

Date: Mon, 11 December 1989  
From: Kenneth R. Allen, 3784 Grove Ave., Palo Alto, CA 94303 (415) 494-8868  
To: MARA South Bay Group and interested parties  
Subject:

**THE LOMA PRIETA QUAKE OF 89:  
REPORT AND ASSESSMENT OF LDS HAM RADIO EFFORTS  
NEAR THE EPICENTER**

At 5:04 pm, October 17, 1989, an earthquake of magnitude 7.1 struck an area in the Santa Cruz Mountains between Santa Cruz and San Jose. The earth movement lasted just fifteen seconds. Seismic waves swept outward throughout the San Francisco Bay Area like ripples in a great earthen pond causing confusion, casualties, disruption of life and damage. The incident received immediate and widespread media coverage, as it occurred at prime time during the Oakland-San Francisco World Series Game at Candlestick Park.

At the outset there was much confusion, and little information was immediately available about the scope or extent of the impact. Many people in the affected areas attempted to carry on as if little had transpired. Now, some two months later, most of the damage reports are in, and the briefings are completed. It is now possible to piece together what actually occurred and reflect on responses for the future.

Life has returned to normal in much of the affected area. As Ted Harris N6IIU, American Red Cross Regional Disasters Services Director summarized: "This was not the big one, folks!" As another Red Cross volunteer quipped: "That was the most realistic 7.0 earthquake exercise I ever experienced." This earthquake was about 1/15 magnitude of the 1906 earthquake.

By definition, a disaster is an incident for which one is not prepared. An earthquake is unique because it occurs without warning, catching even the most prepared by surprise. Consider these incidents:

At 5:03pm in a rambling two-story home on piers on a hillside overlooking the Santa Cruz mountains, a mother stood on the second story deck admiring the sunset. She had just called down to her teenaged daughter to set the table for dinner, as father was expected at any moment. As the daughter reached the top of the stairs, the house jerked violently and the heaved back and forth, tearing at its moorings to hillside. She dived for the cover of the kitchen table and grabbed the arm of her mother, hauling her to safety as the deck collapsed and the floor tipped. The kitchen seemed to explode. The oven flew from its wall mount, refrigerator and cabinet doors flew open, and bottles, cans and dishes crashed to the floor creating an instant goeey mess. Outside, the father, who had just pulled up, watched helplessly as the ground rocked all around him and the house ripped away from the hillside, the first story collapsed, and the house split open. The driveway along the hillside crumbled, then split along its length, and two cars bounced up and down violently, slipping toward the edge of a cliff. When the shaking stopped, father picked his way through the shattered house--the walls of the second story were still standing--calling after his family. He found them huddled under the table in the kitchen, safe.

At 5:04pm, office workers were just ending their days, perhaps sitting at a computer terminal, finishing a project. It started as a creaking in the building, then quickly grew as the floors and walls and window shades began to shudder and rattle. The floor moved up and down as if about ship in a storm. Feeling helpless and nauseous, the worker sat paralyzed, watching pictures and books tumble from the walls. In the midst of all the motion, the air conditioning fell silent and the light and computer terminal fell dark as the power failed. Without an uninterruptible power supply, it was too late to save that last piece of work on the computer. Women's voices were heard, briefly screaming. Outside, buildings swayed and brick chimneys twisted and finally cracked. Telephone poles waved in the breezeless air like willows, and a great cloud of dust arose from the horizon to the south. After what seemed like a very long time, the shaking and noise ceased. The silence was deafening, even disorienting. People poured into the streets. The first reaction was to find out what had happened. The telephone was not dead. One radio station KGO was off the air. Another, KCBS remained on the air, broadcasting the opening ceremonies of the World Series. Street lights were out, and traffic was immediately snarled.

At 5:04pm a commuter on the Dumbarton Bridge causeway cruised toward the three transmitting towers of KGO Radio. He felt a bump, as he had just had a flat tire, but the road started to rock, so he pulled over. Nearby the high tension electrical towers and the towers of KGO whipped back and forth. High tension lines rippled with the rocking. A few seconds later, one of the huge transmitting towers lay in the Bay mud, and a section of another pointed precariously askew, about to collapse.

At 5:04pm, a few seconds later in Candlestick Park, a crowd of 65,000 awaiting the first pitch of the third game of the World Series between Oakland and San Francisco, looked around for the "wave" as a great rumbling shook the stadium. A great cheer went up, masking the rumble. Then the lights in the twilight dimmed and went out. There was no music, no public address system. Fans just sat there. The out-of-town announcers had no idea what had happened. Fans just sat there. Amid the confusion, players poured out onto the field, peering into the stands for family members. Finally, a police car drove onto the field. Over its loudspeaker came the message: The game had been postponed. Everyone should go home. At first only a few knew there had been an earthquake. Even fewer knew that Candlestick Park had recently been renovated to withstand an earthquake.

At 5:04pm, a violent shuddering swept through San Francisco's posh Marina District, built on fill on the north side of San Francisco near the Presidio. In a few square blocks, the shaking was perhaps more violent than in the Santa Cruz Mountains as buildings collapsed and sparks ignited several general alarm fires. Almost deserted because most people had not yet arrived home, there were only a few people trapped in the buildings. Apparently such violent shaking was caused by reflected seismic waves creating nodes of violent standing waves in a few square blocks of older brick buildings constructed on loose, saturated sandy fill soil. Within seconds entire households were lost in rubble, with the remains salvageable only days later at remote dump sites. Water mains burst, leaving no water to fight fires as gas mains broke.

Fortunately neighbors and bystanders rushed to the aid of arriving pump trucks, laying fire hoses from the Bay several blocks into the affected area. The fires were contained, but they burned brightly throughout the night.

At 5:04pm a mile long stretch of the multiple-lane double decked southern approach to the San Francisco-Oakland Bay Bridge, called the Cypress Structure on Interstate 880, began to heave violently. Simultaneously, the Bay Bridge began to rock, heave and stretch. One end of a thirty foot section of the upper deck pulled loose from its moorings to a pier in the cantilever section on the East side and collapsed onto the deck below, blocking all Eastbound and Westbound lanes and causing a number of accidents. Within seconds, a mile-long section of the upper deck Cypress Structure toppled from its piers and collapsed in a cloud of concrete dust onto the deck below, killing or trapping scores of motorists. Witnesses and local residents rushed to the aid of the victims, climbing onto and through the teetering rubble in search of victims and rescuing survivors. It was several hours before professional rescue workers arrived, and police and fire roped off the area, banishing the early heroes to a safer distance and evicting local residents from their homes along the structure. The scene was chaotic and grim, as nearly exhausted workers labored thereafter for days looking for victims caught between the roadways.

Crowds filled the streets of San Francisco, as workers tried to get home and fans left Candlestick Park. Both BART and the Peninsula CalTrains were shut down, lacking power and the assurance of a safe roadway. Thousands of commuters were trapped. Hotels, expecting a World Series crowd that never came, threw their doors open to all comers. Many slept in hallways and in lobbies that night. Little or no looting was reported, as the San Francisco Police were out in force, sweeping the streets before dark of loitering youth on downtown street corners. Everyone seemed to realize that this was a time to help one another, and they did.

Sixty miles away, in Watsonville, houses of the agricultural workers stood twisted and jerked from their foundations; in Santa Cruz, a brick warehouse converted into boutique shops lay in ruins, crushing one victim; in Pajaro, agricultural workers were forced to sleep in the fields that night as their homes lay in ruins; throughout the mountains, water tanks and propane tanks had been knocked from their tie-downs, interiors of houses stood trashed, power was off, water well shafts had collapsed, slides and fissures blocked roads, and yet amazingly few people were killed or injured. Little if any of this information was generally known at the time of and immediately after the earthquake. Many city officials in the South Bay, noting few reports of damage locally assumed damage was not widespread and then went home, leaving regular public safety workers in charge to make tactical decisions. Only later did the scope of the disaster become apparent.

The epicenter of the Loma Prieta Quake was about five miles south of the intersection of Highway 17 and Summit Road in the Santa Cruz Mountains. Summit Road is along the Santa Clara County border with Santa Cruz County. Major damage was suffered by residents all along Summit Road, although structural was somewhat selective. At first it was thought that over 250 people were killed, mostly in the Cypress Structure. The official fatality toll was later placed at 62, revised downward after a thorough inspection of all facilities. Minor injuries were incurred from such hazards as falls on

darkened remains of wine cellars. Approximately 27,000 of over 1,000,000 structures in the Bay Area suffered significant structural damage. About 2700 homes were destroyed. By comparison, the same magnitude earthquake months earlier in Armenia had devastated 100,000 brick buildings in the region and caused approximately 10,000 fatalities. A week before the Loma Prieta Quake, Hurricane Hugo, one of the worst hurricanes in American history, had just devastated several Caribbean Islands and the city of Charleston, South Carolina.

The American Red Cross is charged with a key role in any American disaster. The Red Cross has a contract with the U.S. Government to supply housing and food for 1,000,000 people in the event of a natural disaster. To do this, the Red Cross relies on a nationwide staff of 3500 workers, plus unpaid volunteers. Two disasters of a major magnitude, back to back, showed the Red Cross that it probably could not handle a major catastrophe requiring the housing of 1,000,000 people under its current level of readiness. Other organizations will be needed, including public agencies such as FEMA and the state, county and local Offices of Emergency Services, as well as private relief agencies such as the Salvation Army and various church organizations.

The LDS Church participated in the relief efforts, focussing first on its identified members and their immediate neighbors by providing direct manpower assistance to disaster victims and shelters for others as needed.

In the South Bay Area, the LDS response was quick and deliberate. A service organization called the Mercury Amateur Radio Association (MARA), made up of amateur radio operators (hams) who in large part are members of the LDS Church, has a group in the South Bay Area which operates a radio repeater on 147.285 MHz in the two-meter VHF amateur band. The MARA South Bay Group conducts weekly radio meetings (called nets) and monthly meetings. MARA serves as a resource for an Emergency Radio Response System (ERRS) organized in cooperation with the Welfare Services Agency of the LDS Church.

The two-way radio response of the MARA South Bay Group was instantaneous. At 5:05pm, within a few seconds of the end of the 15-second shaking, the first MARA amateur radio operator to turn on his radio, Chris Swartout N6WCP, activated an Emergency Radio Response System (ERRS) emergency net in the South Bay Area, assuming net control functions as prearranged on the predesignated VHF repeater frequency. Within the first few minutes a net of several LDS ham radio operators was in operation. A number of MARA hams quickly checked into the net, including Ken Allen WB6BCV, San Francisco Region Emergency Communications Coordinator for MARA, Ross Wille N6SJD of Sunnyvale, Dennis Callanta KA6YVZ of South San Jose, Wen Carmen N6MMY of Hollister, Wendall Collett N6QYZ, MARA Emergency Communication Coordinator (ECC) for the San Francisco West Stake area of the LDS Church and Don Wilkins KA6PSL, ECC for the San Jose East Stake, and Monte Tracy KF6WF, ECC for the Saratoga Stake. This net gave MARA immediate eyewitness coverage via VHF radio from San Francisco to Gilroy and west to the Santa Cruz Mountains on a common or party line channel. There was no coverage into the Santa Cruz area and apparently no one in MARA available to respond via radio.

Greg Rauch KI6CK, a MARA member of Boulder Creek and also Emergency Communications Coordinator for the Electric Power Research Institute in Palo Alto, was the designated MARA contact person. However, Greg was in San Diego on business when the earthquake occurred. No one else on the MARA list in the Santa Cruz area apparently responded, somewhat disappointing Greg. It was later learned that ham radio equipment was available at selected buildings, but because of construction, lack of operators and other factors, such as lack of suitable antenna sites, no equipment was installed or activated. The Santa Cruz Stake was thus left with communication via telephone, which was not completely dead, and via roads, which were in many instances blocked or closed to outside traffic.

Over the mountain in the South Bay Area, the ERRS net assumed the structure of the Incident Command System, which is used by many California disaster response agencies, such as the California Department of Forestry (CDF) and the integrated fire and police services of the City of Sunnyvale. In the Incident Command System, a task is organized around the needs of the incident: These include management, operations and resources. In the case of the ERRS incident, the first order of business was to find out what has happened, to communicate that information to responsible LDS Church leaders, and to offer communication assistance if needed. Under instruction of Ken Allen, MARA ham radio operators assumed net control operations responsibility, conducted radio surveys of general and local damage by monitoring two-way radio and broadcast radio and television broadcasts, tested telephone systems, activated equipment in their possession, and attempted to contact stake leaders in every stake in the South Bay and San Francisco Area, made a quick survey of LDS building status assess LDS meetinghouse building damage, if any, in the nearby stakes. +++

From these surveys and reports, MARA determined that there was instantaneous loss of power, with the exception of the area around the San Jose East Stake Center where the repeater was located. There was also intermittent disruption of regular telephone service throughout the South Bay Region. Telephone service appeared to be cut off between the 415 Area Code and Santa Cruz County. (Power was cut deliberately by service providers as shorts were detected and gas leaks were suspected, and telephones were immediately jammed, although most were undamaged.) Through local ham radio operators in and out of the Church using mobile and handheld transceiving equipment and repeaters on line-of-sight VHF and UHF frequencies (145-148 MHz, 220 MHz and 440 MHz), the affected region of the quake was quickly identified and communicated among the ham radio operators then on the air.

The Amateur Radio Emergency Services (ARES) of Santa Clara County responded instantly by activating about four different networks. Two VHF repeaters on Loma Prieta Mountain provided coverage of and a link between the Santa Cruz/Monterey Bay Area and Santa Clara Valley. Many ham radio operators quickly tuned to the frequencies of these repeaters to monitor communications over the mountain. There were no immediate reports into the Felton/Boulder Creek Area, an indication of possible major damage.

When it was determined that the principal affected area was in the Santa Cruz Mountains as pinpointed by seismic reports relayed via commercial radio, the MARA hams

in Santa Clara County tried to contact Church leaders in the region. Jay Geddes WA6CAI, Northern California Area Coordinator for MARA activated HF radio and contacted Keith Crandall K6QIF an official at the Sacramento Bishop's Central Storehouse and others in Salt Lake City on the predesignated frequency of 7.228 MHz in the 40 Meter amateur Radio Band. Monitoring both VHF and HF frequencies from his home in Saratoga and using the telephone, he could pass messages and reports to all in the network.

Initially there was no communication with Santa Cruz Stake except through a Los Gatos Ward ham, Monte Tracy KF6WF. He was able to contact friends in the neighboring Alma Branch through a local telephone exchange, and they attempted to locate and report back on the Branch President. Several Santa Cruz telephone exchanges were reportedly out of service.

By dark, many of the wards and stakes having ham operators were organized to handle information exchange. The radio organization was relatively sparse, and deference was given to local leaders respecting appropriate response. The radio network was designed only to provide and facilitate communication. As long as the telephones worked, there was relatively little need for the radios.

Jay Geddes WA6CAI MARA assumed overall management responsibility for communication. Jay made telephone contact with the closest Regional Representative, Elder Parley Livingston, recently released Regional Representative in the San Francisco Region and with Leo Haney, Regional Welfare Agent for the San Francisco and the San Jose Regions (San Francisco to Monterey), as well as with other local leaders. The new Regional Representative Harold Sellers lived out of the Region and could not be reached immediately. Since telephone communication into the area was restricted, telephone communication could not be reliably established. Initially Elder Livingston was fed information from Jay Geddes as gathered from the ham radio network, and from ward bishops and stake presidents who could be contacted. Ham radio operators contacted their own ward and stake leaders, offered their services, inspected buildings and reported developments on health and welfare in surrounding areas. Elder Livingston was in an area of Atherton where he could not call out but he could receive calls during those first hours. The same was true of many of the other leaders in the area, including Gerald Johnson, First Counselor in the Menlo Park Stake Presidency and the senior member available. Many of the leaders were at work or out of town, and so were not and could not be contacted. Several attempts were made to contact President MacDonald of the Santa Cruz Stake by LDS ham radio operators. Contact was finally made through Leo Haney and Jay Geddes.

It was quickly determined that the damage in most of the South Bay was slight, but that virtually all communication and transportation into Santa Cruz from the Bay Area was cut off. The telephone companies deliberately cut off telephone service into the affected areas so the victims could call out. However, for several hours it seemed that the only civilian communication over the mountains into Santa Cruz was through a limited number of radio channels.

By about 9:00pm, word was received on the MARA network that the Branch President of the Alma Branch, Allan H. Nelson, had narrowly missed being trapped in his house as it collapsed, destroying virtually everything in its path including several vehicles. The rest of the Bay Area had a fitful night's sleep, as mild aftershocks punctuated the night.

On Wednesday October 18, Brother Leo Haney, Regional Welfare Representative and resident of San Jose East Stake, made contact with the Church leaders in Santa Cruz and travelled into the area accompanied by Bishop Hepworth, one of the Bishops in the San Jose East Stake with his cellular telephone and with ham radio operator Justin Nelson N6TMO. The emergency services coordinator at the Bishop's Central Storehouse in Sacramento, Keith Crandall, was in contact with Brother Haney through his BCS affiliation and with Jay Geddes through his radio affiliation. Bishop Victor L. Brown, Jr., former Director of the Sacramento BCS was also involved and eventually appeared on the scene. A spearhead trailer was dispatched to the San Jose East Stake Center. (Some of the supplies which proved to be needed were offloaded into vans, and the trailer was returned to Sacramento.)

The Alma Branch President advised Brother Haney of the needs of the members. County and private service district road crews worked on roads, PG&E worked on power and the Red Cross set up shelters for the general population. The Mercury Group was on standby, actively monitoring various frequencies, following events and relaying information to one another and to local unit leaders. In the community, a central Red Cross "clearing" shelter was set up at the Los Gatos Ward Building by the Red Cross as soon as the building was cleaned up and declared safe. (The chandeliers had fallen, and there was other minor damage.) Another shelter was set up at the C.T. Middle English School, virtually across the street from the new but damaged Alma Branch Building, but in Santa Cruz County. Had the Alma Branch building been available with power and water, it is possible that the Alma Building would have been made available as a shelter.

On Wednesday night, Brother Haney arranged for a work crew of volunteers from San Jose Stake, San Jose East Stake and the Mercury Group to inspect the damage and to offer immediate relief to Church members and neighbors, as their resources permitted. Ray Harris of the San Jose Stake and an expert in construction was job foreman. Jay Geddes made calls to several MARA members. MARA offered its expertise in tactical communications, since many of the phones were out, particularly at the intended work sites. Five volunteer radio operators, a battery/generator-powered VHF base station and antenna, and mobile and handheld portable radios with earphones were assembled for an eight hour operation: Don Wilkins KA6PSL, San Jose East Stake ECC Monte Tracy KF6WF, Saratoga Stake ECC, Justin Nelson N6TMO, Ken Allen WB6BCV, Menlo Park Stake ECC and SF Region ECC, and Jay Geddes WA6CAI, Northern California ECC.

In the affected areas, it was estimated that four homes of members had been destroyed or so severely damaged that the families could not occupy the houses and had to move out to alternative housing. The remaining members indicated they needed little or no outside help, although help was offered.

The number of affected homes in the region is still not known, although a cursory survey indicated that most were not severely damaged. A great deal depended on location and construction. Media reports gave the total number of homes destroyed in the Santa Cruz Mountains (excluding downtown Santa Cruz where a shopping area collapsed) is estimated to be under 100, and the total number of homes (excluding outbuildings) with major damage is estimated to be less than 300 out of several thousand homes in the region.

On Thursday morning, October 19, Brother Haney with Bishop Brown, Bishop Hepworth, Brother Harris and about 20 others assembled a caravan to deploy to the Alma Branch Building. At first Brother Harris was unaware of the capabilities of the Mercury Group and thought it might not be needed. He and others thought the availability of a cellular telephone would be adequate, not realizing the difficulties likely to be encountered with the telephone system. Jay Geddes and Ken Allen explained to him the principles of radio shadows. In such an arrangement, the tactical leader acts as a general over his jurisdiction, and the shadow serves as his radio ears and voice to expedite the passing of one-way formatted informal and formal messages called "traffic." Mercury members had been training for exercises of this type for several years in conjunction with other ARES ham radio operators and the Red Cross in the South Bay.

With that background, Jay suggested to Brother Haney and to Brother Harris that the entire Mercury Group, except Jay, form itself into communication "shadows" and join the caravan. While Jay returned home to monitor the channel and provide a valley-based link for communication, the others bracketed the caravan and talked each other through the traffic to the roadblock on Highway 17. Via radio, Monte Tracy was talked in from Los Gatos and was able to join the caravan at the exact instant it passed the roadblock.

As soon as the caravan arrived at the Alma Branch Building southwest of San Jose on Summit Road, Ken Allen immediately attempted to use the Mercury VHF repeater (W6OKC/R located on the floor at the far east side San Jose from mobile radios in the parking lot. He immediately discovered that the repeater site was too low and that the Alma Branch Building was masked by a hill.

The new Alma Branch Meetinghouse is about five miles (20 minutes) south of the Branch President's property and within two miles south of Highway 17 on Summit Road. The meetinghouse is also located a few miles north of the epicenter of the quake within a few feet of an active seismic area. The building was slightly damaged as the two slabs of the foundation separated on an unreinforced and natural break, and the water heater pipes broke. The structure was otherwise relatively safe and apparently undamaged. However, all power and water were out. Fortunately there was a working telephone, and the weather was warm and dry.

The meetinghouse was surrounded on both east and west sides by fissures caused by the quake and extending along both sides of Summit Road. The smaller fissures appeared like cracks caused by settling of adobe soil or road surfaces. The largest fissures look like large vertical and shear displacements of sections of soil. One section of the road on the hill a mile or so north of the building is a fifty-yard long mass vertically displaced three feet, as if the entire mass were simply pressed up against the hill like a water wave.



A fracture ran the length of Summit Road, at one point showing a seven foot vertical displacement.

It was learned that immediately after the earthquake, the Branch President, President Nelson, had aided his family and rescued his neighbors. His wife and daughter had barely escaped injury as they were caught in the second story of the house while it collapsed onto the first story and slipped a few feet down a hillside on the west side of the summit north of Highway 17. Next door, a neighbor had saved herself by grabbing a water pipe as her house slipped out from under her down a hill. A few people were trapped. The Branch President freed a trapped neighbor across the street and aided others around him. Only minor injuries were sustained and little structural damage was suffered by many of the other hill neighbors. Roads however became impassable due to rock slides and vertical fissures of up to three feet.

President Nelson remained at his house without telephone service in a travel trailer and storage shed after checking on the 50 families in the branch through a borrowed telephone. Road crews moved in quickly and restored most road service. Electricity was out, and as a result so was all power-dependent water service which had not already been knocked out by tipped-over or displaced water tanks.

After the arrival of the work parties, the Branch President, as local presiding authority, was met and given control of the services of the work parties. He advised of the needs and set priorities. The work crews were set up to assist in the major stabilization problems.

Permission was obtained to put a two-way radio station in the building. Ken Allen immediately set up a high-powered Kenwood 7950 two-meter radio base station in the Ward Clerk's Office, where there was window for cable access and light, a table, a working telephone, paper and pencil, and the stake and ward directories, telephone books and a neighboring office for meetings. The base station antenna, a "J-pole"-type vertical, was tied to the halyard and run up the flag pole in front of the clerk's office at the end of a 100 foot run of coaxial cable. Power was provided by a car battery through a local ARES-standard quick-disconnect Molex dual pin connector coupled to custom alligator clips for the car battery. Ken Allen requisitioned use of a 1000 Watt Honda generator belonging to Frank Young N6MGR who was out of town. A 100 foot power cord to the generator was also deployed and made available for emergency power for lighting and radio. Instead it was set up to run the kitchen refrigerator to cool milk that had been delivered to the then-powerless building. The base station had a radio autodial phone patch capability through a telephone line connected to the repeater in East San Jose. It served as a backup to the local telephone in case of failure due to busy or downed lines.

The base station was able to activate the repeater, although with some difficulty. It was decided to set up the base station and the repeater in a manner to allow communication to be carried out either through the repeater or through direct line-of-sight communication, with simultaneous supervision (net control) from the base station. A one-button changeover was programmed into the base station for this purpose, and the repeater was adjusted remotely by Ed Auga W6OKC, the San Jose Region ECC and repeater trustee, to eliminate the "hang time" (the time the repeater remains in transmit

mode after the end of receipt of a transmission). The repeater thus extended the range of the base station from "simplex" or direct line of sight with the work parties in the mountains to a range of about 60 miles between South San Francisco and Gilroy in a manner that did not mask normal "simplex" transmissions on the transmission (output) frequency of the repeater.

After work parties were organized, and Ken Allen, serving as dispatcher and net control, had assigned communication "shadows" to each leader of a work party or authority, he recruited one of the local residents to serve as runner and telephone answerer at the building. The runner served the important role of screening the eyeball and non-radio traffic through the command center, looking up local telephone numbers and substituting for the lack of a map of the area at the building.

Brother Haney and Bishop Brown left the building with their radio communication shadows and inspected all severely-affected buildings. Crews were put to work immediately under Brother Harris's supervision at the direction of the Branch President. Resources could and were called in immediately from field sites from as far away as Morgan Hill and even the BCS in Sacramento through this setup. These included calls for mobile homes, portable storage lockers, a back hoe, clean water, meals for crews and residents, moving vans, packing boxes and tarpaulins needed to cover the damaged buildings against rain expected the next afternoon. A battery powered am radio and a VHF scanner were used at the command center to monitor developments generally, National Weather Service and Fire frequencies, as well as traffic on other channels as it might be of specific interest to the local area. The base station operator served as communication relay between leaders, as a message facilitator, as a radio traffic cop, as a dispatcher for services, and as clearinghouse center for health and welfare inquiries and messages received at the meetinghouse.

Electrical power was restored to the area of the meetinghouse late Wednesday afternoon, allowing the meetinghouse work crews to shut off portable generators, begin to restore water service and to disconnect the car battery running the base radio. Instructions on reconnection of the power mains to the building and the shutting down of the burglar alarm system were handled via radio and telephone.

At dark, the crews gathered at the meetinghouse, where they were dismissed. The Haney group however moved on to the Santa Cruz Stake Center for a meeting with all Bishops in the Santa Cruz Stake. The Bishops advised that they required no assistance at that time for their members. The Alma Branch was of course the exception. The results of the meeting were relayed to the Mercury Group from Justin Nelson to Jay Geddes and to the heads of the stake work parties by Brother Haney.

That night, the Mercury Group held an on-air meeting on the Mercury repeater to recount results, arrange tactical communication schedules for two work shifts and to advise "shadows" on conditions and needs. (A tape recording was made of this 40 minute meeting involving people from San Bruno to Gilroy.)

On Friday October 20, a fresh crew was sent to the mountain to continue to assist the ward members. Two net control shifts were set up, Jay Geddes in the morning and

Ken Allen in the afternoon. This allowed both to handle previous engagements and still cover the assignment.

One Mercury member Dennis Callanta KA6YVZ of Morgan Hill Stake did triple duty. The previous day, at the conclusion of an ARES assignment, he contacted Jay Geddes via the repeater and voluntarily went to Hollister to inspect buildings and to speak with Church leaders. He returned north and as soon as he was within range of the repeater immediately reported his findings to Jay Geddes via radio. The word received was that there was little damage and that local resources for members of the Church were adequate for the time being. When he heard over the air about the telephone problems, he responded to a request from Net Control Ken Allen to install telephone lines. So on Friday (and again on Saturday) Dennis came up to the Alma Branch with telephone wiring equipment and installed telephones. He installed telephones at the Branch President's storage shed and at trailers and mobile homes brought in to house the families of other members whose homes were destroyed and who wanted to stay on their property. At one point the suggestion was made that answering machines be set up or that the telephone company be contacted to redirect incoming calls to other locations.

In addition to salvaging vehicles and assisting in general cleanup, the work crews installed water tanks, primed water pumps, repaired broken toilets, packed furniture to move to storage, received donated supplies redirected from the Red Cross Shelter next door to the Meetinghouse, brought in tarpaulins, and covered damaged homes and belongings against the expected major storm of Saturday afternoon. Services of the crews were also offered and received by neighbors. One crew spotted a forest fire erupt along Old San Jose-Soquel Road and radioed it in. The California Dept. of Forestry was alerted and had helicopters on the scene in minutes with fire trucks right behind. The crews were also ready to alert every family in the neighborhood if evacuation was needed. Some of the radio activities during this afternoon session was captured on audio tape.

Saturday October 21 was more of the same. The regularly scheduled net of the Mercury Pacific-Intermountain Net on 7.228 MHz was operational at 0715 PDT. There was a great deal of Health and Welfare Traffic directed to San Francisco. Propagation was terrible, due probably to a major solar flare. So Ken Allen simply got on the telephone and called Preben Nielsen K7KMZ, the President of MARA in Salt Lake, and told him what the situation was: "Please hold routine health and Welfare traffic; it's a waste of energy and a sap on time for those who are trying to clean up. If help is needed, we will call. We thank you for your concern, but we believe we can handle it for ourselves. Remember those others who were hurt or who really suffered in your prayers and direct aid to appropriate agencies in the form they can accept." Preben passed on the message to the net within seconds, and things calmed down.

At 0800 PDT, the regularly scheduled net of the Mercury South Bay Group was held on the W6OKC repeater, 147.285 MHz. Pat Malan N6TMO was net control, and Ross Wille N6SJD assisted him. The net was brief. Only a few people checked in. A crew had already assembled at the San Jose East Stake Center to caravan to the Alma Branch Meetinghouse for the last work party, and the frequency was needed for the caravan. The caravan returned to the Alma Branch Building, where Frank Young

N6MGR, Los Altos Stake ECC, served as tactical net control. Frank is a manager for the Electric Power Research Institute and had just returned the day before from a conference on disaster preparedness in Washington, D.C. He could not return earlier due to the temporary closure of the San Francisco Bay Area airports. Frank, a Ph.D. in electrical engineering, is also a former Bishop and Stake Executive Secretary, as well as a trained Red Cross Disaster Worker and Shelter Manager. He earned his amateur license while serving as Stake Executive Secretary in Los Altos Stake.

A couple of incidents of the work crews are worth reporting. A number of the residents benefitted from the LDS work crews and particularly the radio dispatch. One man was found trying to move a water tank back onto its foundation. A work crew stopped by to help. They soon found that a few strong men could not budge the tank. Immediately a call was put out over the radio, and twenty men were summoned to the site. Within a few minutes, the tank was in place. Another resident, an elderly lady, found she had boulders all over her driveway which she could never move. The passing work crew quickly dispatched with the boulders and cleared the driveway.

Saturday afternoon, the rains struck. The area was braced but unprepared for possible flooding. Fortunately, the rain was not as heavy as expected, and the crews could carry out their shifts. Several VIPs visited the area. Initially only a skeleton crew was on hand for crew communication. Frank quickly noted the lack of coverage and put out a plea for volunteers to come up the mountain. Within minutes, two more members of the Mercury Group were on their way.

The LDS Welfare Services work crews and the Mercury Amateur Radio Association communicators were but a small vanguard with limited resources. They served as an example of what can be done, given the presence of leadership. Leadership is key. It is difficult to face a disaster such as this and still have enough presence of mind to note what needs to be done and direct the resources to do it. Outside leadership needs to be provided by someone who can provide that assistance and access to resources at a pace comfortable to the victim without intruding. Within the affected area, leaders need to be contacted quickly and informed of available resources, including communication. However, resources cannot be provided unless needs are assessed and requests for aid are issued. Offers of aid must be neither too fast nor too slow to be successful. FEMA, the Federal Emergency Management Agency, reported in its evaluation of the incident that it would be helpful to provide disaster aid immediately in the event of a major disaster, rather than be forced to await the evaluation of a situation and the declaration of a disaster with its attendant release of resources. In any such situation, communication is key. The crisis would have escalated far beyond what was experienced had the telephones been totally out of service and everyone were forced to rely on backup communications, such as amateur radio and CB radio. With this in mind, a few local units are reevaluating their disaster preparedness, including CB and amateur radio where appropriate. Los Altos California Stake for example has a ham radio operator designated for every building and has designated CB channel 22 as the Stake emergency channel.

President Nelson of the Alma Branch, who has been fully occupied with immediate personal needs and frustrated by mortgage companies and insurance adjusters, has gone

out of his way to help his neighbors. Despite the loss of his home and many belongings, he has visited families in the region personally, not just his own congregation, to offer and distribute supplies donated to the clearinghouse at the meetinghouse, even as others were moving his furniture and the furniture of others from destroyed homes into portable storage containers. He has a great sense of humor and sensitivity for the needs of the members. He insisted that there be services Sunday following the earthquake so that people could meet and at least talk out what has happened to them. On Wednesday, the day after the quake, he posted a handwritten sign on the foyer door:

SHORT MEETING SCHEDULE SUNDAY  
DRESS: CASUAL  
SHOWERS: OPTIONAL

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The following is summary of Mercury Amateur Radio Association volunteers known to have participated in this disaster incident as of October 21, 1989:

\*The following check-ins were taken on the evening of October 19:  
WB6BCV, this station, Menlo Park Stake, located in Palo Alto  
WA6CAI, Jay Geddes, Saratoga, Northern California Emergency  
Communication Coordinator  
N6EZO, Eric Youngberg, Morgan Hill Stake, located in South San  
Jose  
KB6NID, Mark Fredrickson, San Jose  
KA6PSL, Don Wilkins, San Jose East  
KB6OKO, Lyle Topham, Saratoga  
N6QYZ, Wendall Collett, San Francisco West ECC, Located in San  
Bruno  
N6SJD, Ross Wille, Los Altos Stake, located in Sunnyvale  
N6VLU, Pat Malan, Los Altos Stake, located in Sunnyvale  
N6WCP, Chris Swartout, San Jose East  
KC7XE, Stan Dye, Santa Clara  
N7ACD, Mike Dye, recent arrival, Stan's brother  
KA6YVZ, Dennis Callanta, Morgan Hill Stake, located in So. San  
Jose and just returned from a survey of Hollister  
N6SKQ, Jeff Freeman, San Jose East, located in Milpitas and  
monitoring from his duty station at the Santa Clara  
County Communication Center in the West Valley

\*Other significant participants not checking in at that time but

who have provided reports or supported the effort:

N6TMO, Justin Nelson, San Jose East, who is presently a shadow in a Santa Cruz meeting with the Santa Cruz Stake Bishops and Victor Brown, Leo Haney and others of Welfare Services.  
KF6WF, Monte Tracy, Saratoga Stake ECC, located in Los Gatos, who was a shadow all day at the Alma Branch site.  
W6MMY, Wendell Carmen, Morgan Hill Stake, located in Gilroy, who reported events from that area and assisted the Stake President  
K6RQG, Ivan Nielsen, Saratoga  
WA6GQE, Don Peterson, Menlo Park, located in Palo Alto  
W6BMU, Dick Dickenson, San Francisco, located in Belmont  
N7CBT, Jim Callister, Santa Clara, last heard operating out of County Comm  
KB6CGT, Bob Callister, Los Altos, located in Mountain View, Jim's dad  
KA6PTQ, Barbara Wilkins, Don's wife  
KB6VLK, Pat Jocius, Los Altos, located in Sunnyvale, and Cupertino City OES Disaster Manager  
KB6VLJ, Luan Johnson, living in Sunnyvale, but of Fremont South Stake, and Sunnyvale OES Disaster worker  
AA6RM, Major Dave Buell of the Presidio, San Francisco Stake ECC and Amateur Radio Emergency Services Emergency Coordinator for the City of San Francisco who virtually one-handedly organized ARES communications for the Red Cross in San Francisco and operated nets for much of the period when San Francisco telephones were disabled  
KI6CK, Greg Rauch, Santa Cruz Stake, located in Boulder Creek and Emergency Communications Coordinator for the Electric Power Research Institute in Palo Alto  
N6MGR, Frank Young, Los Altos, who until this afternoon was on assignment for EPRI in Washington, D.C. attending a disaster planning conference  
WA6TEM, Rick Gramsch, Santa Clara, located in Sunnyvale, who is a control operator for this repeater  
W6OKC, Ed Auga, Morgan Hill, located in South San Jose, San Jose Region Emergency Communication Coordinator, whose house was affected by the quake and who is temporarily housebound  
W6PCJ, Dick Lockett, San Jose South ECC  
WB7AMC, John Tracy, Santa Clara, located in Cupertino  
AA6BR, Tom Taylor, Saratoga, located in San Jose  
KJ4OT, Jeff Lawson, San Jose South  
W6RRK, Vern Price, Santa Clara, located in Los Altos  
N6JEL, Roy Snyder, Santa Clara, located in Cupertino

N6RXX, Margaret Tracy, Monte's wife  
KI6OK, Bruce Fowler, Los Altos  
N6NXU, Ben Oniki, Menlo Park, located in Redwood City  
KC6DSB, Bill Fennoch, San Francisco, located in San Bruno  
KB6NL, Darick Nordstrom, Hollister  
N6RBZ, Steve Jeppson, Sunnyvale  
WB7BWX, Greg Rey, Santa Clara, former President of the Varian Amateur Radio Club  
K6QIF, Keith Crandall, Sacramento Bishops Central Storehouse and  
advisor to State OES

\*Apologies to any which were missed and not mentioned.  
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Report prepared by Kenneth R. Allen WB6BCV, San Francisco Region ECC, and Menlo  
Park ECC (MARA South Bay Group)