Dr. Richard Olson, Department of Political Science, University of Redlands.

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In May, at the regular meeting of the Emergency Preparedness Commission, it was reported the discussions have been held with County school officials and city school officials regarding the need to coordinate school planning countrywide, particularly as to which emergency resources the schools should utilize and the need for uniformity of planning--such as whether school children should be released or not released during an emergency. The Executive Officer asked Dick Wales of the County Superintendent of Schools Office to comment on the Superindendent Office's relationship to the schools throughout the County. Mr. Wales reported that their function was to act as a contact with the 95 school districts in Los Angeles County. Each district has its own elected school board and acts autonomously. Therefore, the County Superintendent of Schools Office is not in a line of authority. The Executive Officer reported that the expressed needs of some of the shcool's people had been discussed with Chairman Barlow and from the discussion a recommendation had been made to the Plans and Programs Committee that a Schools Planning and Coordinating Sub-Committee be set up that would include representatives from Los Angeles County and City Fire and Law, as well as Health, Red Cross, industry, Pacific Telephone Company, and Area and city representatives who could work in coordination with school officials to identify problem areas and propose solutions.

Finally, the Office of Emergency Services awarded a contract to a Los Angeles firm to develop a movie for TV primarily on earthquake safety. Plans were to make a twelve-and-a-half minute movie covering the "do's and don'ts" in an earthquake, with safety hints directed both at individuals and family. The planned theme was an escape artist prepared for anything, including earthquakes. This movie was part of OES's goal to educate the public concerning earthquake preparedness. The movie was made but because of poor quality was

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not shown on TV.

Period Seven: May 13, 1977 to September 8, 1977

Period Seven begins on May 13 with the announcement that the US Senate had unanimously passed the Earthquake Hazards Reduction Act sponsored by Alan Cranston. This act authorized \$205 million to be allocated over a three year period for research in the areas of earthquake prediction and hazard reduction.

The majority of organizational earthquake activity during this period had to do with earthquake preparedness presentations and public service announcements. For example, on May 24, 25, and 26, the 24th Annual Western Safety Congress and Exhibits was held at the Anaheim Convention Center. It was sponsored by the Greater Los Angeles Chapter National Safety Council. One portion of the program, "Disaster Planning," was sponsored by EPC. It included a presentation by Dr. James H. Whitcomb, Cal Tech, on "Earthquakes---Causes, Effect, Predictions, Planning Considerations."

In June, a special meeting of Mayor Bradley's Task Force on Earthquake Prediction was held to enable representatives from Creative Home Economics Consultants to present their information to the Task Force and other city employees. Their presentation included a slide show and display of pamphlets and information on earthquake preparedness. CHEC members also presented their program to the National Red Cross Workshop held in Pasadena during this month.

Also in June, at the regular meeting of the Emergency Preparedness Commission, members of the Sheriff's Department gave an update on the dam safety program. They reported that to date the last 38 dam evacuation plans for the county had been submitted for review. All plans for LA city dams had also been submitted.

In July, the only significant organizational earthquake response activity was the passage of Resolution 1-77 by the Seismic Safety Commission. This resolution requested the California State Department of Education to reinstate their disaster preparedness education program, including earthquake drills and provide a better coordination of school disaster plans.

By August, the Office of Emergency Services was only receiving approximately two or three requests for earthquake information per week. Also during this month, OES analyzed the amount of radio and television exposure their earthquake public service announcements had received. Initially, the radio spots, distributed to approximately 400 stations in October, 1976, were not widely used. By November, 1976, only about 15.6 percent of the stations used the spot. Of the 56 in the LA area, only 8.9 percent reported using the announcements as compared with 16.8 percent of the other California stations. However, by August, 1977, an estimated 100 stations throughout California reported using the spots. Many of these stations were smaller, independent stations reporting multiple usage of each of the 10 spots. The spots also received coverage in other areas outside California. In response to them, OES received requests from Canada, Alaska and Guam to use the Emergency Service radio spots. Considering television coverage of the four TV public service announcements, the results are similar. Table 1 reports coverage approximately one month after each spot was released. Most coverage was in January, 1977, although still only 26 out of 60 (43.3 percent) stations reported using the spots. Stations in LA County clearly trailed behind those in the rest of California. However, by August, 55 of all the television stations reported using the earthquake spots. Of the seven Spanish speaking stations, nearly all reported using the spots. Also, OES received about 150 requests for more information from people who had reviewed these television spots.

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TABLE 1

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TELEVISION COVERAGE OF OES PUBLIC SERVICE ANNOUNCEMENTS OF EARTHQUAKE PREPAREDNESS AND SAFETY: BY AREA AND MONTH¹

Month	Number of area stations	Stations using spots	Percent of usage	Average number of showings per stations
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Los Angeles County				
October, 1976 November, 1976 December, 1976 January, 1977	14 13 14 13	3 1 1 4	21.4 7.7 7.1 30.8	13 13 8 13
Other California				
October, 1976 November, 1976 December, 1976 January, 1977	47 48 47 47	16 16 18 22	34.0 33.3 38.3 46.8	10 13 11 13

 $^{\rm I}{\rm These}$ statistics were derived from reports collected for OES by Moderrn TV Spots.

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Period Eight: September 9, 1977 to December 7, 1977

Period Eight starts with the announcement by Caltech scientists that they had detected a large number of small earthquakes along a 20 mile stretch of the San Andreas fault near Palmdale. Such "quake swarms" were known to have preceded the 1971 San Fernando quake and other large tremors.

Although there had not been an actual prediction on the basis of the "quake swarms," the California Earthquake Prediction and Evaluation Council felt it would be helpful to discuss the announcement at their regular meeting on October 12. At that meeting, Clarence Allen of Caltech led the discussion of microseismic activity which came out of the work of Dr. Karen McNally of Caltech. Allen stated that swarms have preceded some earthquakes and not others. He felt there is no cause for alarm. All and all, he tended to play down the significance of the swarms as being precursors to an earthquake. Allen added that the public must be patient with scientists about predicting quakes. He stated that just because someone goes on the news doesn't mean there is a prediction. He stressed that the public must be kept informed of all earthquake activities and research. He added that scientists could not keep anything secret even if they tried. He stressed the point that scientists must be careful with how they put forward information, but they also must be honest. Thus he brought home the point that scientists must be willing to keep the public informed of their activities. No formal evaluation was made regarding the "quake swarm" announcement.

Regarding the National Earthquake Hazard Reduction Act of 1977, Bob Olson of the State Seismic Safety Commission discussed the Cranston Bill of the CEPEC meeting. He stated that the objectives of the bill included: a system to predict earthquakes, to design and develop new construction methods for existing unsafe buildings, to develop codes and land use planning, public

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education, improve social understanding of predictions, to study how to make insurance available, and means of earthquake control. Olson stated that the mission of the Earthquake Hazards Reduction Committee which met in September was to prepare for the implementation plan of the Cranston Bill and to specify roles of local agencies and organizations. Three main concerns were discussed:

1. Hazardous Buildings--providing funds for local evaluation, experimenting with existing buildings and making property loans.

2. Predictions--management of information and responses to predictions and the study of the impact of predictions on local decision-making; the use of federal disaster funds for implementation plans; development of an authoritative warning system; clarifying the legal implications of predictions and controlling potential prediction "promoters" for commercial fraud.

3. Public Information--the coordination of efforts to integrate community groups and to strengthen areas of disaster preparedness.

While this bill would provide funding for a three year period, Olson and Allen clearly pointed out that it would be impossible for the government to think that the prediction effort could be implemented in three years. Allen stated that he hoped that the government would continue its funding beyond the three year period. He added that he hoped the government would not be hesitant to refund the project if results were not delivered in three years.

Next, Roger Pulley, OES, brought up the discussion of the importance of distinguishing between different levels of potential earthquake warnings. He stated that he had been working on such a schema which would assign certain probability estimates to the eventuality of a coming quake. He discussed three levels of warning:

1. Earthquake Advisory--a long term prediction

2. Watch--long term evidence of a coming quake

3. Warning--a short term period before an earthquake with several levels of evidence that earthquake activity is imminent.

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Pulley asked the panel of scientists if such a classification could be applied to earthquakes. Jerry Eaton, USGS, added that we may need different terms for the public and scientists. Allen added that scientists at this point were nowhere near the watch level and that specific time windows must be added to each of these warning levels so the public can better understand the meaning of the warning. Pulley agreed not to make any definitive statement on these warning levels until confidence levels and time windows can be worked into the schema.

In an interview on October 31 with Dr. Peter Ward, Chief, Branch of Earthquake Mechanics and Prediction, he stated that to date, USGS's Earthquake Prediction Council had reviewed three "predictions": the southern California Uplift announcement, Dr. Bufe's prediction of a small quake on the Hayward Fault, and Dr. King's prediction in February for a quake around San Juan Bautista. Data, however, did not warrant a formal warning in any of these cases. Also, the Council reviewed Whitcomb's announcement (however, not for the purposes of issuing a statement) and came to the same conclusions as CEPEC. Ward also mentioned that they had received a large report which included a prediction for Peru from a scientist with the Division of Mines. The Council sent this information to the Peruvian government. They felt they should not evaluate the prediction unless specifically requested by the Peruvian government.

Also, in reviewing requests for information and for speakers concerning earthquake related topics, representatives at USGS, Menlo Park, indicated there had been a slight increase in the first 3-4 months of 1977. They attributed this to the publicity surrounding Henry Minturn's "prediction" in December, 1976. Below is a summary of requests:

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1977	Letters	Phone Calls	Engagements	Total
First quarter	157	83	18	258
Second quarter	78	72	15	165
Third quarter	54	93	11	158
Total	Ľ	565<		581

C. Castro, Public Relations Officer, also stated that due to the requests mentioning the southern California Uplift or James Whitcomb, she had composed a short statement to include in the information packet sent to the public. Briefly, this statement mentioned that studies are being made in the Palmdale area to determine whether evidence exists to indicate an impending quake. The statement also mentioned that CEPEC reviewed Whitcomb's data and determined that it was insufficient to issue an official warning. She also mentioned that USGS's pamphlet series is now being revised.

During the first part of this period, the Seismic Safety Commission was also active. On September 28 and 29, the SSC held meetings with local government officials in both northern and southern California regarding the National Earthquake Hazard Reduction Program. Recommendations were sent to Carl Steinbrugge's task force regarding implementation of the Cranston bill. Recommendations covered areas such as: non-earthquake resistant buildings, potential impacts of earthquake prediction, education and information programs, insurance programs, building codes, and local governments' role in earthquake hazard reduction. On October 18, SSC officials met with representatives of the Council of Governments regarding the National Earthquake Hazard Reduction Program. Most of the discussion focused on the problems of paying for earthquake hazard reduction programs and the need to strengthen disaster preparedness programs.

Then on October 20, SSC held their annual workshop on hazardous structures in San Diego. The workshop related specifically to what local communities can do about reinforcing pre-1933 buildings. A SSC task force consisting of 5 SSC members and 2 outside members was set up to work on formalizing recommendations regarding the pre-1933 buildings for local communities. Four major topics were emphasized during the workshop. They included: 1.) standards for

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building rehabilitation; 2.) roles of public finance; 3.) social issues and community participation; 4.) local government and public finance.

On October 19, a County-City Disaster Safety Exercise was held. The scenario used was a 7.0 earthquake on the Newport/Inglewood Fault that caused damage in the southeast portion of the county, including the cities of Pico Rivera, Carson, Lakewood, Lynwood and Norwalk. Participants included 15 cities, 14 county departments, 5 state agencies, 3 hospitals, the Red Cross, the telephone company, public utilities and the news media, OES, California Highway Patrol, and Radio Amateur Civil Emergency Services (RACES). Also, one high school in Carson volunteered some of its students to act as quake victims. The exercise reaffirmed the continuing need for county/city exercises to increase coordinated county-wide effectiveness in training emergency response personnel, testing emergency procedures and systems, and preparing to utilize available resources. The exercise was considered a success although additional training was thought to be necessary.

Finally, on October 27, the Emergency Preparedness Commission and the Los Angeles Community College District sponsored the First Annual Emergency Planning Seminar for School Officials, held at the LA Convention Center. The idea behind the seminar was that the educational system is seldom an integral part of community disaster planning although the schools can play an important role during all phases of a disaster, including pre-disaster response. The seminar included several speakers and a variety of workshops. Approximately 400-500 people attended. The three workshops sponsored by the Commission included Media Coordination: "Truth is the First Casualty" and "Curriculum Development for Disaster Planning" and <u>Mass Evacuation</u>: "The Dam Safety Act."

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The month of November started with an earlier-than-scheduled Seismic Safety Commission meeting. This was held in Palmdale on November 10. Robert Olson, SSC, stated that the reason this meeting was held early was that Robert Hamilton, USGS, had requested the early date due to new information regarding the "Bulge." It was held in Palmdale at the request of Congressman Chimbole (representing the Antelope Valley). He wanted to make the public aware that he and other officials were concerned about the earthquake problem in their area. Many groups were represented at the meeting including: USGS, Caltech, Department of Mines and Geology, Department of Water Resources, and the LA County Sheriff's Department.

Most of the information given was an update on earthquake activity in the Palmdale area, especially Dr. Karen McNally's investigation of the "quake swarms." Also, Peter Ward, USGS gave a summary of USGS' purpose regarding its investigation of the southern California Uplift. Although he stressed the possibility that the uplifted area <u>might</u> be a precursor to a great quake, he stated that at this time they did not have any observation that would indicate the time, place, or magnitude of any specific impending earthquake in southern California. Ward also stressed the fact that proper earthquake planning is important. He suggested such planning include: (1) evaluation of the likely effects of a possible earthquake; (2) identification of hazardous structures and of what to do with these structures; (3) public education in techniques of reducing earthquake hazards; (4) planning for the eventuality of handling earthquake predictions of varying specificity.

During the discussion that followed the agency presentations, Mr. Easterling, Palmdale Chamber of Commerce, expressed resentment and concern that the uplifted area was called the "Palmdale Bulge." He stated that the area covered more than Palmdale and that the name was having adverse effects

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on the area. Several members of the Palmdale Board of Realtors also expressed their opinion that the Special Studies Zone Act along with the current reference to the "Palmdale Bulge" had adversely affected property values of parcels of land within the zones. Bob Olson suggested officially using the term "southern California Uplift" for the area and stated that the SSC would look into the problems created by the Special Study Zones.

Also during November, the Disaster Preparedness Committee of the Lancaster Chapter of the American Red Cross began sending letters to all the civic, ethnic and social groups and school districts in the Anteleope Valley area informing them that speakers are available to discuss disaster (especially earthquake) preparedness with them. The Disaster Preparedness Committee staggered their mailings to about 15-20 groups a week. The response was very good and many presentations were scheduled (10 in November and 5 in December). This program came about primarily because the Chapter decided it wanted to grow. They felt that the greatest expenditure within the Red Cross is for disaster preparedness. They, therefore, decided to channel their energies into preparedness at the community level.

The program they present consists of three parts. First they show the OES's film on the Sylmar quake or the Red Cross's film "Community Disaster Action." Next they describe how various organizations such as the Sheriff's Department and the Red Cross respond and coordinate activities in the community following an earthquake. Lastly, a new element to the usual Red Cross presentations includes a discussion of what individuals can do to prepare themselves for an earthquake. This includes such suggestions as taking first aid training, making plans to evacuate one's home and stockpiling food, water, and camping gear. Their individual preparedness tips stress self sufficiency as well as dependence on the Red Cross for training, evacuation,

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and disaster relief. This one hour presentation is usually followed by a question and answer period. Most of the discussion in these sessions center around individual's personal experience in quakes and earthquake predictions. The most frequently asked questions about earthquakes are whether quakes can be predicted, if one can tell how severe a quake will be before it occurs, and how people can tell when an earthquake will occur.

Finally, in November, under the direction of the Office of Emergency Services, the California Earthquake Response Plan was completed. This plan is in compliance with the California Emergency Plan which identifies earthquakes as one of the peacetime emergencies for which contingency plans are required. The Plan provides public officials with the magnitude and nature of the potential problems they might be confronted with and the type of response that would be needed following a major earthquake. It contains specialized operational concepts and emergency actions specifically geared toward the unique aspects of a devastating earthquake. The plan stresses emergency preparedness for post disaster problems likely to be faced by the stricken jurisdiction. The overall emergency period is divided into three overlapping phases. The first is the immediate emergency phase. This includes the report and evaluation of the earthquake, search and rescue operations, emergency medical treatment, etc. Next is the sustained emergency phase. This includes actions necessary after the appropriate life-saving and propertyprotecting actions have been completed. They include detailed damage assessment, reuniting family members, and securing evacuated areas. The final phase includes all recovery and rehabilitation actions. Only brief mention is made of the potential pre-emergency/earthquake prediction phase and any hazard reduction actions possible during this time. This is covered more fully in the California Earthquake Prediction Response Plan published separately.

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Period Nine: December 8, 1977 to April 22, 1978

The beginning of Period Nine is signalled by a meeting on December 8 of the American Geophysical Union in San Francisco. At the meeting, eighteen papers were presented on various aspects of the San Andreas Fault system, with several studies pointing to increased seismic activity in southern California.

On the same day as the above meeting, the Seismic Safety Commission held their monthly meeting. At that meeting, Commissioner Steinbrugge reported that the work of the Earthquake Hazards Reduction Working Group was continuing and that considerable interest had been shown in the draft report made by the working group. He noted that input made by the Commission was especially valuable to the report. He also noted that further meetings had been scheduled-one with the advisory committee and one with federal and state agency heads. Also at the meeting, Robert Olson provided background information on Senate Bill 1279, the California Earthquake Hazards Reduction Act. He noted that under the bill the Commission would not be taking on actual operating duties but would instead act as a program manager contracting work out to other agencies. A committee was appointed to examine the philosophical approach of being a coordinating and monitoring agency as opposed to an operational agency and to make specific recommendations as to what the Commissions's role should be in the enactment of a California Earthquake Hazards Reduction Program. Commissioner Steinbrugge was named chair.

Chairman Rigney also commented on the consumer protection aspects of the sale of various earthquake warning devices. It was noted that the Commission is not in the position of endorsing any manufactured products. However, neither can it prohibit the placing of these products on the market. It was suggested that Director Olson discuss this matter with the State Department of Consumer Affairs and OES to find out what they feel should be done.

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Commissioner Perry presented a summary of his report on disaster preparedness problems in California. The problem areas identified as of potential concern to the Commission were suggested from a survey of emergency service directors from around the State. They were:

(1) Lack of executive leadership for disaster preparedness.

(2) Lack of local disaster preparedness programs.

(.3.) Lack of emergency operating centers in many communities and inadequately equipped centers in others.

(4) Lack of training for local officials in disaster operations and skills training for disaster workers.

(5) Lack of disaster program guidance and assistance from the Office of Emergency Services.

(6) Inadequate mutual aid plans.

(7) Dam failure evacuation plans.

The commission voted to accept the report and to refer the matter to the staff for inclusion in the work program agenda.

At the January Seismic Safety Commission meeting, Tom Tobin, Senior Engineer, California Coastal Commission, reviewed the Coastal Commission's functions relating to seismic safety. He stated that the Coastal Act fills a gap between the Alquist-Priolo Special Study Zone Act and other legislation providing seismic safety through land use regulation. Tobin also informed the Commission that the Coastal Commission will be entering into an interagency agreement with the California Division of Mines and Geology in order to solve some of the problems the Coastal Commission has been facing (i.e., the lack of in-house capability for independent geotechnical review of each permit application received, the variance of reliability of registered professionals, and the misunderstanding regarding land use decisions and the Coastal Commissions's evolving interpretations of measures which minimize risks and assure stability). It was also decided that the Division of Mines and Geology and the SSC should



jointly prepare a handbook for publication by the Division of Mines and Geology for local jurisdictions to better understand and administer the Special Studies Zone Act.

At the same meeting, Dick Buck, Disaster Programs Analyst for SSC, reported his findings on the consumer protection aspects of earthquake safety devices. He stated that the Department of Consumer Affairs would soon be issuing a requirement to the manufacturers of earthquake safety devices to substantiate the claims presented in their advertisements. He asked the Commission to watch for other devices that appear on the market and might warrant investigation. Also, Commissioner Steinbrugge suggested that the Commission staff explore the causes behind the utilities' negative attitude toward gas shut-off valves.

During the latter part of January, the Office of Emergency Services continued its campaign to keep local government officials informed concerning recent seismic developments within California. On January 31, Charles Manfred, Director OES, sent a letter to all Chairpersons, Boards of Supervisors, Mayors and Directors of City and County Emergency Services Organizations to inform them of the current status of the southern California Uplift. He mentioned the fact that USGS had announced that the Uplift was larger than first believed to be. Manfred stated that along with discovering a new high point north of Palm Springs, USGS also revealed data suggesting that part of the uplift had subsided. He also gave a brief review of the USGS report to the Seismic Safety Commission last November and included a summary of various anomalies observed including elevation changes, quake swarms, magnetic field changes, gravity and strain changes, and ground cracking. Mr. Manfred again stressed the importance of local government taking preparedness measures for future quakes. He suggested that such preparation might include:

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1. evaluation of the likely effects of possible earthquakes;

2. identification of hazardous structures and consideration of what to about these structures;

3. public education in techniques of reducing earthquake hazards;

4. planning for the eventuality of handling earthquake predictions of varying specificity.

Manfred also suggested that officials in all local jurisdictions become familiar with the recently published State of California Earthquake Response Plan and use it as a guide to update their plans and response procedures.

On February 7, the first CEPEC meeting of 1978 was held in Los Angeles. Charles Manfred opened the meeting by summarizing some of the State's accomplishments toward earthquake hazard reduction since the 1971 San Fernando quake. He also noted that the recently-passed Earthquake Hazard Reduction Act of 1977 will free over 200 million dollars for basic earthquake studies over the next three years, much of which will be spent in California. Manfred also mentioned the planned reorganization of CEPEC. He stated that they will be meeting with each member in order to set up one, two, and three-year terms. This would allow two appointments each year and would free members to serve on other boards and commissions.

Next, the council discussed the two Seismic Safety Commission's Resolutions 2-77 and 3-77. Resolution 2-77 requests State agencies to undertake hazard mitigation and preparedness measures. The second one requests the same from the federal government. These items were placed on the agenda in order to make council members aware of the resolutions.

Council members then discussed the current program sponsored by USGS to involve volunteer groups such as 4H, Girl Scouts, Red Cross, Retired Persons Association, in collecting earthquake-relevant data. Roger Pulley, OES, summarized a two-day conference at USGS in Menlo Park. There, Peter Ward, USGS, outlined a plan to involve the volunteer groups. Basically, over

the next year, preliminary linkage will be established between the volunteer organizations and various scientific projects. Council members then discussed some of the problems which might occur using volunteers (i.e., the expertise of the various groups; time commitments involved; the importance of making individuals feel they are playing an important role). The project is entitled "Project Earthquake Watch," and is funded by USGS. The principal investigator is Dr. Leon Otis of the Stanford Research Institute.

Finally, the council members discussed USGS's Earthquake Prediction Council review program. Basically, this council was set up to review in-house predictions. However, the USGS council has received requests from those outside USGS to evaluate prediction data. This has brought to the attention of the Survey the need for one organization, such as the proposed National Earthquake Prediction Evaluation Council (NEPEC) to be the ultimate body to evaluate earthquake predictions. In the discussions that followed, several members suggested that an advisory agency be formed with members from both within and outside USGS to evaluate predictions and report back to the director of the Survey. No action was taken on this proposal.

On February 8, the Emergency Preparedness Commission sponsored the "Fourth Annual Emergency Preparedness Seminar for Government Officials" at Montebello Golf Course, Montebello, California. This seminar was again directed toward key officials from government, industry, schools, medical fields, media, and other segments of the private sector. Approximately 500 officials attended. The subjects covered included: the possible effect of a major earthquake, dam failure, terrorist attack, or nuclear incident; importance and methods of coordination of mutual aid among LA County's 80 jurisdictions and their interrelationship with the state and federal government in a major disaster; the availability and benefits of disaster relief; and the dissemination of emergency information and instructions to the public.

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For the remainder of this period, organizational earthquake response activity revolved around the Seismic Safety Commission meetings. In response to the Commission's meeting in Palmdale on the southern California Uplift, Assemblyman Chimbole introduced Assembly Joint Resolution 61. This resolution requested Congress to allocate adequate money from the National Earthquake Hazards Reduction Act to meet the highest priority needs for earthquake hazard mitigation in California. On February 9, the Seismic Safety Commission moved unanimously to support AJR 61. Also at that meeting, Director Olson noted Commission received a request from the Structural Engineers that the Association of California for assistance pertaining to the utilization of volunteer engineers for past disaster damage assessment. Director Olson stated that OES will publish and distribute a plan for the utilization of volunteer engineers for post-disaster damage assessment in cooperation with the Structural Engineers Association.

At the March 9 meeting of the Seismic Safety Commission, Dick Buck, Disaster Programs Analyst, reported that the Department of Education refused to provide funding for disaster preparedness education. However, they have appointed a coordinator for the program and he is working with the Seismic Safety Commission staff and OES. As a result of these meetings, it was decided to recommend that a survey be undertaken to ask specific questions of selected school districts and educational interest groups concerning what they feel would be helpful from state government relative to disaster preparedness education.

At the final Seismic Safety Commission meeting of this period, held on April 13, Commissioners were provided with copies of a report by Dr. Ralph Turner and associates, UCLA, on public information for earthquakes. Results were briefly discussed. The Commissioners also discussed plans for their

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annual workshop to be held on October 12 and 13. It was the consensus of the group that components of the workshop include: Implementation of the California Earthquake Prediction and Hazards Reduction Act of 1978 and review of the National Earthquake Hazards Reduction Act of 1977; completion of a Seismic Safety Commission policy statement on the independent review processes for major and critical facilities; and a panel on the state-of-the-art of earthquake prediction.

Also during this meeting, the Commissioners discussed the problem of automatic gas shut-off valves. Commissioner Condon noted that the public utilities are required to have emergency plans for consumer safety by the Public Utilities Commission's General Order No. 112c. He made a motion that the Commission urge the Public Utilities Commission to review the General Order to determine if it could be expanded to require emergency plans for gas shut-off procedures by utility companies which will provide reasonable public safety in the event of "predictable earthquakes." This last phrase was later changed to "damaging earthquakes." The motion passed unanimously. Also the staff was directed to research whether or not the Uniform Building Code requires or has ever required the anchorage of gas water heaters.

Period Ten: April 23, 1978 to August 13, 1978

On April 23, the first new prediction or near prediction of a destructive earthquake for southern California was made by Soviet geomorphologist, Andrei Nikonov. The Soviet Embassy distributed the report to local press representatives stating that the prediction was for a major earthquake occurring in the Palmdale area sometime before the end of 1978.

During this period, the Emergency Preparedness Commission continued its participation in the reorganization of the LA County-wide emergency preparedness plan. Although no federal contract to implement the plan has

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been completed, Charles Manfred, OES, obtained a \$50,000 contract to be used to study alternatives for reorganization of LA County's Emergency preparedness response capability. The target date for completion of this project is February-March, 1980. The intent is to improve the coordination of emergency planning and response among the 81 jurisdictions in the county.

During May, the Emergency Preparedness Commission began planning its "Fifth Annual Emergency Preparedness Seminar for Key Officials." In doing so it sent out questionnaires to all participants of the Fourth Annual Seminar. The program being planned will emphasize the continuing responsibility of all levels of government and the private sector to make plans to cope with disasters. Previous participants were asked for their input into this program theme. Then, on May 23, EPC conducted its second annual Industrial Emergency Preparedness Seminar at the National Safety Council's Western Safety Congress held at the Anaheim Convention Center. The program focused on how to prepare a disaster plan, including: government involvement, law and fire resources, utility involvement, and risks and problems of small and large industries. Participants included those from industry, business, government, schools, medical and other officials.

Also during May, at the meeting of the Seismic Safety Commission, the Commissioners reviewed the recommendations of the Special Studies Zones Act Committee before sending them to the State Mining and Geology Board and the State Geologist. Along with several recommendations of a technical nature, the Commissioners recommended that the Division of Mines and Geology and the SSC should prepare a handbook for local jurisdictions to better understand and administer the Special Studies Zones Act. They also recommended that Mines and Geology prepare and publish a comprehensive state-of-the-art technical volume on guidelines for identification and evaluation of surface fault hazards for geologists who conduct and review such geologic investigations.

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The Commissioners then reviewed the proposal made by the Hazardous Buildings Committee to sponsor urgent legislation which would provide authority to local governments to establish a reasonable building standard to improve life safety in earthquake hazardous buildings. It was moved and seconded that the SSC would sponsor the proposed urgency legislation. Finally, Roger Pulley, OES, reported that the recent earthquake prediction made by a Russian scientist will be discussed but not evaluated at the next meeting of the California Earthquake Prediction and Evaluation Council later this month.

New at the June meeting of the SSC, Ed Puchi, Associate Engineer for SSC, brought the Commission up-to-date on the status of the Hazardous Buildings legislation. He stated that the Commissioners' recommendations to the draft legislation on Hazardous Buildings Reconstruction Standards would become part of Assembly Bill 2752 and would be co-authored by a number of State legislators.

Dick Buck, Government Program Analyst, briefly reported on the progress of the Joint Committee on School Disaster preparedness Education. He stated that, in response to direction from the Commission, the Committee has been conducting an opinion survey of local school personnel regarding disaster preparedness education presently being used in the schools. Recommendations from this study will be presented at a later date.

Roger Pulley, OES, then reported that the combined efforts of the Pacific Telephone and Telegraph Company, the SSC, the Public Utilities Commission and the Office of Emergency Services has resulted in the placement of emergency survival procedures in telephone directories for the Los Angeles area. He indicated that eventually these procedures will be placed in telephone directories throughout the state. Mr. Pulley also noted that the procedures include a full page on earthquake safety.

Director Olson briefly reviewed the earthquake study called for in the California Earthquake Prediction and Hazards Reduction Act of 1978. This Act requires the Seismic Safety Commission to "undertake a study to determine the feasibility of (i) establishing a comprehensive program of earthquake hazard reduction having as its purposes the saving of lives and mitigating damage to property and (ii) developing and implementing a system for predicting damaging earthquakes in California. Since the passage of Proposition 13, the funding for this study has come into question. However, it was pointed out that the Commission has been mandated by the Legislature to report on the study by June 30, 1980, regardless of the availability of funds to perform the study. It was, therefore, decided to proceed with the development of operational plans for the study on the assumption funds would be available. The staff was directed to investigate other possible funding sources and to prepare a draft proposal to be used if necessary. However, at the July SSC meeting, Chairman Rigney noted that the '78-'79 budget has been signed by the Governor and the funds for the Earthquake Prediction and Hazards Reduction Study (S.B 1279) were left intact. Therefore, the Executive Director was instructed to proceed with the necessary procedures to implement the study.

Due to the delays in the implementation of the Earthquake Prediction and Hazards Reduction Act caused by the passing of Proposition 13, Director Olson suggested that the Commission change the topic of the 1978 workshop. He stated that due to delays, the necessary information and planning for the original topic would not be available. It was decided that the workshop be changed to a study session limited to commissioners and staff only. The topics would be changed to those relating to the future of the Commission.

Continuing with the investigation of requirements for anchoring water heaters, the Commission voted to sponsor a proposal by the International Council on Building Officials to add a requirement of the Uniform Building

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code that anchorages be provided for water heaters.

A discussion of the staff-proposed amendment to Senate Bill 330 regarding disclosure for second sale of real estate transfer was undertaken. Jack Shelby, California Association of Realtors, related problems realtors sometimes have with city and county mapping of special study zones. Also, he stated that homeowners often do not know where to locate the necessary information, which adds to the disclosure problem. The Commissioners decided to add the phrase "on file with the city or county" to the staff amendment in order to clarify where homeowners and realtors could obtain the needed information. The staff was then directed to present the amendment to the Assembly Judiciary Committee for consideration. Also during this time, the Commission continued its work on the proposed Mexico-USA "Symposium on Human Settlements in the San Andreas Fault Zone." Director Olson noted that work on the symposium is going on in conjunction with negotiations for renewing a treaty between the US and Mexico pertaining to mutual assistance during times of disaster.

July was the month when the City of Los Angeles' <u>Earthquake Operational</u> <u>Plan</u> was completed and published. This plan is a composite of elements submitted by each city department that has a demonstrated disaster response capability. The individual elements provide an overview of each department's operational plan during a major earthquake. The plan itself was developed as a tool to provide information of each department's operational plan in order to improve inter-department cooperation and coordination of effort at all levels' of command during a major quake. The plan, however, stressed emergency response preparation rather than any kind of hazard reduction measures. Fourteen departments in all contributed to the plan.

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Finally, at the August meeting of the Seismic Safety Commission, the Commissioners discussed the proposed policy statements entitled "Partnership for Seismic Safety" and "Guiding Earthquake Recovery." These papers called for local governments, counties and special districts to take an active role in long-term planning for earthquake hazard reduction as well as taking immediate action when an earthquake disaster occurs. They also stressed the point that financial assistance made available for recovery by disaster assistance, special appropriations and private sources should be conditioned on observance of codes, standards and procedures adequate to assure future seismic safety to the greatest extent possible.

Commissioner Bolt made a special presentation to the Commission on the state-of-the-art of earthquake prediction. He discussed the new worldwide network of strong motion instrumentation being planned. These instruments will be tied together over a large area rather than utilized as separate devices. They will be placed in areas designated as those most likely to have a great earthquake. These will include India, Taiwan, Japan and California.

Dick Buck then reported on the recommendations from the Joint Committee on School Disaster Preparedness Education. These recommendations included the following:

(1) Communicate with the Superintendent of Public Instruction requesting him to a) revise in consultation with the Director of the Office of Emergency Services Section 560 of Title 5 of the California Administrative Code to reduce ambiguities and specifically to require earthquake drills; b) revise in consultation with the Director of the Office of Emergency Services current planning guidance for schools to simplify and include specific instructions for earthquake drills; c) study the feasibility of integrating disaster education objectives into State curriculum guidance on other sources of study, such as safety and environmental education; and d) continue Department of Education participation in the activities of the working group to develop objectives and specifications for a short course about earthquakes.

(2) Appoint Commissioners who have expressed an interest in this subject to a committee to include those who have been in the working group, as well as the State Geologist. This committee would develop the objectives and specifications for the short course about earthquakes for use in elementary and secondary schools, and to promote the development and use

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of the course.

(3) Communicate with the Director of the Office of Emergency Services, the Region 7 Director of the Defense Civil Preparedness Agency, and the National Director of the Defense Civil Preparedness Agency to a) commend the California Office of Emergency Services for the emphasis it has given disaster education in its current program guidance to local governments; b) request that natural disaster education be given a high priority in funding of State and local disaster preparedness programs; and, c) request that natural disaster education be included in workshops and training courses for local disaster coordinators.

These recommendations were unanimously approved.

Period Eleven: August 14, 1978 to December 31, 1978

The final period begins with the occurrence of a destructive earthquake in Santa Barbara, California. This quake caused an estimated twelve million dollars in damage and many injuries which led to an official state declaration of emergency in the Santa Barbara region.

The main topic for discussion at the September Seismic Safety Commission meeting was the Santa Barbara earthquake. The majority of the meeting was directed toward the extensive damage to mobile homes caused by the earthquake. Commissioner Mann reported that out of approximately 146 mobile homes observed, 140 were damaged in some way. This occurred primarily because of the type of foundation used for mobile homes. The idea of requiring more stable foundation supports was discussed. Commissioner Mann related the social aspects of this problem since many mobile homeowners are senior citizens. If they have to affix their coach permanently, they may be liable for property tax. The Commission decided to hold a public meeting in Santa Barbara to obtain opinions directly from mobile home owners regarding the problem and possible solutions.

In October, the most significant organizational earthquake response activity was the presentation of the final report of the Earthquake Task Force to Mayor Tom Bradley. This was presented by Rachel Dunne, Chairperson,

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before a meeting of the Task Force members, the press, and invited guests.

A summary of the findings included the following statement:

Although a reliable system of scientific earthquake prediction may not be available for a decade or more, a number of predictions are likely to be made during development of science, and resulting public concerns and business reactions will necessitate responsive action by local government. A substantial savings in lives and reduction of property damage could be realized with a well-coordinated prediction response.

The scientific validity of predictions will be evaluated by the California Earthquake Prediction Evaluation Council (CEPEC) or its Federal counterpart, NEPEC, and a general earthquake warning will be issued by State or Federal officials if the prediction is verified. The City will need a capability to assess the local significance of the predicted earthquake and to issue local warnings as appropriate.

If an Earthquake Prediction Response Plan were developed before the first prediction is confirmed, the City could make maximum use of the available lead time when a warning is announced, and the advanced planning would allow a rational and timely selection of the components of response most appropriate to the specific characteristics of the prediction. The City could indicate its preparedness and immediately begin implementation of a carefully structured program.

The City should also be prepared to implement a beneficial response to an unconfirmed, pseudo-scientific or low probability prediction which might generate widespread public concern. The City should avoid reinforcing an unconfirmed prediction, but could respond to public concern by providing information and assistance that will help the public become better prepared for any earthquake.

The Task Force's principal recommendations to Mayor Bradley included:

(1) The City should prepare an Earthquake Prediction Response Plan and establish the appropriate coordination and organization functions to enable a prompt and effective response to any prediction of an earthquake within the region. The plan should provide criteria and contingency plans for a wide range of potential responses geared to the specific time, location, magnitude and probability (or confidence level) of the prediction. This Task Force report provides numerous suggestions and recommendations for incorporation in the Response Plan.

(2) Ongoing and proposed programs of earthquake safety should be designed for appropriate augmentation or acceleration in the event of a significant earthquake prediction.

(3) A new emphasis should be placed on public information for earthquake preparedness: families, individuals and neighborhoods will need to be self-sufficient for days and even weeks following a major earthquake, and special programs and materials should be prepared to encourage and assist in this preparation, which should be intensified following a significant earthquake prediction. Specialized programs and materials on earthquake preparedness should address the particular needs of children, the handicapped and the elderly. 584 <

(4) State and Federal actions should be sought on several important issues:

a. Enabling Federal disaster assistance to become available following the prediction of a major earthquake and in preparation for the anticipated disaster.

b. Provision of reliable earthquake insurance, either as a system of Federal earthquake insurance or as part of a Federal system of natural disaster insurance.

c. Clarification of the legal authority and liability of the City for responsible actions taken in response to an earthquake prediction.

(5) The Earthquake Prediction Task Force should be reconvened by the Mayor in two years (October, 1980) to review the progress in implementing its recommendations and to update its findings based on any changes in prediction technology, legislative action, available programs or public concern (Consensus Report of the Task Force on Earthquake Prediction, City of Los Angeles, October, 1978).

At the November meeting of the Seismic Safety Commission, Commissioner Ford and Mr. Bernard Farrell, Department of Insurance, made a presentation of the problem of earthquake insurance in California. Although insurance is readily available and not very expensive, only about 5 percent of the single family dwellings in California are covered. They discussed the problems insurance companies face in paying off catastrophe claims and federal regulations which limit the amount of reserves to be held by insurance companies for such payments. Also, the Commission was advised that Commissioner Bolt is working with the Chancellor of the University of California, Berkeley, to develop an earthquake exercise drill which may possibly be used as a model by other institutions.

Finally, at the December Seismic Safety Commission meeting, Vice Chairman Giersch briefly reviewed the proposed resolution pertaining to mobile homes. The resolution indicated that the Seismic Safety Commission considered the anchorage of mobile homes to be important to public safety, and it requested the Department of Housing and Community Development, under Section 8897 of the Government Code, to prepare suitable earthquake-resistant criteria for

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new and existing installations. The resolution also requested the Department to make information about earthquake insurance and standards available to mobile home owners, and indicated that the Commission would continue to monitor the progress of work done on this subject.

Director Olson then reviewed background information on the proposed study by the Office of Statewide Health Planning and Development concerning seismic safety issues in hospitals. He noted that the Commission had been asked by the Office of Statewide Health Planning and Development to make recommendations pertaining to the study. He presented a draft report of the Hospital Act Committee based on its discussion meeting held the previous day. The Committee suggested that the Commission make the following recommendations.

(1) The Office of Statewide Health Planning and Development conduct an inventory of general acute care hospitals, including appropriate State hospitals, as a pilot project in Kern, Riverside, San Bernardino, Los Angeles, Ventura, and Santa Barbara counties to assess the vulnerability of the services they provide in the event of damage from strong earthquakes. The inventory should be conducted by a qualified person and should include sufficient detail so that any potentially significant deficiencies in service can be estimated on a statistical basis. The inventory should be sufficiently accurate to provide a basis for long range planning, including an ability to estimate general costs to correct types of common deficiencies (not for individual buildings), to locate areas where hospital services may be deficient as a result of a stong earthquake, to determine the types of services most likely to be affected, to identify the most common types of hazards that may exist, and to plan future hazard reduction measures which could reduce major deficiencies.

(2) The Office of Statewide Health Planning and Development should conduct this inventory with the advice and assistance of the Building Safety Board, and utilizing the services of the Office of the State Architect. The Committee noted that, to be successful, this inventory must not result in citations, warnings, or other repercussions for individual hospitals. If serious area-wide problems are discovered, the inventory can be used to identify the types of corrections needed and the geographic areas in which to begin.

The Commission voted to adopt the Hospital Act Committee's recommendations and send them to the Office of Statewide Health Planning and Development for consideration.

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CHAPTER THREE

SUMMARY AND CONCLUSIONS CONCERNING ORGANIZATIONAL EARTHQUAKE RESPONSE

As was stated earlier, most organizational earthquake preparedness measures have traditionally been directed toward post-disaster needs of the community rather than earthquake hazard reduction planning. The major question that we want to answer in this section is whether the near predictions and cautions concerning future quakes have had any significant effect on traditional types of earthquake response planning and whether or not the current situation has increased planning efforts or redirected them toward hazard mitigation.

From the data collected and presented in the narrative history, it appears that the near predictions have had a different effect on local safety and welfare agencies than on state agencies. At the local level, the majority of the earthquake response activity that took place after the first media coverage of the southern California Uplift was a continuation of pre-uplift activity, much of which was stimulated by the 1971 San Fernando earthquake. Researchers were told repeatedly by local agency and service organization officials that the near predictions (specifically, the southern California Uplift and Whitcomb's hypothesis test) had little if any direct influence on organizational earthquake planning. Any discussion of the near predictions by agency personnel was on a strictly informal basis. Officials of the major safety and welfare agencies (such as the sheriff's department, the police and fire departments, and the Red Cross) advised us that their standard emergency procedures would cover any problems presented by a damaging earth-

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quake. Except for possibly an increase in damand for already existing services, they did not feel that any special plans needed to be developed to handle a major quake.

The current near prediction situation has clearly not redirected these agencies toward hazard mitigation plans. The major preparedness thrust of these organizations centers around emergency response--preparedness measures directed toward post-disaster response. Although the Los Angeles Police Department did recommend that its station commanders list potentially hazardous buildings in their jurisdictions, this was done so that the structures could be checked <u>after</u> a quake. These lists may become important for hazard reduction planning in the future. However, listing the buildings was intended as an emergency response action.

The emphasis in the three major county-wide earthquake exercises which took place in 1976 and 1977 was definitely an emergency response. The exercises commenced after the hypothetical disaster event had taken place. Also, the problems presented to the organizational "players" during these exercises focused totally on dealing with troublesome situations that developed after the earthquake and on maintaining adequate communication between the players in order to monitor the utilization of resources. The participating agencies ignored the potentially problematic nature of interorganizational communication and coordination in the event that an earthquake prediction is made or a short-term warning announced. In light of this lack of concern with the predisaster time period in the current earthquake threat situation, we asked several officials from the agencies sponsoring the disaster drills why they had chosen an earthquake for the focal problem of the exercise. Repeatedly, we were told that the earthquake scenario was just one of many different disaster scenarios used for preparedness drills throughout the year. However,

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one director of the "Ring of Fire" exercise told researchers that the earthquake scenario was used, "because the state is putting pressure on us to devise earthquake plans." This suggests the influence state agencies have on local preparedness plans, although still in the direction of emergency response rather than hazard reduction.

Although it appears that most of the local agencies have not been significantly affected by the near predictions, there are three groups that have. One of these is an established disaster response agency; the others were created after the announcement and in response to the southern California Uplift and Whitcomb's hypothesis test. The first agency is the Civil Defense Office of the City of Los Angeles. Because this agency has one major plan that covers both nuclear and natural disaster crises, it did not change any procedures in response to the near predictions. However, the unit did experience a drastic increase in demand for services due to the announcements. This activity was primarily an increase in requests for earthquake preparedness information and for disaster preparedness meetings. The latter included both neighborhood block meetings and work group meetings designed to teach participants what to do to prepare for a quake. Again, this information stressed measures to prepare oneself for post-disaster problems.

The newly created groups are the Creative Home Economics Consultants and Mayor Bradley's Earthquake Prediction Task Force. The CHEC group was established because the members felt a sense of urgency generated by the near prediction announcements. Their program stresses self-sufficiency during the post-disaster emergency period. Although they do incorporate a few hazard reduction measures into their presentations, their emphasis is emergency response.

On the other hand, the only local group that primarily stressed hazard mitigation and preparedness measures for dealing with earthquake prediction was the Earthquake Prediction Task Force. This group was created in order "to explore and evaluate the range of possible city responses to an earthquake prediction." The areas studied by the group and the final recommendations presented to the Mayor emphasized both emergency response and hazard reduction measures. These were directed toward both long- and short-term prediction situations. The creation of this group represents the most substantial local government response to the near predictions. It also represents the most substantial attempt by local government to incorporate hazard mitigation into their overall earthquake preparedness plans.

On the state level, however, there has been considerably more activity surrounding the earthquake prediction announcements. Most of this activity has been generated by two agencies, the Office of Emergency Services and the Seismic Safety Commission.

The state headquarters of the Office of Emergency Services (which is responsible to the Governor's office) has undertaken two tasks which are directly related to the developing scientific ability to predict earthquakes and to the issuance of the near predictions. First, the agency initiated a state-wide media campaign in August, 1976, consisting of radio and television public service announcements, informing the public what to do before, during, and after an earthquake. Although OES is primarily an emergency response organization which assists various city and county governments in need of disaster relief funds, the officials in OES also believe that they have an educational function toward the public, particularly regarding earthquake safety. Second, the California Earthquake Prediction Evaluation Council (CEPEC) has been organized as a branch of OES. This Council's purpose is "to provide OES with (a) professional opinion as to the reliability of the

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data (upon which a prediction is based) and the scientific validity of the technique used to arrive at a specific prediction" (letter from Charles Manfred, Director of EOS, to Boards of Supervisors, Mayors, and Directors of City and County Emergency Organizations in the southern California area March 15, 1977). The council formally evaluated the southern California Uplift area in April 14, 1976 and Whitcomb's hypothesis test on April 30, 1976. In both cases, CEPEC concluded that the area under investigation warranted further detailed study, but that there was insufficient evidence or too questionable an interpretation of the available data to conclude that an earthquake would occur at a specific future time. However, the members of CEPEC were sufficiently concerned to resist limiting their responsibility to informing local governments about the council's formal conclusions on the predictions. Instead, they extended their responsibility by also urging those governing bodies to begin taking hazard reduction measures. On April 20, 1976, a letter was sent by OES to local officials and the directors of emergency organizations entitled "Urgent Earthquake Safety Information." This letter included eleven earthquake planning recommendations, four of which are directly related to hazard reduction:

1. Review, update, and/or prepare instructional material for release by the news media to your citizens.

2. Be prepared to speak directly to the people through local radio broadcasting systems, outlining precautionary measures to be taken before an earthquake.

3. Identify hazardous areas and structures in your jurisdiction which may have to be evacuated prior to or immediately after an earthquake.

4. Consider ordinances and enforcement to reduce hazardous structural features which are non-functional to a facility such as parapets or cornices.

Because of the connection between CEPEC and OES and because of the agency's commitment to increasing the public's knowledge of public safety measures,

OES officials have been frequently included in organizational hazard reduction planning and in public forum discussions and programs.

The reaction of the Seismic Safety Commission to the Palmdale bulge announcement has had quite far-reaching effects on other government agencies and programs. On April 8, 1976, the Commission issued Resolution 1-76 which was sent to both state and local government agencies in California. In part, this resolution stated that the uplifted area should be seen as "a possible threat to public safety in the greater Los Angeles metropolitan area." The Commission recommended that state officers assign high priority to financing plans for predisaster mitigation measures. This resolution was used by various state and local agencies to initiate or to reassert the need for certain public safety programs. For instance, the State Office of Architecture and Construction sent a memo to the County Superintendents of Schools in the southern California region requesting that structural studies of physical plants be conducted and that response plans and drills be formulated. In Los Angeles County, the resolution was also used as the basis for developing a curriculum module on earthquake prediction and preparedness (with both technical and social components) for both primary and secondary schools. Similarly, the legal counsel for the State's Department of Water Resources Dam Safety Program also referred to this resolution in a court hearing concerning the revocation of a local water district's permit to store water behind a particular dam. The issuance of the resolution was cited as an indication that an "emergency situation" existed in the southern California Uplift area (where the dam and reservoir are located) and that the dam would be unsafe under maximum earthquake conditions. Two similar resolutions were passed in 1977. The first requested state agencies to undertake hazard mitigation and preparedness measures while the second requested the same from the federal government. The Commission has also been very active in the

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Special Study Zone projects, along with the Division of Mines and Geology, and with projects stemming from the National Earthquake Hazard Reduction Act.

Thus, from the organizational earthquake response activity data presented in the narrative history, it becomes apparent that organizations in which earthquake concerns are most central to their major goals and functions are the most likely to take the near predictions seriously. That is, they are most likely to respond to the prediction situation by increasing their preparedness plans, by incorporating hazard reduction measures into those plans, and by considering appropriate organization response during the pre-disaster period--between the time of prediction and the actual quake. As prediction capabilities become more sophisticated, we would expect to see a situation in which more organizations begin to consider the pre-disaster period more seriously, either on their own or because of pressure from state and federal agencies.

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CHAPTER FOUR

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EDUCATIONAL INSTITUTIONS AND THE EARTHQUAKE THREAT

The aim of this portion of the final report is to record how schools in Los Angeles County, including the Los Angeles City School system, responded to near predictions of a destructive earthquake, beginning with the February, 1976, announcement of the southern California Uplift (Palmdale Bulge). Parochial school policies and practices were determined to the extent possible. Though private schools were too diverse and inaccessible to permit systematic coverage, information that came to our attention is also a part of the report. The primary focus is on recording what systemwide formal policies were announced and what steps were taken to put these policies into effect.

Our information came from a number of sources, including school officials at the main County and City office, district administrators, and school principals. We also interviewed teachers, parents, and community and civic leaders. We were interested in finding out about the curriculum at different grade levels and what resources were available. We attended earthquake or emergency planning seminars held in local areas following the Uplift announcement to learn as much as possible about their origin, persistence, and spread. Some programs were initiated by the school and some by the community. Samples of policies, programs, units, reference material and other relevant information and practices are included in the âppendix.

In our data gathering we were particularly interested in responses about earthquake preparedness and awareness that included training teachers to deal constructively with earthquakes while school is in session; preparing

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children to deal with earthquakes (including drills); instruction for children concerning earthquake preparedness and safety in their homes and elsewhere, including any information that is supposed to be taken home; education for the general student concerning earthquake dynamics and earthquake prediction, especially concerning the southern California Uplift and other features of the local earthquake scene; and community programs dealing with earthquake safety and preparedness. Our goal is to report illustrations and impressions rather than a comprehensive or statistically representative study.

School Policy

A policy letter from the Head Administrator of the Los Angeles County Schools was sent to key officials a few months after the announcement of the California Uplift. This letter, including several enclosures, was dated July 8, 1976 (Appendix A). Dr. Richard M. Clowes, Superintendent, addressed the letter to the Chief Administrators of the Los Angeles County school districts (ninety-five districts). The topic of the letter was "The Palmdale Bulge and Earthquake Safety." It stated:

This Office acts as a collecting point and reviewing agency for the disaster preparedness plans of the school districts within Los Angeles County. Section 560 of Title V, California Administrative Code, sets forth the steps required to comply with present regulations . . . that much had been written and heard about what has come to be called the "Palmdale Bulge," . . . that various agencies had expressed concern relative to the safety of residents in the entire southern California area if an earthquake of high magnitude should occur . . .

The enclosures and information were to help the administrators in their "effort to protect students and employees in the event of a major Earthquake."

The enclosures consisted of several items: a copy of a letter from the Chief Structural Engineer, Office of Architecture and Construction; a resolution of the State Seismic Safety Commission; a geological survey report

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from the Department of Interior; a land uplift map of southern California; a picture of the surface trace of the San Andreas fault in Marin County following the 1906 San Francisco earthquake from the United States Department of Interior, Geological Survey, Reston, Virginia; an Earthquake (intensity V and above) Location Map of the United States published by National Oceanic and Atmospheric Environmental Data Service, dated 1970; and a map showing earthquake faults in the Los Angeles Area printed by the California Division of Mines and Geology.

The letter from the Office of Architecture and Construction to the Los Angeles County Superintendent of Schools, dated July 1, 1976, addressed the topic of "The Palmdale Bulge." Precautionary action such as making a cursory survey of school buildings and correcting construction deficiencies was recommended. Reviewing and updating evacuation plans were requested, and there were earthquake instructions to follow during the shaking and after the shaking. The letter was signed by Fred W. Cheesbrough, Chief Structural Engineer, Sacramento.

A second item was Resolution No. 1-76 from the State of California Seismic Safety Commission. It addressed the following topic:

Re: Finding that the "bulge" in Southern California is a threat to public safety and requesting State and local agencies to take steps to mitigate the potential disaster, stimulate preparedness, and inform the public.

Signed,

8 April 1976

Karl V. Steinbrugge, Chairman Seismic Safety Commission Sacramento, Ca.

The third item came from the United States Department of the Interior, Geological Survey, and was a summary of the briefing to Edmund G. Brown, Jr., Governor of California, March 17, 1976. The briefing made reference to the uplift along the section of the San Andreas fault and the summary indicates

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that the "evidence does justify a warning that a great earthquake will take place in this area and also justifies preparedness actions." It indicated that probable losses in Orange and Los Angeles Counties alone from a great earthquake would include damage to an estimated 400,000 buildings. Three thousand to twelve thousand people would be killed, twelve thousand to fortyeight thousand people would be hospitalized, and property loss would total twenty four billion dollars if a major earthquake (M 8) occurred in this area as it did in 1857.

Workshops were held with Administrators from the ninety-five districts to facilitate the implementation of this policy directive. The handbook, <u>Civil Defense and Disaster Planning Guide for School Officials</u> (1972, California State Department of Education, Wilson Riles, State Superintendent) was given to administrators and formed the basic guideline for the principal's plan.

The Los Angeles City School administration had its own personnel who assumed responsibility for implementing this policy. Mr. Gordon Trigg, Director of Student Auxiliary Services, was in charge for the city. Workshops for city school administrators from the ten area offices were held. In the area offices, a Deputy Assistant Superintendent channels this information to principals. Local school emergency plans are filed in the District offices. In the city schools, an Emergency Procedure manual was developed under Mr. Trigg's supervision. It communicates school standards for dealing with natural and man-made disasters. This manual is given to each local school and the principals use it as a guide in forming their plans, adapted to the individual neighborhood school needs.

<u>Title V, Code 560</u>. The California Administrative Code, Title 5, entitled "Education," forms the legal basis for stating and implementing school policy. Article 2, Code 560 of Title 5, sets the state standards for

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school <u>Civil Defense and Disaster Preparedness Plans</u>. This Code was adopted in 1973 following the San Fernando earthquake.

School officials and manuals refer to Title V, Code 560, as the law that they are expected to follow. The code (a) requires the governing board of each county school district to adopt written policy guidelines for use by the schools of the district in formulating individual civil defense and disaster preparedness plans, (b) requires principals of each school to formulate and submit a civil defense and disaster preparedness plan to the district superintendent for approval, and (c) requires each school to test its plan (other than fire drills) at least twice during the school year and to keep a record that is available to the Department of Education upon request.

Title V, Code 560, is an administrative ordinance, instituted by the Governor as head of the executive branch. As an administrative ordinance it has less clout than an administrative statute passed by the legislature and signed by the Governor. Violation of the latter is a misdemeanor while an ordinance sets standards and expectations but is not legally enforceable.

In Los Angeles County, the Head Administrator did establish this ordinance as school policy and school principals are required to develop emergency plans for individual schools. This procedure had been adopted before announcement of the southern California Uplift. However, a revised and updated plan was required during the school year following the Uplift announcement.

The actual code reads as follows:

Article 2. Civil Defense Plans and Drills

560. Civil Defense and Disaster Preparedness Plans. The governing board shall:

(a) Adopt a written policy guideline for use by schools of the district in formulating individual civil defense and disaster preparedness plans. The policy guideline shall meet the criteria established in that part of the Civil Defense and Disaster Planning Guide

for School Officials entitled "Essential Characteristics of the School Planning Guide," published by the State Department of Education, and shall be subject to approval by the county superintendent of schools. The policy guideline shall be reviewed at least annually and revised as needed. Plans and revisions may be subject to review and approval by the State Department of Education.

(b) Require the principal of each school in the district to formulate and submit to the district superintendent for approval a civil defense and disaster preparedness plan for that school. Each school plan shall satisfy the governing board's policy guideline, coordinate with the appropriate local government plan, be reviewed at least annually and be kept current.

(c) Require each school to test its plan (other than fire drills) or each portion thereof on a rotating basis at least two times during the school year and keep a record of such tests. The record shall be maintained in a manner determined by the governing board, and available to the Department of Education upon request.

The amended version of Section 560, including the new paragraphs (b) and (c), was distributed in 1977 by the State Department of Education, with clarifying instructions. Elaborating on paragraph (a), the State Department of Education circular contained the following statement:

Essential Characteristics of the School Planning Guide

Individual schools, school districts, and communities vary in ability to meet the needs of disaster preparedness according to size, local conditions, services available, staffing patterns, and existing safety programs of the area to be served. The written plans for organizing and operating school disaster preparedness programs at the local level will also display an equal variety, since the plan for each school system should be prepared to meet the unique needs of that particular system. All good school plans, however, should have the following characteristics:

They are designed to be reviewed and revised. All persons with responsibility for the development and execution of disaster plans, including board members, should understand that the plan must be regularly reviewed and updated in light of current needs and conditions.

Disaster plans must have the formal approval of the school district governing board, which, through resolutions, makes explicit provisions for total implementation of the plan, provides funds for approved disaster preparedness programs, provides policy guidance for all administrative personnel and gives designated persons the necessary authority to act in times of emergency.

Elaborating on paragraph (b), the State Department of Education emphasized the importance of integrating individual school district plans into community civil defense plans: They are developed in cooperation with the local civil defense agency and are a part of and coordinated with the total community civil defense plans. Without such cooperation and coordination, the school's plan not only cannot be effective but it can also jeopardize the success of the total community plan.

They designate leadership positions at all levels of operation and define and assign responsibility to such leaders. They include provisions for designated persons to serve in a liaison capacity between the schools and local government emergency agencies for purposes of planning, training, testing, and conducting Emergency Operating Center exercises.

They are the result of the combined efforts of the entire community--school board members, school staff members, students, community leaders, parents, representatives of related governmental agencies, and others. Broad involvement of the community not only helps to protect against hasty or poor planning decisions but also enhances the understanding and acceptance of the plan by the total community.

Good plans include provisions for supplying the teachers, classrooms, and instructional materials for survival training programs. Such programs would prepare community leaders and others for service during periods of a disaster.

They include provisions for a permanent public information program to ensure community support and acceptance of the schools' emergency plans. The public information program would also help to develop the public's awareness of the role that the schools play in the total community emergency plan.

Good plans are definite enough to provide specific policy and directives for meeting the needs caused by predictable emergency situations and flexible enough to permit action required to meet the needs caused by unexpected natural disasters and other emergencies, including civil disturbance.

They designate, by title, alternate persons who are authorized and directed to initiate disaster plans when the designated administrator is absent.

<u>Civil Defense and the School</u>. Code 560 refers to criteria for "civil defense and disaster preparedness plans" in the State Department of Education booklet, <u>Civil Defense and Disaster Planning Guide for School Officials</u>, which was issued to local schools. In this booklet on page 14, a diagram shows the county or city civil defense office as the apex. School personnel are given civil defense titles, e.g., school civil defense director (principal). To add to the confusion of terminology, directions given at the Emergency Planning Seminar (1977) stated that schools develop plans with approval of the Civil Defense Agency.

Mr. Michael J. Regan, Los Angeles City Civil Defense Coordinator,

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stated that this part of the law needs to be clarified and changed. It presently states that local school plans must have the approval of the civil defense director. However, this kind of review for all the schools in Los Angeles is impossible with a minimal civil defense staff of three persons-coordinator, an assistant, and a secretary. When the civil defense coordinator receives a plan, it is referred to the fire department assigned to that particular school district.

Mr. Regan also pointed out a prevalent confusion among school administrators concerning lines of authority. He stated that the initial response to an emergency is taken by the police and fire departments. After they check out local areas, the civil defense office can coordinate central communications through the City emergency alertness center.

Many schools have outdated 1960 civil defense war shelter supplies which are being dismantled as the Civil Defense coordinator has time and not being replaced. Yet, we talked to principals who think the civil defense organization will come to them in an emergency because their school has these supplies. At one time, nearly thirty years ago, their locations were designated as shelters. The current thrust of civil defense is to "be self-sufficient until help arrives."

Effective communication links with the school and community need to be included in the law so that the lines of responsibility and authority will be clearly understood. Not all schools have two-way frequencies for communication as a backup if telephones are out of order or busy. In the course of an interview with one person at the Civil Defense Agency, it was assumed that all schools have a two-way radio frequency, but many don't.

The Community and Civil Defense. How the line of authority is established varies greatly by the county and community at the present time.

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In Orange County, for example, Mr. George Thyden, Civil Defense Coordinator, has a very effective civil defense program which does include all schools in his area. Each year names of local school representatives are given to him. Mr. Thyden has a unique school program which he offers to local schools for teacher training and preparation, and student-parent awareness. His particular interest in this area is reflected by the many requests from schools, even in Los Angeles County, where he gives talks and serves as a resource person who assists them in their earthquake preparedness program.

Since announcement of the Uplift, Los Angeles has published a manual, <u>Earthquake Operational Plan</u> (1978) under the sponsorship of the Los Angeles Earthquake Joint Planning Community and the Los Angeles Civil Defense Disaster Board. It includes disaster plans submitted by all city organizations-airport, harbor, recreation, etc.--but the schools are not included. When an inquiry was made about this omission, it was explained that schools have their own plans and organizational setup. Yet the supplementary instructions to school administrators concerning the amended Title V, Section 560, issued by the State Department of Education (reprinted in an earlier section, <u>Title</u> <u>V</u>, Code 560), clearly call for incorporation of school district emergency planning in local community emergency plans.

Presently, there is a Los Angeles Emergency Preparedness Commission working on a Master Plan for the county. Included on this commission with Mr. Regan are Dr. Richard Wales (Los Angeles County Schools) and Mr. Gordon Trigg (Los Angeles City Schools). In time, such a Master Plan may resolve some of the misunderstandings and can clarify roles and responsibilities.

It may be noted that private schools do not have a central office and they function autonomously in maintaining standards. In a sampling of private school administrators, we found some who conducted actual earthquake

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drills, some who made token preparations, and a few who had plans but didn't remember them or follow the written plan. And one head mistress said that they aren't required to have a plan or follow one. We also talked to one who did not know of Title 5, Code 560, and said that it didn't apply to private schools.

Parochial schools seemed better prepared. There is a central office where standards are issued to local school administrators. They followed policies quite similar to those in the public schools.

The Local School and Teaching Resources

Before we contacted local schools we were interested in knowing what earthquake teaching resources were available--films, units, books, etc. We also wanted to know about the school curriculum and where any teaching about earthquakes takes place. To gather this information we talked to curriculum specialists and officials in libraries and audio-visual departments. This information could give us some insights into school resources for teachers.

<u>Curriculum</u>. According to curriculum specialists, the main thrust in the curriculum focuses on concepts in science at the elementary level (how earthquakes are formed), and more advanced information about geology and earthquakes in the junior high earth science units. Emphasis on these topics would be at the teacher's discretion as there are many units covered in science textbooks.

Though school budgets have cut severely into resources, a few specialists are still available for consultation. Most specialists in the Los Angeles city schools however, have returned to the local classroom.

In interviews with curriculum personnel, it was confirmed that earth-

quake preparedness and awareness is not part of the curriculum. Teachers with special interest in the topic may do a short unit on earthquake or use it in discussing safety, science, or current events. Though we followed up on referrals to teachers who were reported to have done this, we were not successful in finding one.

In the Los Angeles County Schools, a program specialist with a background in geology, Mr. Arie Korporaal, has devoted some time to this area. In collaboration with two other persons he developed a teaching module, <u>The San</u> <u>Andreas Fault</u>, and this unit had been reprinted by the geology teachers association. However, we were not able to find out where it was used in Los Angeles County. Mr. Korporaal gives earthquake workshops for administrators, primarily, so he didn't have local teacher feedback on who may have received and used his information. He would like to see units offered in local schools and to have an earthquake resource center available to teachers and community.

<u>Audio-visual resources</u>. In the LA County school district, each of the ninety-five districts purchases its own films and maintains an audio-visual library for the use of local schools. Film strips are purchased by individual schools, which keep them locally. If the budget permits, films can be rented from outside sources. The County does not maintain a central film library.

In one local County school district there were four films on earthquakes. <u>Your Chance to Live: Earthquakes</u> (1978), 15 minutes, color, had been checked out two times from January through June, 1978. Another film, <u>Earthquakes</u> <u>and Volcanoes</u> (4th-Jr. High) was checked out twice during the same period. A third film, <u>San Andreas Fault</u> (4th-Sr. High), was used six times, and <u>Birth and Death of the Mountains</u> (senior high) was checked out four times. Schools in this district, budget permitting, could also rent outside films.

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In the Los Angeles City schools there is a central depository for audio-visual materials. Local schools place orders from the central sound film library. Filmstrips are purchased by the local school and kept in their own library.

The following information gives some impressions regarding usage of earthquake films from the depository. For all grade levels, a total of six films were listed, though two had recently been withdrawn from circulation because they had worn out. Funds have been cut severely so replacement seems remote.

At the elementary level there was one film, <u>Earthquake: Do's and</u> <u>Don'ts</u> (1978), and there were eleven copies. Orders had been filled 205 times while there were 356 times the orders could not be filled. This film was in great demand and was the only film on earthquake awareness and preparedness. There were three films in current circulation for the junior high/ secondary level. One was <u>Earthquakes: The Land</u>, six copies. Orders had been filled 87 times, and requests could not be filled 31 times. A second film was <u>Earthquakes: Lesson of Disaster</u>, one copy. Orders had been filled 44 times while 64 requests could not be honored. The third film was <u>San Andreas Fault</u>, 5 copies. Orders had been filled 102 times and 59 orders were turned down.

Two films had been withdrawn from circulation. <u>Earthquakes and</u> <u>Volcanoes</u>, of which there were once 50 copies, all of which are now worn out, was not replaced. <u>Hidden Earth</u>, 11 copies, is also out of circulation. The last good copy had been used 6 times, and 73 orders couldn't be filled.

The popularity of these films indicates an interest in the topic at the local school level, and audio-visual aids are considered invaluable teaching aids. However, the budget has suffered severely since passage

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of Proposition 13 in 1978, we learned, so replacements and new orders are very limited.

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The newest film mentioned was <u>Earthquake</u>: <u>Do's and Don'ts</u> and it was in the greatest demand. Since this is a film on awareness and preparedness, it should generate a lot of healthy discussion in a safety or science class. School texts do not approach earthquakes in this practical way, but a film like this could be used to develop motivation when introducing a subject. This is a way to present a topic in a non-threatening, low-keyed way.

In the audio-visual catalog one film strip entitled <u>Earthquake</u> (National Geographic Society) was available for purchase by the local school. However, it was not possible to determine which schools may have bought it.

Library books. In the Los Angeles County School, each district has its own library which teachers can use. The main office has a reference library which displays state approved books and other recent information. But each school maintains its own budget, text book selection, and individual library. Because of this decentralization we could not get an overview of individual schools and what they used.

The Los Angeles City school system, however, does maintain a central school library in the city. It is used as a checkout and reference library for local teachers and schools. In checking the catalog and vertical file section we were able to obtain some impression of the kind, number, and frequency of use of books on earthquakes.

For example, the main catalog section listed three books--Coffman, <u>Earthquake History of the United States</u> (1973), Iacopi, <u>Earthquake Country</u> (1965), and Adams, <u>Earthquakes: An Introduction</u> (1966). The Coffman book had not been used while Iacopi's book was checked out 10 times. The last date on Copy 1 (other copies not located) was April, 1973. One checkout date, 1969, GOG <

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was shown for the Adams book.

In the reference file, <u>Earthquake History of the United States</u>, <u>Part II</u>, was the one pamphlet on this subject.

In the Elementary Textbook card catalog section, eight reference books were listed. The most recent publications were Christoper, <u>Earthquakes</u> (1975) and Lauber, <u>Earthquakes: New Scientific Ideas About How and Why the</u> Earth Shakes (1972).

State adopted and approved textbooks for each grade level were located in another section which is used for reference and browsing. One observes that the topic, earthquakes, is handled as one of the geological natural disasters along with such other types as volcances. Introduction to this topic begins in elementary school where concepts about the changing earth are emphasized. In junior high a more advanced approach is employed. But a survey of the literature shows little information on earthquake preparedness, awareness, or learning about southern California earthquakes or earthquake prediction.

In the city, as in the county, local schools maintain individual libraries and books are added periodically. Libraries vary greatly regarding book selections. Again, because of this decentralization we were unable to ascertain the number or kind of books on earthquakes in each school catalog.

The Local School and Earthquake Preparedness

Since Los Angeles County offers a wide variety of geographical settings, we felt we could get a more accurate reflection of the local school's response to earthquake threat since announcement of the southern California Uplift if we divided the county by natural geographical regions. The mountain ranges and ocean form the natural barriers of the basin, valley, and desert where school districts are located. Every area is potentially vulnerable

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to a major earthquake and some areas have been more recently affected than others. For example, the San Andreas Fault and the Uplift area pass through sections where there are Los Angeles County schools.

Schools in every region should be concerned about earthquake safety and preparedness. We wondered what effect the experience with news of the Uplift may have had on these areas. To be sure of sampling the diversity of settings, we arbitrarily divided the County into six geographical regions for our inquiries. The Los Angeles County schools and the city schools overlap in a number of areas. The six regions include San Gabriel Valley, east and west; Antelope Valley, desert side; central and north Los Angeles; south central and south coastal; west and west coastal.

Our purpose was to gain some impressions of how school policies are implemented, and the importance attached to such programs and practices and to earthquake safety and preparedness. Our illustrations and impressions came from persons contacted in these six regions. They include thirty-six school principals and a comparable number of teachers representing elementary, junior high and secondary levels. We interviewed other school personnel and administrators as well as parents and civic leaders (volunteer and paid staff). We also sought information from private schools.

Responses we were most interested in were the local school's preparedness plan, training of teachers, student education concerning earthquake preparedness, and community programs, especially concerning the southern California Uplift.

<u>School disaster preparedness plans</u>. Principals at local schools indicated they did have written plans and that they do have a set number of drills each year. Schools varied greatly as to the directions and standards followed. For example, the 'drop' drill or 'take cover' drill

may serve the same purpose for an emergency, including an earthquake. Yet the term "earthquake" drill was seldom used. But we did find schools where the principal not only had an earthquake drill in the classroom, but followed it with a signal to assemble in the yard. (This would be a combination of 'take cover' and 'fire drill' that was used for an earthquake drill). Such usage was exceptional, however.

Most school plans used directions for "drop" or "take cover" as the earthquake drill. However, such meaning was not usually communicated. If teachers or students were asked if they had earthquake drills, the answer was usually no.

In a few schools, particularly in areas where there had been firsthand experience, such as the San Fernando Valley and Palmdale, the school principal had written specific and separate directions for teachers on the topic, earthquake. If a particular school addressed this topic in more detail, it usually reflected the motivation and concern of the principal, e.g., Hawthorne Elementary School in Beverly Hills.

In some communities, e.g., Sulphur Springs and Palos Verdes, the school and the American Red Cross had advance plans worked out together, and the local principal had these as part of the school plan.

The general impression given by most school principals was that they seemed prepared for a moderate earthquake, but genuine concern was expressed whether or not the local school is prepared for a major earthquake, should one occur. One principal stated that everything is based on assumptions-assumptions we won't have a major earthquake, assumptions the school buildings are safe, assumptions our communication system will work and help will come, and that we will be able to handle the injured. (Teachers are not required to take first aid, yet it is assumed they are prepared to give first

aid).

The safety of the school buildings was checked following the Uplfft announcement and any problems were reported to the Safety Department. We assume the schools are safe, principals indicated.

Since news and media coverage of the southern California Uplift, principals indicated more personal awareness of the necessity to be prepared; yet most had not thought through what would actually be potential problems regarding retaining children for an indefinite period, holding the teachers, securing a supply of food, dealing with parents, and releasing the child to an unsafe environment in the event of a major earthquake.

Typical replies were "God only knows what would happen"; "Teachers will rise to the occasion"; "Everyone senses the danger and will do his part. I've never seen it fail"; "In a real disaster help will come from the Civil Defense," or "Red Cross," "Salvation Army," "Police," and "Fire Departments." Local schools generally make the assumption that there is an outside organization prepared to fill the void in emergency earthquake planning.

The problem of communication, that many schools do not have two-way frequencies and that there is a set of complex directions for contacting help if telephones don't work, came up frequently.

Our general impression from interviews was that most principals had not thought seriously about earthquake preparedness and awareness, but our questions generated some thought and interest.

One school in a potential inundation zone below a dam had practiced a mock evacuation. Two schools had simulated earthquake attacks, and students as well as staff assumed assigned roles. This exercise gave first-hand experience in observing evacuation patterns from classes and planning alternative evacuation routes, for example. One principal regularly had earthquake drills--without the teachers' prior knowledge--as he wanted to see how

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they would function in a crisis. This principal would also plan an earthquake drill when school was in recess. to observe playground behavior and to plan accordingly. Classrooms were checked personally by him and his assistant following a drill, then the entire school would evacuate to an open area. But most principals seemed to use the low-keyed approach and were less active in school drill for earthquake preparedness.

The impression we gained was that most principals were following district orders and they were not particularly aware of Title 5, Code 560. This ordinance was never cited to us by principals as the reason for revising school plans, or for questioning the adequacy of existing arrangements. Some did state that their schools were civil defense shelters, because supplies were still stored here. Most seemed rather vague about the outside communications network for use in case they weren't able to contact the district office in a major disaster. Futhermore, they were depending on an organizational structure "out there" to assist them. Only three schools referred to plans to be self-sufficient, even overnight, or until help arrived. Most planned to dismiss the children to parents as soon as possible, and never considered outside hazards in the environment as a deterrent.

Since announcement of the southern California Uplift, the schools nearer the San Andreas Fault seemed to be the most realistic about their roles during a major disaster.

<u>Teacher training</u>. Principals were asked if there were specific training for teachers to deal constructively with an earthquake while school is in session. The most frequent reply to this inquiry was "no." Principals did state they discussed rules for fire drills, drop and/or take-cover drills at the beginning of the school year. The term "earthquake drill" was not generally used. Teachers who were asked this same question also stated

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that they had not been given specific earthquake preparedness instructions. It was assumed that they were expected to know what to do, though most did not have first aid training or cardiopulmonary resuscitation training in case of a major disaster. No one seemed to have a clear picture of what they were expected to do, other than to follow the principal's directions. A typical response was "to wait and see what will happen" or "just rock and roll and ride it out."

A few principals had written separate emergency preparedness plans for earthquakes, including specific directions for school personnel. These plans usually reflected the principal's personal experience with a man-made or natural disaster such as a fire during school. Teachers interviewed at these schools showed more awareness of hazards and emergency procedures.

<u>Student preparation</u>. We were interested in knowing how the local schools prepared children to deal with an earthquake, including the use of drills. Interviewees generally expressed the view that schools are not preparing children to deal with an earthquake. In one or two instances, schools did go through a simulated mock earthquake drill and there was role-playing by students and teachers. In one school this seemed successful and the principal stated that they were planning to repeat it. In another school, some parents complained that the exercises were frightening their children. In most cases the topic of earthquakes, even relating it practically to the "drop" or "take-cover" drills, was handled in a very low-keyed way. Usually, earthquakes were not discussed in student emergency preparation.

The teacher and the class. We interviewed teachers from different areas and school levels. We were interested in knowing how they felt about their training and preparedness to handle an emergency, how they conducted drills, and if earthquake preparedness is included in conjunction with one of

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their teaching units. We focused particularly on how the Palmdale bulge may have affected their training or teaching on earthquake awareness and preparedness.

Most of the teachers indicated they had not been given specific instructions for advance earthquake preparation, and most of them stated their school did not have earthquake drills. But drop drills or take-cover drills were usually required (teachers didn't equate these with earthquake drills, though this is part of the directions given by administrators). In an emergency, teachers rely upon the principal's orders.

Some teachers realized they were expected to render first aid if necessary. However, taking a class in first aid is not required and most teachers had not taken the training. One teacher mentioned that "we can deal with a 4.0 earthquake, but we are not prepared for a major one. If we are, it is a kept secret." Another teacher remarked that a serious earthquake had never happened when school was in session so "we will just keep our fingers crossed that the next one occurs when school is not in session."

The problem of adequate communication was mentioned several times. One teacher wondered what would happen if telephone lines were broken. A teacher in one community had learned there was no emergency back-up system and this was a concern. In the Los Angeles City schools, the junior high and high schools have two-way radio communication. These facilities were installed because of student problems during the past few years. But it is necessary to have trained personnel to work the system. Elementary schools can connect into this system by following a complicated set of directions. There was a question whether local personnel could handle two-way radio effectively in case of an emergency. Directions are given so locally designated personnel can use the system, but the big question was whether there was enough practice to use

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it during an emergency, and if enough persons knew how to use it.

Teaching earthquake preparedness and awareness is not a part of the curriculum though some teachers may incorporate it in a social studies, science, or safety discussion if it seems relevant. One high school science teacher said she had used the current film, <u>Earthquake</u>, and also a science film series loaned from a television series on earthquakes. The topic of panic and mob behavior in a crisis became very relevant with this showing. This led to a discussion of being prepared and knowing how to react intell-igently. A junior high social studies teacher stated he feels it is very effective to discuss an earthquake immediately following one which the class may have felt, or to discuss news media publicity about one that just happened. Announcement of the Palmdale Bulge and media coverage on earthquake predictions were some other examples. Such discussions become more than academic, and information is applied to how students could be personally affected, and how to be prepared.

Another teacher stated he teaches a class that has a short unit on how the earth changes. Part of this unit includes earthquake faults and how the earth moves. In group discussion he leads them into expressing their feeling about earthquakes, and this inevitably leads to discussing preparedness. One science teacher had students who have undertaken earthquake projects, such as making an earthquake tilt meter. The availability of resource supplies from a science center provides motivation for some teachers. If there is something available on earthquakes, it may stimulate interest in having a unit on that topic.

Current event topics are another way of introducing earthquake discussion. The teacher who made this comment referred particularly to the announcement of the southern California Uplift. But she tried to steer away

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from student concern about personal preparedness and safety. Another teacher remarked about the location of her school and the dam above them. This was of great concern, and she felt it was more than just a class or school concern. It should be a community concern.

We have cited examples indicating that some teachers do include teaching about earthquakes, though most of the teachers interviewed said that the topic was not usually discussed unless it happens to fall into their science unit. The view was generally expressed that if earthquake and preparedness were a part of the curriculum, students and teachers would be better prepared. Some teachers had a great personal fear of earthquakes and didn't want to discuss the topic, but they felt that if they understood what to expect and how to react themselves this would help to dispel fears the students may also experience.

In the school system there seems to be as wide a variety of approaches in discussing or ignoring earthquakes as there are teachers. Teachers and classes varied greatly.

Home earthquake preparedness and safety instruction for children. We found replies to a question about home preparedness similar to answers about teaching earthquake preparedness. It is not a part of the school program and there is very little attention given to this area. In the Fall of 1979, all schools sent home a three-folded pamphlet called "Parent's Guide to Emergency Planning." This pamphlet addressed several topics, as follows: that the schools had an emergency plan; what the school had instructed children to do in emergency drills and procedures, including fire, earthquake, flood, civil defense, and smog episodes; policy about keeping children until the emergency is over, then releasing pupils to parents; the radio station number to listen to for current information; pupil expectation and

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standards during an emergency; and a section to parents describing the school's responsibility to students, asking parents to make certain the children understand, and explaining that emergency procedures have been discussed.

In the open letter to parents the comment was made, "We plan to hold them (pupils) at school until the emergency is over. We urge you to remain home until the emergency is declared over." The last column lists items to be included in advance preparation for an emergency, and six basic rules to follow in an emergency.

This bulletin was signed by the Los Angeles city school superintendent, Mr. William J. Johnson. The ninety-five county districts adapted the same bulletin for their local schools and these were signed by local district administrators. One version of the bulletin is reproduced here.

Though school communications are sent home by way of the pupils, there is no feedback on whether information reaches home and if it is read. This seemed to be the consensus among principals. Whether the communication was important enough to serve as the basis for classroom discussion is at the teacher's discretion.

The need for a budget and for some official department to head a required program for earthquake safety, preparedness and awareness, modeled after the fire department's fire safety program, which ties in individual and home safety, was mentioned many times. Though earthquake preparedness and home safety awareness are not a part of the curriculum, it was felt that an outside coordinator who came in with a program similar to the fire department's program would be of great value at school and for getting the information home at the elementary school level.

The fire department's school educational program for fire safety has an official who visits schools annually to talk to the student body about

YOUR SCHOOL'S EMERGENCY PLAN

• The schools' primary role in an emergency is to care for the safety and welfare of children during school hours.

• The safest place for your children in an emergency during the school day is in the school.

• School personnel will know and use proper procedures during an emergency and will provide instructions and guidance to pupils.

Your Child's School Will.....

 Prepare pupils in emergency drills and procedures....FIRE,
EARTHQUAKE, FLOOD, CIVIL DEFENSE,
SMOG EPISODES.

• Keep pupils at school until they can be reunited with their families.

• Consider moving pupils only when occupation of the school becomes unreasonable due to unsafe conditions.

• Release students only after the emergency has been declared over and, in the case of major disaster, only to parents reporting to school.

• Provide current district information on radio station KHJ 93 and over the telephone, 926-KEEN.

PUPILS SHOULD...

• Understand that all emergency procedures are developed to avoid confusion, prevent injury, and save lives in case of disaster.

• Learn the emergency procedures for FIRE, EARTHQUAKE, CIVIL DEFENSE, FLOOD, and SMOG EPISODES.

• <u>Follow</u> instructions of school staff members at all times.

• <u>Know</u> the safest and most direct route from home to school.

• <u>Understand</u> what to do in case an emergency occurs while enroute to and from school.

• <u>Know</u> the person or persons designated by their parents to care for them in the event that their parents are not at home.

• <u>Take</u> their responsibilities in an emergency seriously.

STUDENTS, PLEASE:

• <u>DO NOT</u> panic or leave the school site during the time of an emergency.

• <u>DO HELP</u> fellow students to remain calm and to follow instructions quickly and quietly during the emergency.

PARENTS, PLEASE....

• Remember that the safest place for children in an emergency during the school day is at school.

• Remember that schools WILL NOT SEND YOUR CHILDREN HOME in an emergency situation unless the schoolbecomes unsafe, and then only if it can be done with complete safety.

• Be certain that the Student Information Form is accurately and completely filled out each year and returned to the school.

• Make certain that your children understand the safest and most direc route to and from school. $\begin{bmatrix} I \\ I \end{bmatrix}$

• Make certain that your children understand what to do and where to go when an emergency arises enroute to or from school.

• Monitor the radio station KHJ 93, for emergency information and, for special taped instructions regarding schools, call the ABC Public Information line, 926-KEEN.

• Be aware of, support, and reenforce the emergency procedule information your children receive at school.

Dear Parents,

Young people are our most prized possessions and most important resources. Their welfare and safety is a continuous responsibility of the school. At no time is this more apparent then when a state of emergency arises during the school day.

Public safety officials tell us that the school environment provides the safest possible protection against those hazards often associated with emergencies outside of school.

In light of this, our District has developed policies and procedures to utilize your community school during unpredictable times. School administrators and staff are trained and ready to provide direction to students. We plan to hold them at school until the emergency is over. We urge you to remain calm and at home until the emergency is declared over.

A common strategy and a coordinated course of action are musts if we are to effectively combat what might otherwise result in confusion and, possibly, tragedy.

We will not take our responsibility lightly. Nor should you. Help yourself, your family, and us to be prepared. Read this pamphlet. Review it with family members and stress the need for their cooperation. Through mutual cooperation and preparedness we can, and will, provide for the safety and welfare of all concerned.

8928-A 618< Eugene Tucker, Ed.D.

HAVE ON HAND

- 1. Battery operated radio.
- 2. Flashlights.
- 3. First Aid kit.
- Water (a few gallons for each family member).
- Food (canned foods, and powdered milk for at least a week's meals).
- Pipe and crescent wrenches to turn off gas and water. (Know where your gas, electric, and water main shutoffs are and how to shut them off.)
- List of emergency numbers (fire, police, ambulance).
- Telephone book for Survival Guide information pages.

IN AN EMERGENCY FOLLOW THESE RULES

- 1. Don't panie.
- Do not use your telephone except to report medical or fire emergencies.
- 3. <u>Keep streets clear</u> for emergency vehicles.
- 4. <u>Cooperate with public safety</u> officials. Don't go into affected areas unless your help is requested.
- Monitor your radio (battery operated) for information and damage reports.
- 6. Informed and cooperative citizens can help minimize damage and injury.

ABC Unified School District 16700 Norwalk Boulevard Cerritos, California 90701 (213) 926-5566, ext. 151



PARENT'S GUIDE TO EMERGENCY PLANNING

fire safety, usually followed by an illustrative film. A safety checklist is sent home by pupils to go over fire safety preparedness with parents, then it is signed by the parent and returned to school. Checking at home for an overloaded multiple-extension socket and having an alternate escape route are examples of the safety checklist.

We have noted the general frustrations of principals in getting information home by pupils and not knowing whether parents were interested in what was taking place at school. The approach of having everything signed at all grade levels is difficult to implement. Feedback is generally a problem.

In talking to many parents, we encountered similar remarks. One concerned parent--a District PTA Safety Chairman--said "the schools say they have a plan but we don't know what it is. I would appreciate seeing a copy." Another PTA safety chairman remarked that principals really don't like to get so involved in hypothetical situations--no use stirring up concerns when it may not be necessary. But we also talked to parents who didn't seem to care what was being taught and considered that was the school's business.

Other parents mentioned that they have never heard about earthquake preparation from the schools. They seemed to be more influenced by the news media. No one seemed to have a clear picture of what would happen at school during a major earthquake disaster. Some said they hadn't thought about it, or didn't want to think about it. One or two indicated they had attended a PTA program on the topic, but the attendance was very small. People are just too busy to attend meetings these days.

<u>Private and church-related schools</u>. Though patterned on a smaller scale, earthquake preparedness in the church-related school was not very different from the public schools. Emergency plans are required and local schools are expected to have drills and standards. In a few of these schools

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there were programs on this topic and another element was added on one occasion. The teacher stated that "earthquakes do not instill the same fear or apprehension it may for others. We believe that Christ is the center of our lives and we have faith which helps us to feel less preoccupied or concerned."

In the private schools, because they do not have a central office, there was a greater variety of standards. A two-room school doesn't have as many options. Some schools have plans, but more than one administrator couldn't recall what they were or what signals were used. At another school, the Head Administrator said they didn't come under the Title 5, code 560 law, and didn't know what it was all about.

We did not find special programs that had been devoted to earthquake preparedness, nor did we observe any change of standards since the announcement of the southern Calfornia Uplift.

Community Programs

When our study began in the summer of 1976, we talked to community and school personnel identified as having a special interest in safety and program planning, focused on earthquake preparedness and awareness following the Palmdale Bulge (southern California Uplift) announcement. A number of programs evolved during this period and the following year. School administrative workshops, local school PTA programs, and community school-sponsored events were held. They varied in length from one meeting to week-long programs. The purpose of these programs was two-fold: preparedness in case of a major disaster and dissemination of information. Within the schools, workshops were held for administrators and principals to disperse information and help in writing revised school emergency preparedness plans. The following year, district Parent Teacher Association groups reported a number of schools

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that had special programs on earthquakes. Some schools and communities planned week-long earthquake and disaster preparedness programs. Specialists and civic and community organizations participated in several. Representatives from the Red Cross, Civil Defense, police and fire departments, city managers, and many others were invited to participate.

We attended meetings and interviewed those associated with planning the programs, and several of them are described in the following pages. We learned that these and similar programs were motivated by the announcement of the Uplift and the publicity given to the subject. Those in responsible positions felt the importance of being better prepared in the school and community if a major earthquake disaster occurred. Concerns about other disasters influenced their motivation, too. Recent fires, floods from erosion, being located by a nearby dam, were some reasons stated. But it was the threat of a <u>major</u> earthquake following the Bulge announcement that was the stimulus to do something.

Three years later we followed up on the programs we are reporting and found that they had not been repeated, although they served the purpose at the time they were offered. Programs on earthquakes leveled off at PTA meetings, too. Reports on several of the events were published and the information is presently used and requested. The Cerritos group published a booklet, <u>Earthquake: Safety and Survival</u>, which is being used as a reference book for many schools and community organizations in the ABC School District, the city of Norwalk, and other places in that general area.

The Civil Defense directors, Mr. Mike Regan of the City of Los Angeles and Mr. George Thyden of Orange County, are still in demand to discuss earthquake preparedness. Other resource specialists--Red Cross, fire and police, etc.--are also being requested for programs, though they were in more demand

during the months that followed the Uplift announcement. It is possible that Whitcomb or Minturn's prediction of a forthcoming earthquake during the months following the Uplift announcement could have intensified the interest, though these weren't remembered at a later date when we re-interviewed.

The disaster preparedness program which Mr. Thyden conducts with schools (by request) has continued to build momentum and he has extended the procedure and information he offers. The Automobile Club of Southern California still sponsors a PSA (Parent Safety Program) which functions through the thirty-four PTA districts, though only five districts are active.

Among district PTA safety chairmen, there is a passive concern about earthquakes. One director stated that we live in a crisis society, that we have to have a disaster to be shaken into reality. She feels there is a void between the local school and parents and she had never received any home communication on earthquake preparedness. This informant stated that following the Palmdale bulge, nothing was done on a state-wide PTA basis. Another PTA district official involved in safety programs indicated these meetings don't seem to relate to earthquakes as a topic of concern. They deal with street crossing, bicycle safety, etc. But we did find one district where the PTAs are strong and the district leaders exercise leadership in the community. At the present time this community is preparing an Earthquake or Disaster Preparedness Seminar in the Winter of 1980. This is reported in detail in the section on "Glendora: A Model Plan."

In the next few pages we report on some of the preparedness programs we attended in 1976 and 1977 following the Uplift announcement, and share some impressions about them. Current information about these programs and some of the participants is also mentioned. Most of the manuals or booklets published in connection with these programs are still being used as preparedness guides.

Sulphur Springs Disaster Preparedness; September, 1976. This program was sponsored by the Sulphur Springs Union School District. A comprehensive plan, approved by the superintendent of schools and the Board of Trustees, was developed by Mr. Spero Bowman, District Disaster Preparedness Coordinator. About forty pages long, it addressed the problem of a major disaster, natural or man-made, in the community and presents a detailed plan "to provide for the safety and welfare of its students and staff. . . . The school district is also aware of its role to work cooperatively with other community agencies to prepare for and deal effectively with a disaster situation. . . . <u>The</u> <u>primary purpose is to provide for the welfare and safety of the students</u> <u>during school hours."</u>

The introduction to the plan also states that it was written in compliance with the California Administrative Code, Title V, Education, Section 560, and that it was "developed in cooperation with state, county, and local civil defense officials and has been approved by them" (appendix, Sulphur Springs Disaster Plan and Table of Contents). The plan included a community line-of-authority chart, as it related to the school, and all school staff were assigned specific roles in the event of a disaster. About two pages were devoted to earthquake.

Sulphur Springs is located about 50 miles north of Los Angeles and suffered extensive damage during the 1971 San Fernando quake as well as being in close proximity to the southern California Uplift. The Sulphur Springs PTA sponsored two earthquake preparedness meetings for parents that were held on successive Wednesday evenings in November, 1976, at two local elementary schools. These meetings were suggested by Mr. Ken Klemm from the Office of Emergency Services, who is a resident in this area. He suggested to the curriculum committee that the District should establish measures to prepare

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for an earthquake in event one should occur during school hours. Mr. Spero Bowman was in charge of the presentation. He had been working on the disaster manual. During the preceding months, since early 1976, some inservice training for teachers had been offered on what to do in case of a disaster, especially earthquakes. Earthquake preparation materials had also been sent home. So the school community had been involved in earthquake preparedness.

But the response at the PTA meetings was disappointing. Usually twenty-five to fifty parents attend a PTA meeting, but only a total of twenty-eight individuals attended the two meetings in Sulphur Springs, even though they were held in the evening. Several explanations have been offered for the lack of better attendance: e.g., finding out information on how to be prepared for a coming quake may frighten some residents; residents may see no benefits in attending such a meeting, feeling that there is nothing one can do to alleviate the effects of a quake; they feel they can cope adequately; or there had already been so much written and discussed about the topic that it is "old stuff." Whatever the reasons, the fact remains that residents of this community in a vulnerable area who had received publicity about these meetings did not respond to the opportunity to hear and discuss earthquake preparedness.

In 1979 we learned that Mr. Bowman's position was deleted following the passage of Proposition 13, and that the principal was at a different school. But the <u>Earthquake Preparedness Manual</u>, written in 1976, is still being used. The local Red Cross continued offering workshops for teachers and there were other teacher workshops about earthquake disaster.

The Sulphur Springs Elementary school held a simulated earthquake disaster and persons were assigned roles--simulated injury, shelter signs, etc. In this drill, it was felt some children thought of it as a game while

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others might have been frightened. Because a few parents complained that their children were upset and registered protests, the simulated earthquake drill was not held again.

In the school's holding plan, there are now medical supplies stockpiled by the Red Cross, so the initial program continues to have some effect.

Beverly Hills, Hawthorne Elementary School; November, 1976. A PTA sponsored meeting, "When an Earthquake Strikes," was publicized in the <u>LA Times</u> Westside Section on Sunday preceding the meeting. The program included a panel of three persons: Mr. Coleman Jenkins, LA County of Building and Safety; Chief Robert Tomau, Beverly Hills Fire Department, and Dr. Bowman, Principal. In introducing the program, the PTA President stated that "the more knowledge we have, the more it will help us to react calmly in case of an earthquake."

Discussion centered around earthquake faults and a local dam, predictions and conceptions about disasters and preparedness, and safety of the school buildings and the school's preparedness plan. Dr. Bowman stated that the students had practiced earthquake drills throughout the year. The southern California Uplift was mentioned during the discussion period as well as different earthquake predictions and cautions which were made recently.

Dr. Bowman was still principal of this school in 1979. Although there have been no other programs, the school has continued its focus on the necessity to prepare for an emergency in an earthquake. Mr. Bowman feels there is on-going educational earthquake awareness in the school and an emphasis on preparation. The administrators and the physical education teacher have all had cardiopulmonary resuscitation training. He indicated that the school plan is explicity about what happens <u>after</u> the earthquake and aftershocks, e.g., student body moves to field for body count and remains there until police come. The principal and vice-principal check rooms to see if

all are vacated. A foreign population from Iran, where students have had first-hand experience with earthquakes, have entered the school so it is necessary to train them for emergenices here, too. He stated he has frequent school earthquake drills.

<u>Cerritos College, Norwalk; February, 1977</u>. An earthquake preparation seminar was held one evening and it was publicized on campus and through broadcasts on KNX-FM radio. About 200 people attended the seminar, 65 percent from the community and the remainder from first aid and early childhood classes.

The seminar included a film, "Our Active Earth," concerning the San Fernando quake, and two speakers, Murray Pratt of Area E office of Civil Defense and Libby Lafferty of the Creative Home Economics Consultants. Mr. Pratt addressed the topic of government assistance available following a major earthquake. And Mrs. Lafferty emphasized home and family preparation in the event of a quake, and showed slides to illustrate her comments. The major theme of the program was that one should take steps to inform people about preparedness so as to develop their capacity for self-sufficiency.

<u>Cerritos; Spring, 1977</u>. An earthquake preparedness meeting was held that included city government officials representing eight cities within the Cerritos College school district and four other school districts. The booklet, <u>Earthquake: Safety and Survival</u> (Appendix B), synthesized information shared at this meeting. It coordinated the information and efforts of city government officials from Artesia, Bellflower, Cerritos, Downey, Hawaiian Gardens, La Mirada, Lakewood, Norwalk, and the Long Beach Red Cross and Long Beach Search and Rescue unit. This booklet gives a summary of "actions to be taken in the event of a severe earthquake. . . . It is vital that every individual have a good knowledge of this material since his greatest source

of protection will come from himself."

Why and how the booklet and program were initiated is not clear. Mr. Ted Spriggs, Community Services Coordinator of Cerritos College, was instrumental in implementing the program. The booklet that was published is intended for the individual citizen's use. It discusses dangers of an earthquake, during an earthquake, after an earthquake, evacuation centers, and emergency numbers. Earthquake rules for personal and home protection, (published by Civil Defense, County of Orange) are also listed. The booklet has become a standard emergency earthquake preparedness reference in this area and it is included in the emergency preparedness manual of one of the school districts.

During this period of time, one credit course for teachers stressing earthquake survival in schools and how to set up earthquake learning centers were also held.

In 1979 we learned that Mr. Ted Spriggs' position was deleted because of Propositon 13 and that the preparedness program had not been repeated.

First Annual Emergency Planning Seminar; October 27, 1977. This seminar, mentioned earlier under "Civil Defense and the School," attracted school officials from the Los Angeles Unified School District, the Los Angeles County Schools, the Los Angeles Community College, parochial schools, and college or university level delegates, and a joint effort by some school administrators. The purpose of the conference was to provide information for disaster planning generally, and to assist officials with their required revised school emergency plans.

This conference came soon after the decision was made to have revised plans submitted in 1977. This was the year following the southern California Uplift announcement, while there was still active concern about adequate

preparation. The following enclosures were included in the Conference

packet:

-When an Earthquake Strikes -EARTHQUAKE, prepared by Maintainance Branch, Safety Section Describes Background, a plan and San Andreas Fault, What to do during and after shake "your Responsibility--Upgrading Now" -Letter to Principals re: -Emergency Legal Procedure Handbook for principals -Business Services Center Emergency Plan (EQ., p. 4) -Legal Documents--Title 5, Se. 560, Dam Safety Act, etc. -Six colored bulletins relating to safety, disaster, etc. -LA and Orange Co. Earthquake Planning Project, May, 1975, NOAA study findings, 1973 -School Disaster Preparedness 9th Grade Unit (San Bernardino) -"Schools and Disaster Preparedness Planning" Reprint by Dynes and Quarantelli -"In Time of Emergency," a citizen's handbook

Mentioned earlier in the section, Implementation of Policy, this conference had guest speakers and workshops on specific topics.

Though called a "First Annual" seminar, it has not been repeated nor are there plans to have another one. It served its purpose at the time, and took much planning and effort. Mr. Gordon Trigg, Los Angeles City Schools Administrator, was very involved in planning and implementing the seminar.

Earthquake Preparedness Fair, San Marino, Stoneman Avenue Elementary School; November 7, 1977. Developed around a two-week module, this program had two primary goals, student education and home preparedness planning that is coordinated with the school. For thirty minutes daily, teachers discussed causes and effects of earthquakes, safety, home preparedness, first aid, and drill procedures. A Red Cross first aid course, "First Aid for Little People," was given in classes by the school nurse. Cardiopulmonary resuscitation classes for parents and teachers, consisting of two four-hour training sessions, were filled to capacity. This class was given by paramedics from a professional ambulance service in Pasadena. "Simulating an Earthquake" was planned by the Pasadena Chapter of the American Red Cross, and each class session

dealt with specific unexpected problems. Observers of the simulation included students and teachers recruited by the Parent Volunteer Drill group. The Red Cross and San Marino Police and Fire Department were also there to observe and comment. Two problems for future consideration came out of the event: how to communicate with public agencies if the telephone isn't operating, and dealing with problems of sanitation if the emergency is of long duration.

This program was publicized and community and parents were informed in advance. There was opportunity for comment and parents had the option whether their children participated. Following the program it was fully evaluated by teachers, staff, and parents, and other participants, so it was a combined community and school effort. The complete report of the program, samples of evaluation forms, and an extensive evaluation were compiled.

According to participants we contacted in 1979 an interest in having such a program developed after the southern California Uplift. Residents had already experienced the first-hand effect of the 1971 San Fernando Valley Earthquake as the shocks did damage in some sections of the Pasadena-San Marino area. A similar event was not held in 1978 or 1979, but a similar program on a smaller scale may be held in 1980.

Glendora: A Case Study of an Evolving School and Community Disaster Preparedness Program

The following case study is about a community where the interest in disaster preparedness, motivated in part by the announcement of the southern California Uplift, has presently caught the imagination of the schools and the community. It has been through the patient nurturing of this idea by a few that interest has gained momentum. It is the kind of program that can serve as a model for other communities.

In November, 1978, the Glendora Town Hall Forum held a meeting on Disaster Preparedness. The program generated so much school and community interest that a committee was formed to continue developing ways to implement an effective program for that area. Plans are being made for a large city-wide Emergency Preparedness Day and Family Fair to be held in February, 1980. A simulated earthquake drill involving the entire area, including the schools, is planned for April, 1980.

We heard about the program from school personel and the PTA representative, who were enthusiastic about the progress being made and community response. It may be noted that such a community effort follows almost two years after the San Marino Earthquake Preparedness Fair. Since it is a program currently in progress we were particularly interested in finding out as much as possible concerning its origin, persistence, and spread.

Glendora, a community of 37,000, is in the Los Angeles County School District, and is located near the San Gabriel Mountain foothills in the San Gabriel Valley. The Big Dalton Dam is located a few miles above it. The Glendora School District first came to our attention as an area where there is an active program on emergency preparedness from Los Angeles County school administrators, Dr. Wales and Mr. Korporaal. Glendora was also mentioned to us by Mr. Thyden, Civil Defense Coordinator in Orange County, who serves as one of their resource persons.

Three persons were identified particularly as active leaders in the disaster preparedness program. There were Mrs. Dee Morgan, physical education teacher at Sandburg Jr. High, Mr. Tris Hubbard, Glendora School District support services coordinator, and Mrs. Betsy Elman, former Sandburg Jr. High PTA President and now on the Glendora PTA council. They are active in community

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and school organizations. The following information reflects an apparent consensus based on information from them and other community sources, on how an interst in emergency preparedness began and how the interest spread.

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Dee Morgan, junior high teacher, became concerned about the lack of emergency preparedness in the community and in the school's ability to cope with a major disaster. From her personal observations and research she shared her information with interested groups. An articulate speaker, she talked to community groups which included the local PTA's in the ten local schools. In Glendora, this organization is strong and attracts good leaders.

She indicates that her interest in this subject began when she saw the film, <u>Earthquake</u>, in 1975 and saw the parallels to what could happen if their dam broke. She was impressed by the general panic which can take place when communications break down and a community is not prepared. The NOAA report, which was one of her references, described in graphic numbers what could happen if a major earthquake occurred. With the Palmdale Bulge announcement in 1976 and the news coverage that followed, her concern was intensified. It was following this development that she began sharing her information and speaking to groups.

If a major earthquake occurred in their community, she stated in her talks, and the Big Dalton Dam above them broke, it is estimated that seven and one-half feet of water would reach the first school in ten minutes. She expressed concern about communication and how the school and community would function and how prepared they were to be self-sufficient until help arrived. In a major earthquake (e.g., M = 8.3) there were overwhelming hazards even if the dam didn't break. As a teacher, she was privately concerned that teachers are expected to render first aid, but they are not required to take training.

The PTA, during Mrs. Elman's presidency at the school where Dee Morgan taught, became actively involved in an awareness and preparedness program. The PTA council became involved, too, and Mrs. Elman later took a leadership role on the council. The council worked closely with Mr. Tris Hubbard, school district coordinator, in charge of school preparedness prog-Though each school had its local plan, as required, the District has rams. now adopted further safety measures. With PTA volunteers, they have set a goal that each school can be self-sufficient for a two-day period, that each would be able to handle its own problems. In a major earthquake, it is recognized that heavy demands would be placed on police and fire departments in the community. The earlier idea of depending upon an emergency communication system in which runners were sent for help was rejected as being impractical as power lines may be broken or streets buckled. It is also the goal of the program that each school have trained first-aid and cardiopulmonary resuscitation (CPR) personnel, first aid supplies, blankets, food, stretchers, and other essentials for a major disaster, according to Mr. Hubbard.

In 1977, after Mrs. Morgan began talking to groups, the PTA council adopted a program called DEAP (Disaster Emergency Awareness and Preparedness) with forty active members. The idea started when Mrs. Elman was PTA president and the purpose is to make poeple aware and to be prepared for a major disaster. DEAP also sponsored Dee Morgan's talks and the members worked actively with her by promoting her ideas and by helping to implement an effective school preparedness program through Mr. Hubbard. Many persons commented that it was this teacher's interest and volunteer work that was instrumental in lifting the community and school program off the ground. Whenever she speaks, she brings her van, a model of personal preparedness equipment and supplies.



The community involvement began through the Glendora Town Forum which meets quarterly. Mr. Hubbard is a member of the steering committee which plans the community programs. At the Town Hall Forum on Disaster Preparedness, Mrs. Morgan was on the program. Using information from the NOAA report, she presented a scenario that could happen in Glendora if there were a major earthquake of 8.3 proportions. This included the projected number of killed and injured; number of buildings destroyed or damaged; and what effect it could have on community resources. She posed the question: could Glendora meet the demands of such a disaster? A panel of city officials discussed the question and realized the problems and limitations, e.g., no communications back-up system, etc.

Following this program, interest in the topic continued among those who had attended the Forum in a capacity-filled large auditorium. The momentum persisted, and plans are being made to implement an effective community preparedness program. A number of steps were taken: a community disaster planning committee, chaired by Mr. Tris Hubbard, was appointed by the City Manager; plans are being made to have a community family disaster preparedness workshop on February 28, 1980. These workshops will include topics on home preparedness, food storage, and other aspects of emergency preparedness. Films will be shown and there will be demonstrations on first aid and other aspects of preparedness. The PTA under Mrs. Elman's leadership, is planning this all day program. Local civic organizations will participate, including the Red Cross, fire department, paramedics, and other groups. Special speakers have been invited. The City government is participating with the PTA by offering its facilities--printing, mailing, etc.

To implement and coordinate a good emergency disaster program, the city manager requested Fire Chief Ray Schackelford to develop a system for the

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community <u>to link</u> all disaster plans into a single program--schools, hospitals, and other involved organizations. Since separate community disaster plans had not been inter-linked, it was impossible for public and private agencies to communicate with each other. The school plan for example, depended upon the telephone with no emergency back-up system. Through the Claremont American Red Cross chapter in an adjoining community, plans are being made to establish a communications system for the area using their generator and emergency back-up system.

Volunteer groups, primarily the PTAs, have shared the work load. Mr. Tris Hubbard is working through them to secure needed emergency equipment, such as stretchers, for local schools. Mr. Hubbard remarked about their responsiveness and effectiveness in implementing these needs.

A community disaster simulation is planned for Spring, 1980. The disaster council or "preparedness meeting" group, appointed by the city manager, have plans for two stages. The first phase will be an in-house emergency simulation at city hall and will include hospitals and schools. After this trial run, there will be a community-wide emergency simulation a few weeks later. Fire Chief Schackelford is coordinating this program. The planning group includes representatives from schools and hospitals, the chief of police, the city manager and his assistant, and other concerned representatives.

This case study of Glendora shows how a community can work together in planning an effective emergency preparedness program. It represents the combined efforts of many organizations which are striving to prepare and plan for a common goal through advance planning and implementation of a workable approach to meeting school and community needs during a major disaster.

Conclusions, Problems, and Recommendations

The purpose of this chapter on Educational Institutions has been to record whether and how schools in Los Angeles County responded to nearpredictions of a destructive earthquake, beginning in February, 1976, with announcement of the southern California Uplift (Palmdale Bulge). We have reported what system-wide formal policies were announced, and what steps were taken to put these policies into effect. We have attempted to form impressions of how much importance is attached to programs, units, or other practices by officials in the school systems. We also recorded in a more impressionistic way how much importance is attached to such programs and practices and to earthquake safety and preparedness in the local schools by local administrators and teachers.

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We learned that schools did not in most instances respond directly to the announcement of the Uplift. However there was a massive though temporary response to a directive from the Los Angeles County Superintendent of Schools, following amendment of the state ordinance on school disaster preparedness plans, which in turn was stimulated by announcement of the Uplift. As amended, Title 5, Section 560 of the California Administrative Code, entitled "Civil Defense and Disaster Preparedness Plans," requires: a) the district board to adopt a written policy guideline for schools, to be reviewed at least annually and revised as needed; b) the principal of each school to formulate and submit for approval a civil defense and disaster preparedness plan for that school, and c) each school to test its plan on a rotating basis at least twice during the school year and keep a record of such tests. The county schools required revisions of local school plans to be placed on file in a central office in the fall of 1977. The directive

from Dr. Clowes, the superintendent to district administrators within the county, contained enclosures that described the "Palmdale Bulge" and reported the possible effects of a major earthquake. The required plans were prepared and placed on file but have not been reviewed for completeness or adequacy. There is no provision to review their implementation or to require that they be updated periodically. Essentially it has been up to each component school district how seriously they viewed the task of earthquake preparedness.

So far, the announcement of the Uplift and the amendment of Title Five have not noticeably affected the film, units or books that are used as classroom resources. There has been some effort by a few individuals to get more earthquake information into the curriculum. The Safety Division did require inspection of school buildings. Stockpiling of supplies is not done generally, but we did locate some schools where this effort was being made. It is not, however, required at the county level.

Insofar as the awareness of recently heightened earthquake threat has reached into the local school and the classroom, it has been because of the initiative of concerned school principals, teachers, and parents, rather than because of any mandate or assistance from higher levels of school authority. There are scattered local program success stories, although many of these have been ephemeral because their continuance depended upon the dedication of single individuals. The most promising program we have found in Los Angeles County was described at greater length. A critical element in the success of this program has been that it evolved early from a school plan to a total community plan, and that several people developed personal stakes in its success. This is undoubtedly the pattern that should be followed if we are to go beyond sporadic and temporary attacks

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on the problem of earthquake preparedness in the schools.

<u>Problems</u>. Teachers and administrators at all levels readily acknowledge that the schools are poorly prepared to cope with a disastrous earthquake. The indirect stimulus of the Uplift announcement caused some fresh attention to be focused on the problem on a system-wide basis. Here and there local catalysts, responding on their own to the crescendo of earthquake warnings, have stimulated admirable programs. But on the whole the schools of the County are no better prepared than they were before the announcement of the Uplift, and perhaps even before the San Fernando earthquake of 1971. Seven major problem areas have been called to our attention.

First, Title Five, Code 560, which is supposed to fix the schools' responsibility in case of disaster, is a weak ordinance, vague in its requirements, and easily satisfied by token compliance. As an administrative ordinance rather than a legislative statute it is not enforceable as law. Consequently it can not be used effectively to require high standards for earthquake safety and preparedness. The absence of any provision for review and evaluation of district plans encourages token compliance. The interpretative guidelines supplied by the State Office of Education constitute a small but pitifully inadequate step from vagueness toward specificity. While the approach is admirable in allowing for local discretion in suiting plans to community conditions and needs, it is unrealistic to expect that each school district will have sufficient expert advice available to prepare and implement a plan that is realistic and comprehensive. And the ordinance requirements are met by a one-time effort to prepare and file a plan, followed up only by semi-annual school drills.

Second, any realistic plan for school response to an earthquake must take account of the relationship between school and community. The Office

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of Education guidelines emphasize this point. But few of the plans have addressed these problems realistically, and few of the administrators with whom we spoke had clear conceptions of what the community-school relationships might be in specific but plausible crisis situations. Community plans, like the 1978 City of Los Angeles Earthquake Operational Plan, are often prepared on the assumption that the schools will look after themselves. In the same communities, school plans are developed on the assumption that essential services and emergency assistance will be provided by community agencies. In this connection school officials often blindly assume that vulnerable lifelines will hot be broken, that water, gas, electricity, food supplies, communication systems, and transportation systems will remain available and operative. Little effective attention has been given to the necessity for self-sufficiency and the state of isolation that could realistically confront schools in case of a major earthquake.

Third, and related to the second problem area, is the widespread myth of civil defense. Repeatedly we heard that civil defense authorities would take charge in an emergency and provide needed guidance, resources, and coordination. Civil defense authorities are the first to admit that civil defense exists in only token proportions in most communities. Only the largest communities have civil defense offices that are not simply responsibilities added on to regular fire or police duties, and even these offices suffer under token funding and token staffing. Several schools were once designated as civil defense emergency centers and stockpiled with emergency supplies. School officials often assume that these designations are still operative and the stockpiles current. Civil defense authorities have indicated that for the most part the designations are no longer operative and the stockpiles are of dubious utility after years of neglect.

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Fourth, it is generally unclear just what teachers are expected to do in an earthquake emergency, and teachers are untrained for some of the responsibilities most often expected of them. It is agreed that teachers should give first aid, but few teachers are trained in first aid and there is no requirement for such training. Teachers are not systematically briefed on the many contingencies that must be dealt with in case of earthquake, nor on the special needs of children on such occasions. Teachers themselves usually enunciate the established tradition that teachers stay with their pupils in an emergency until they are no longer needed. But in saying this teachers are not envisioning the possibility that parents may not be able to reach the school on the day of the earthquake. The responsibilities are not specified and the assumption is that school principals will issue necessary orders at the time. Teachers will be torn between ill-defined responsibilites toward their students and concern for their own families and property.

A fifth problem area, contributing to the fourth, is the lack of standardized procedures, terminology, and signals for use in an earthquake emergency. It is left to each principal or teacher to decide whether to remain indoors or go outdoors, and what other decisions to make. There is no generally recognized pattern of "earthquake drill" that teachers and students can learn for use in an emergency. "Drop drills" and "take cover" drills are widely practiced as holdovers from the heightened civil defense consciousness of the cold war period. But these drills are often not thought of as earthquake drills, so neither teachers nor students have been taught to make the necessary split-second connection between the earthquake and the appropriate protective response. And reliance on vestigial and ambiguous civil defense signals or fire alarm signals in an earthquake emergency can lead

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to little but confusion.

The sixth problem area is the absence of systematic provision and adequate support systems for training children to understand and deal with earthquake hazard at school, at home, and in the community. The lame excuse that some children are frightened by thinking about earthquake danger could just as well be made against educating children for fire safety. But we have learned to deal with that fear when it occurs in case of fire safety and the problem is essentially no different for earthquake safety. Some resourceful teachers have made it their responsibility to introduce earthquake safety to their students, most often in connection with physical science units. But there is no systematic provision for such training in the curriculum. Our limited survey suggests that the demand for teaching resources such as motion pictures by individual teachers exceeds the supply. In particular, teachers receive little help in presenting the human, as contrasted to the physical, side of earthquakes.

The failure of the schools to deal with earthquake safety in home and community by educating children with the same seriousness, authority, and realism that they do for fire safety is documented in our sample surveys of Los Angeles County residents, in which we find that households with school children are no better informed about the earthquake threat than households without children, and that children are seldom recognized as significant sources of information about the earthquake threat and earthquake safety.

A sixth problem area is integrally related to the fifth. In the event of a severe earthquake or a short-term earthquake warning no school plan will be viable without a clear understanding between school personnel and parents concerning their respective responsibilities and authority in the

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crisis. And no workable understanding can be reached solely by discussions between local schools and parents. Because of the profound emotions associated with traditional parental responsibility, understandings concerning when and under what conditions children will be retained in school or released must be defined by law. Since uncoordinated efforts by parents to reach their children constitute one of the most potent sources of traffic congestion and communication overload in the event of an earthquake, these understandings must be developed in collaboration with officials responsible for coordinating community-wide response to disaster. The schools urgently need help from both state and local authorities to insure that whatever plans they have made will not be placed in disarray by the uncoordinated and imperative action of parents.

Finally, no apparent attention has been given by school systems or individual schools to the possibility of responding to a short-term earthquake warning. Although we have no assurance that scientists will be able to issue short-term alerts in advance of severe earthquakes in the near future, the possibility is a real one, as demonstrated by the Chinese experience. In case of a short-term warning of a few days, a decision would have to be made concerning whether to close the schools temporarily, which would immediately raise the question of whether working parents would be at home to look after the children, and whether schools would assume residual child care responsibilities. In case of a few hours warning, each school would have to make unaided decisions about keeping the children in school or trying to send them home, at a time of confusion, traffic congestion, and communication overload in the surrounding community. In either case, advance planning and coordination with authorities in the community is essential if the schools are to deal effectively with a short-term earthquake warning.

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Recommendations. Our recommendations are primarily that constructive attention be given to each of the seven problems enumerated. We have neither the expert knowledge nor the intimate familiarity with the working of individual school systems needed to select the best plans for dealing with these problems. It seems clear that a more adequate statutory base and fuller guidelines from the State Office of Education are needed. Serious collaborative planning between schools and those community officials who will assume key responsibilities in an emergency is needed, and the schools must be helped to prepare to be self-sufficient if necessary. Educational authorities in the State and County must take the initiative to specify classroom teachers' responsibilities in an emergency, and then insure that they have the necessary training and support to implement these responsibilities. The earthquake hazard must be acknowledged as a critical fact of life in California, with appropriate and standardized procedures, drills, and signals placed in general use and attention to earthquake safety given the same importance as concern for fire safety in the school curriculum. Especially with California's mobile population, training of children for individual and household earthquake safety must fill the gap created by limited adult experience with damaging earthquakes. The respective responsibilities and authority of school personnel and parents in case of a severe earthquake must be precisely defined in law and well advertised to parents and to officials responsible for coordinating the community-wide emergency response. And finally, under state auspices, plans should be developed for coping with short-term earthquake warnings ranging from a few hours to a few days notice.

Teachers and administrators have offered many specific suggestions for dealing with these problems. Adequate involvement of the most active and interested school personnel in planning will insure that these sugges-

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tion's receive the attention they richly deserve. We especially recommend the County and State officials study the experience in communities like Glendora where strong grass roots efforts have materialized and involve the most active personnel from these communities in planning statewide programs.

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REFERENCES

Clark, William B., and Carl J. Hauge. 1971. <u>Earthquakes: Be Prepared</u>! Sacramento, Calif.: California Division of Mines and Geology. Special Publication 39.

Coping With Children's Reaction to Earthquake and Other Disasters. N.d. Northridge, Calif.: San Fernando Valley Child Guidance Clinic; reprinted by the City of Huntington Beach, Office of Civil Defense and Emergency Services.

Disaster Planning Guide for Schools. 1979. City of Huntington Beach: Office of Civil Defense and Emergency Services.

Disaster Preparedness Plan: In Cooperation With Civil Defense and Red Cross: A School Manual. 1965. Pasadena, Calif.: Pasadena City Schools.

How to Survive an Earthquake. 1979. Downey, Calif.: Creative Home Economics Services.

In Time of Emergency: A Citizen's Handbook. 1977. Baltimore, Md.: Department of Defense, Defense Civil Preparedness Agency.

Myers, Norman L. 1972. <u>Civil Defense and Disaster Planning Guide for</u> <u>School Officials</u>. Sacramento, Calif.: California State Department of Education.

Stadum, Carol. N.d. <u>Earthquake Information for Teachers</u>. City of Huntington Beach, Office of Civil Defense and Emergency Services.

Stadum, Carol J., Arie R. Korporaal, and Priscilla Lee. 1975. <u>The San</u> <u>Andreas Fault--Where East Meets West: A Teaching Module</u>. Downey, Calif.: Office of Los Angeles County Superintendent of Schools, Division of Curriculum and Instructional Services.

US Department of the Interior/Geological Survey and the Office of Emergency Preparedness. 1969. <u>Safety and Survival in an Earthquake</u>. Washington, DC: US Government Printing Office.

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APPENDIX A

Two enclosures from Dr. Richard M. Clowes' letter, dated July 8, 1976, to the chief administrators of all Los Angeles county school districts concerning the Palmdale Bulge and Earthquake Safety. Dr. Clowes is Los Angeles County Superintendent of Schools.

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ICHARD M. CLOWES, Superintendent

July 8, 1976

TO: Chief Administrators Los Angeles County School Districts

FROM: Richard M. Clowes Superintendent

SUBJECT: THE PALMDALE BULGE AND EARTHQUAKE SAFETY

Recently much has been written and heard about what has come to be called the "Palmdale Bulge". Various agencies have expressed concern relative to the safety of residents in the entire southern California area if an earthquake of high magnitude should occur.

This office acts as a collecting point and reviewing agency for the disaster preparedness plans of the school districts within Los Angeles County. Section 560 of Title V, California Administrative Code, sets forth the steps required to comply with present regulations.

Enclosed are copies of a letter from the Chief Structural Engineer, Office of Architecture and Construction, a resolution of the State Seismic Safety Commission, a geological survey produced by the Department of the Interior, and a land uplift map of southern California.

We hope that this material will be useful to you as you continue your efforts to protect students and employees in the event of a major earthquake.

RMC/RFW:dt

General Bulletin No. 7 SSC: 76-77

JUL 13 1976

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LOS ANGELES COUNTY EDUCATION CENTER • (213) 922-6111 7 9300 EAST IMPERIAL HIGHWAY • DOWNEY, CALIFORNIA 90242

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STATE OF CALIFORNIA SEISMIC SAFETY COMMISSION

RESOLUTION NO. 1-76

Re: Finding that the "bulge" in Southern California is a threat to public safety and requesting State and local agencies to take steps to mitigate the potential disaster, stimulate preparedness, and inform the public.

WHEREAS, an area of over 4,500 square miles has risen five to ten inches since 1961 along a section of the San Andreas Fault where historically major or great earthquakes have occurred and are likely to occur in the future; and

WHEREAS, there is uncertainty about the specific location and mechanism of the possible earthquake and that other areas of California similarly face potential future earthquakes; and

WHEREAS, the U.S. Geological Survey has studied the uplift and reported publicly about it, including a news release of February 13, 1976, briefings for the Governor of California and the California Congressional Delegation, testified at recent hearings held by this Commission, and is spending substantial funds to monitor and evaluate the uplift; and

WHEREAS, the full implications of the uplift are unclear, but such uplifts are known to have occurred before damaging earthquakes in California and Japan; and SSC Res. No. 1-76 April 8, 1976

Page 2

WHEREAS, a severe earthquake in southern California similar to that of 1857 would cause large numbers of casualties and much damage in the greater Los Angeles metropolitan area; and

WHEREAS, the Seismic Safety Commission recently held hearings in Los Angeles on the uplift and implications for public safety; now, therefore, be it

RESOLVED, that the Seismic Safety Commission finds that the uplift should be considered a possible threat to public safety and welfare in the greater Los Angeles metropolitan area; and, be it further

RESOLVED, that the State support efforts to determine the extent of the threat to public safety and welfare; and, be it further

RESOLVED, that the appropriate State office and officials assign high priority to making adequate monetary and other resources as well as new financial, assessments, bond or tax procedures available to State and local government to aid them in initiating or improving and encouraging predisaster mitigation measures to reduce loss to life and property; and, be it further

RESOLVED, that the Seismic Safety Commission requests all State agencies to take precautions to mitigate damage to their facilities; and, be it further

RESOLVED, that the Seismic Safety Commission urges all State agencies with assigned emergency responsibilities to be ready to respond to the possible disaster with all available resources under the leadership of the Office of Emergency Services and as provided for in the California Emergency Plan; and, be it further

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April 8, 1976 Page 3

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RESOLVED, that the Seismic Safety Commission requests the Office of Emergency Services to expand current effort and take all new necessary steps to further stimulate preparedness efforts by appropriate State and local agencies including counties, cities, special districts, and school districts and accelerate its public information program to insure that residents in the area receive accurate information about the uplift and precautionary actions that can be taken to minimize hazards to life and property in their homes and businesses; and, be it further

RESOLVED, that there should not be a relaxation of concern and effort to mitigate potential earthquake damage in all areas of California; and, be it further

RESOLVED, that the Executive Director is directed to monitor and report to the Commission on the activities of State agencies within the context of this resolution and schedule periodic briefings by such agencies to the Commission, and to aid local agencies and individuals by referring and coordinating their requests to appropriate State agencies; and, be it further

RESOLVED, that the Executive Director shall transmit copies of this resolution to the Governor, Legislature, State, federal, and local government organizations, and others as may be appropriate.

SEISNIC SAFETY COMMISSION

KARL V. STEINBRUGGE, Chairman

Approved and adopted by the Seismic Safety Commission at its regular meeting in $\underline{Socronorh}_{0}$, California, and dated this \underline{Cighth}_{1} day of \underline{Cighth}_{1} , 1976.

DEPARTMENT OF GENERAL SERVICES

OFFICE OF ARCHITECTURE AND CONSTRUCTION SACRAMENTO P3803



July 1, 1976

Superintendent of Schools Los Angeles County 9300 E. Imperial Highway Downey, CA 90242

Gentlemen:

The Palmdale Bulge

The State Seismic Safety Commission has approved and adopted Resolution No. 1-76, a copy of which is enclosed. Also enclosed is a copy of a Summary of Briefing to Governor Brown, Jr., dated March 17, 1976.

The Commission calls attention to the so-called "Palmdale Bulge", covering an area of approximately 4,500 square miles, which has risen in elevation from five to ten inches since 1961. The full implications of the uplift are not clear, but there is evidence from studies in other countries that uplifts of less than 5" have preceded destructive earthquakes.

It is well known that California is subject to the occurrence of major and great earthquakes. The last great earthquake to have occurred in this Southern California area was in 1857. Future earthquakes of Richter Magnitude greater than 8 are inevitable.

The attached information is directed to the County Superintendents of Schools of Los Angeles, San Bernardino, Riverside, Orange, Kern, Ventura and San Luis Obispo Counties for distribution to Governing Boards of Trustees within their jurisdiction. Any precautionary actions which would mitigate damage to buildings and minimize hazards to life in the event of an earthquake should be taken.

Some suggested precautionary actions are:

- 1. Make cursory surveys of school buildings to identify any conditions which warrant further study.
- 2. Make further studies, where indicated, utilizing the expertise of persons qualified in seismic design.
- 3. Correct construction deficiencies as recommended.

Superintendent of Schools Los Angeles County Page 2 July 1, 1976

- Review and update evacuation plans for occupants.
- 5. Instruct occupants on what to do:

During the shaking:

- a. If indoors, stay indoors. Immediately protect yourself from falling or overtunning objects by hiding under sturdy furniture, away from glass, or within a doorway. Don't leave the building during the shaking.
- b. Don't use candles, matches, or other open flames.
- c. Don't run through or near buildings where there is danger of falling debris.
- d. If outside, stay in the open away from buildings and utility wires.
- e. If in a moving car, stop but stay inside.

After the shaking:

- a. Evacuate the building.
- b. Check utilities. If water pipes are damaged or electrical wires are shorting, turn off at primary control point. If gas leakage is detected, shut off at main.
- c. Turn on radio or television for emergency bulletins.
- d. Stay out of damaged buildings; aftershocks can shake them down.

Sincerely, Frød W. Cheesebrough Chief Structural Engineer (916) 445-8730

FWC:nb Attachments

cc: Mr. R. A. Olson Mr. R. J. Askin Mr. S. Van der Ryn I - III - File - Reading

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APPENDIX B

BOOKLET ENTITLED EARTHQUAKE: SAFETY AND SURVIVIAL, DEVELOPED FOR USE IN THE CERRITOS COLLEGE DISTRICT MEETINGS IN 1977

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Safety & Survival

Co-Sponsored By:

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Cerritos Collège Community Services Cities of Artesia, Bellflower, Cerritos, Downey, Hawaiian Gardens, La Mirada, Lakewood, Norwalk and Long Beach Red Cross Long Beach Search & Rescue

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distant.

FOREWARD

This summary of actions to be taken in the event of a severe earthquake is designed for your protection. It is vital that every family and every individual have a good knowledge of this material since his greatest source of protection will come from himself -- You will not be able to depend upon outside help since damage may be widespread, including government buildings, etc. Therefore, your knowledge and advance preparation could save yourself and your family a great deal of hardship.

For additional materials contact your local Emergency Preparedness Office as designated herein.

CITY MANAGERS AND DISASTER COORDINATORS:

- Artesia: M.D. McKeown City Manager (865-6262)
 - Les Pricer Disaster Coordinator (865-6262)
- Bellflower: Edward Alario City Manager (866-9003)

Disaster Coordinator Paul Drusso (866-9003)

Cerritos: Gaylord Knapp City Manager (860-0311)

> Kurt Swanson Disaster Coordinator Community Safety Coordinator (860-0311, ext. 222)

CIVIL DEFENSE RADIO STATION: _ KFI 640

Downey: Charles Thompson City Manager (861-0361)

> Donald B. Robison Deputy Director of Civil Defense (861-0361 ext. 225)

EMERGENCY PREPAREDNESS STEERING COMMITTEE OF CERRITOS COLLEGE & CIVIC RESPONSIBILITY COMMITTEE

> Hal Bodle Nello Di Corpo Jim Jeffries Juanita Harlan

Don Layton Charles F. Oswald Jean Snook Ted Spriggs

Hawaiian

Gardens: Jack A. Simpson City Manager (860-2476)

> Carlos Urrutia Disaster Coordinator (860-2476 ext. 33)

La Mirada: Claude Klug City Manager Civil Defense Director (943-0131)

> Rick Pucci Assistant Civil Defense Director

CITY MANAGERS AND DISASTER COORDINATORS: Continued

Lakewood: Howard L. Chambers City Administrator (866-9771)

> Joe Rosart Community Safety Coordinator (866-9771) also Sergeant Patterson Lakewood Sheriff's Station (866-9061)

Norwalk: William Kraus (868-3254) City Manager

> Maurice Pratt Civil Defense-Area E (868-9908)

Sergeant Ted Eatmon Norwalk Sheriff's Station (863-8711)

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THE DANGERS

The actual movement of the ground in an earthquake is seldom the direct cause of death or injury. Most casualties result from falling objects and debris because the shocks can shake, damage, or demolish buildings and other structures. Earthquakes may also trigger landslides and generate huge ocean waves (seismic sea waves), each of which can cause great damage.

Injuries are commonly caused by:

1. Partial building collapses, such as toppling of chimneys, falling brick from wall facings and roof parapets, collapsing walls, falling ceiling plaster, light fixtures, and pictures.

2. Flying glass from broken windows.

3. Overturned bookcases, fixtures, and other furniture and appliances.

4. Fires from broken chimneys, broken gas lines, and similar causes. The danger may be aggravated by the lack of water due to broken mains.

5. Fallen power lines.

6. Drastic human actions resulting from panic.

WHAT CAN YOU DO?

There are many actions which you can take to reduce the dangers from earthquakes to yourself, your family, and others.

A. BEFORE AN EARTHQUAKE OCCURS

1. As a citizen:

- a. In those areas where damaging earthquakes can be expected, support local safe fuilding codes with efficient inspection and firm enforcement
- b. Support school building programs which provide for the strengthening of old, weak school buildings or their replacement with earthquake-resistive structures on ground reasonably safe from failure during a strong earthquake.
- c. Support community efforts to replace old weakbuildings and to insure that loose objects on buildings exteriors (e.g. cornices), are either removed or securely fastened.
- d. Organize and support programs to prepare for future earthquakes.
- e. Support research to learn more about the earthquake problem and to supply information needed to plan wisely the citing, design, and construction of manmade structures.

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- 2. As a homeowner or tenant:
 - a. Check your home for earthquake hazards. Bolt down or provide other strong support for water heaters and other gas appliances since fire damage can result from broken gas lines and appliance connections. Use flexible connections wherever possible. Place large and heavy objects on the lower shelves. Securely fasten shelves to walls. Brace or anchor high or top-heavy objects.
 - b. In new construction and alterations follow building codes to minimize earthquake hazards. Sites for construction should be selected and engineered to reduce the hazard of damage from an earthquake. Your city should have a seismic-safety element in its general plan which designates earth fault lines.
- 3. As a parent or head of a family:
 - a. Hold occasional home earthquake drills to provide your family with the knowledge to avoid injury and panic during an earthquake.
 - b. Teach responsible members of your family how to turn off electricity, gas, and water at main switch and valves. Check with your local utilities office for instructions.
 - c. Provide for responsible members of your family to receive basic first aid instruction because medical facilities may be overloaded immediately after a severe earthquake. Call your local Red Cross or civil defense director for information about classes.
 - d. Keep a flashlight and a battery-powered transistor radio in the home, ready for use at all times.
 - e. Keep immunizations up to date for all family members.
 - f. Conduct calm family discussions about earthquakes and other possible disasters. Do not tell frightening stories about disasters.
 - g. Keep two weeks supply of food and water on hand.

4. Suggestions for foodsupply and first aid

The importance of food in a disaster is more than relieving hunger. There is something about eating that eases tensions and calms anxiety. Food is a vital factor in raising morale.

- a. For your emergency food supply, choose foods that you and your family like and would use anyway. Keep in a safe and easily accessible place.
- b. Foods must be dated sot that they can be periodically rotated.
- c. Pack your First Aid kit with your other emergency supplies - also prescription medicine. If evacuation is suddenly ordered, your 'get-away kit' is complete.

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- d. Store in lightweight, airtight and compact containers.
- e. Shop for one-serving and one-meal sizes to avoid leftovers.
- How and where do I store it?
- a. In case of quick evacuation, have packed a portable food and First Aid survival box to make yourself self-sufficient for 48 hours anywhere. The cardboard box or foam food chest is lightweight and has carrying handles. This may be stored under a bed or in a spot in the house where concrete or beam reinforcement would protect it.
- b. In each car, store a similar food/First Aid "minikit" for members of the family who are away much of the time.
- 5. How do I provide for water?

A supply of water for drinking and cooking is vital. Plastic containers, properly sealed, will keep water potable for several months. Keep a supply of purification tablets in your emergency kit. These are obtainable at any drug store. Water from the hot water heater, from the toilet storage tank or from the swimming pool can be used. Swimming pool water, after straining and boiling or after straining and chemically purified will suffice.

Remember, water will be more important than food and city water mains will probably be out of service. If water is available from the tap it should be boiled or otherwise purified before use since contaminants might get into the system following an earthquake.

B. DURING AN EARTHQUAKE

- Remain calm. Think through the consequences of any action you take. Try to calm and reassure others.
 a. Do not light a match, keep a flashlight handy.
- 2. In indoors, watch for falling plaster, bricks, light fixtures, and other objects. Watch out for high bookcases, china cabinets, shelves, and other furniture which might slide or topple. Stay away from windows, mirrors, and chimneys. If in danger, get under a table, desk, or bed; in a strong doorway. Encourage others to follow your example. Usually it is best not to run outside.
- 3. If in a high-rise office building, get under a desk. Do not dash for exits, since stairways may be broken and jammed with people. Power for elevators may fail.
- 4. If in a crowded store, do not rush for a doorway since hundreds may have the same idea. If you must leave the building, choose your exit as carefully as possible.
- 5. If outside, avoid high buildings, walls, power poles, and power lines, and other objects which could fall. Do not run through streets. If possible, move to an open area away from all hazards. If in an automobile, stop in the safest place available, preferable an open area.

C. AFTER AN EATHQUAKE

- 1. If your children are in school during a severe earthquake do not panic. Teachers are instructed on how to handle emergency situations, such as an earthquake. If the roads are so impassible that you can not get to school quickly, the school is responsible for the children until parents can come to pick them up.
- 2. If an earthquake occurs during non-school hours check for injuries in your family and neighborhood. Do not attempt to move seriously injured persons unless they are in immediate danger of further injury.
- 3. Check for fires or fire hazards.
- 4. Wear shoes in all areas near debris or broken glass.
- 5. Check utility lines and appliances for damage. If gas leaks exist, shut off the main gas valve. Shut off electrical power if there is damage to your house wiring. Report damage to the appropriate utility companies and follow their instructions. Do not use matches, lighters, or open flame appliances until you are sure no gas leaks exist. Do not operate electrical switches or appliances if gas leaks are suspected. This creates sparks which can ignite gas from broken lines.
- 6. Do not touch downed power lines or objects touched by the downed wires.
- 7. Immediately clean up spilled medicines, drugs, and other potentially harmful materials.
- 8. If water is off, emergency water may be obtained from water heaters, toilet tanks, melted ice cubes and canned vegetables.
- 9. Check to see that sewage lines are intact before permitting continued flushing of toilets.
- 10. Do not eat or drink anything from open containers near shattered glass. Liquids may be strained through a clean handkerchief or cloth if danger of glass contamination exists.
- 11. If power is off, check your freezer and plan meals to use up foods which will spoil quickly.
- 12. Use outdoor charcoal broilers for emergency cooking. It is a good idea to have a camp type stove which could be used while electricity and gas are unavailable.

13. Do not use your telephone except for genuine emergency

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calls. Turn on your radio for damage reports and information.

- 14. Check your chimney over its entire length for cracks and damage, particularly in the attic and at the roof line. Unnoticed damage could lead to a fire. The initial check should be made from a distance. Approach chimneys with caution.
- 15. Check closets and storage shelf areas. Open closet and cupboard doors carefully and watch for objects falling from shelves.
- 16. Do not spread rumors. They often do great harm following disaster.
- 17. Do not go sightseeing immediately, particularly in beach and waterfront areas where seismic sea waves could strike. Keep the street clear for passage of emergency vehicles.
- 18. Be prepared for additional earthquake shocks called "aftershocks." Although most of these are smaller than the main shock, some may be large enough to cause additional damage.
- 19. Respond to requests for help from police, fire fighting civil defense, and relief organizations, but do not go into damaged areas unless your help has been requested. Cooperate fully with public-safety officials. In some areas, you may be arrested for getting in the way of disaster operations.
- 20. A word about sanitation. If the earthquake is severe it is quite possible that the sanitary sever system will be badly damaged and inoperable. Therefore, temporary arrangements may be required for the disposal of both human and household wastes. Keep a container of lime available. Small latrines can be dug in the yard with adequate lime coverage and ground cover. Chlorine used for pool purification can also be used as well as sealed plastic bags. Such procedures are strict emergency methods and should be discontinued at the earliest possible time.
- D. KNOW YOUR EVACUATION CENTER:

Greater Long Beach Chapter American Red Cross 3150 E. 29th Street Long Beach, California 90806 Phone: 596-6341

E. EMERGENCY NUMBERS:

<u>ARTESIA</u> City Hall Fire

865-6262 868-0411 661<

Hospitals: Artesia Community 865-6244 Pioneer Hospital 865-6291 Ambulance: Aids 863-4728 **BELLFLOWER:** City Hall 866-9003 Fire 638-6121 Police 866-9061 Hospitals: Bellflower Community 866-7570 866-9029 Bellwood Woodruff Gables WA5-5281 Kaiser 920-4321 Alondra Community 866-9741 Ambulance: Bowers 925-5971 CERRITOS City Hall 860-0311 Fire 868-4011 Police 866-9061 Hospitals: Artesia Community 865-6244 Pioneer Hospital 865-6291 Ambulance: Aids 863-6291 DOWNEY: City Hall 861-0361 Fire 861-9221 Police 861-0711 Hospitals: Downey Community 869-3061 Rio Hondo Memorial 861-6771 Ranchos Los Amigos 922-7312 Ambulance: Bowers 925-5971 HAWAIIAN GARDENS: City Hall 860-2476 Fire 638-6121 Police 866-9061 Hospitals: Cerritos Gardens Gen. 860-0401 Ambulance: Inter-Community 827-6670 LA MIRADA: City Hall 943-0131 Fire 868-0411 Police 863-8711 Hospitals: 941-2251 La Mirada Community Ambulance: Aids 698-8011

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	LAKEWOOD:		
	City Hall		866-9771
	Fire		638-6121
• .	Police		866-9061
	Hospitals:		
	Lakewood General	· · ·	866-9711
	Doctors Hospital		531-2550
	Ambulance:		401 0111
	Dilday	· · · ·	421-8411
	Bowers		925-5971
		н на селото	
	NORWALK		000 2054
	City Hall	•	000-0203
	Fire		
	Police		863-8711
`	<u>Hospitals</u> :		000 4700
	Norwalk Community		863-4763
	Studebaker Hospital		. 868-3751
	Ambulance:		000 4700
	Aids		863-4728
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Page 162 has been removed.

Due to copyright restrictions, a map has been omitted from the Los Angeles Times, 1971, listing 42 earthquake faults in southern California.

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OFFICE OF CIVIL DEFENSE COUNTY OF ORANGE



EARTHQUAKE RULES

- 1. KEEP CALM DO NOT RUN OR PANIC.
- 2. REMAIN WHERE YOU ARE; INDOORS OR OUTDOORS.
- 3. IF INDOORS, STAY INDOORS. TAKE COVER UNDER DESK, TABLE OR BENCH, OR IN DOORWAYS, HALLS OR AGAINST INSIDE WALLS. STAY AWAY FROM GLASS WINDOWS OR SKY-LIGHTS. DO NOT RUN OUTDOORS! YOU MAY BE HIT BY FALLING DEBRIS OR LIVE ELECTRICAL WIRES.
- 4. IF OUTDODRS, GET AWAY FROM BUILDINGS. GO TO CLEAR AREAS AND STAY AWAY FROM WALLS, UTILITY POLES AND DOWNED WIRES THAT COULD CAUSE SERIOUS INJURY OR DEATH.
- 5. DO NOT RUN THROUGH, OR OUTSIDE BUILDINGS. THE GREAT POINT OF DAN-GER IS JUST OUTSIDE DOORWAYS AND CLOSE TO OUTER WALLS.
- 6. IF AT HOME, TURN OFF THE UTILITIES AS IF YOU WERE LEAVING THE HOUSE FOR THE DAY.
- 7. IF UTILITIES ARE DAMAGED:
 - A. Gas:
 - (1) INSPECT FOR LEAKY PIPES BY SMELL ONLY, DO NOT USE CANDLES, MATCHES OR OTHER OPEN FLAMES.
 - (2) IF YOU SMELL GAS:
 - (A) OPEN ALL THE WINDOWS AND DOORS SO THE GAS CAN ESCAPE. IF YOU KNOW HOW, SHUT OFF THE MAIN VALVE AT YOUR METER. LEAVE THE HOUSE IMMEDIATELY AND NOTIFY AUTHORITIES OF THE GAS LEAK.
 - (B) REMEMBER TO GIVE THE EXACT LOCATION.
 - (C) DO NOT RE-ENTER THE HOUSE UNTIL A REPRESENTATIVE OF THE GAS COMPANY ARRIVES AND MAKES REPAIRS OR TELLS YOU IT IS SAFE.

B. Water:

IF PIPES ARE BROKEN INSIDE THE HOUSE, SHUT OFF THE MAIN VALVE ON THE PIPE WHICH BRINGS THE WATER INTO THE HOUSE.

C. Electricity:

IF THE HOUSE IS PROPERLY WIRED, TROUBLE IS VERY UNLIKELY. IF THERE IS A SHORT CIRCUIT TURN OFF THE ELECTRICITY AT THE METER BOX.

- 8. TURN ON YOUR RADIO OR T.V. DO NOT USE THE TELEPHONE, EXCEPT TO REPORT EMERGENCIES.
- 9. DO NOT! DO NOT! DO NOT GO SIGHTSEEING!

REMEMBER – PANIC ACTION KILLS AND INJURES MORE PEOPLE THAN THE DIRECT RESULTS OF THE QUAKE.