

DISASTER RESEARCH CENTER  
THE UNIVERSITY OF DELAWARE

Research Note #5

The Baldwin Hills, California Dam Disaster

by

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## Introduction

On Saturday, December 14, 1963 at 3:38 P.M. a break in the Baldwin Hills Dam in Los Angeles sent a torrent of water onto the hillside and valley below, causing extensive destruction in an estimated one square mile residential and business area. The 292.4 million gallons of water that had been stored in the reservoir battered out the sides of houses and completely demolished many buildings; household items such as furniture and refrigerators were swept away and mud and debris were spread for miles. Many residents who either did not hear the warnings to evacuate or failed to heed them fled to their rooftops and other buildings and were later rescued by helicopters. Only five people were killed, but 27 other persons were injured enough to require hospitalization despite the extensive damage to both public and private property which ran to several million dollars.

On Sunday, December 15 at 11:30 A.M. a three man Disaster Research Center team arrived in Los Angeles. The primary purpose of the trip was to provide the team with field experience, and thus it represented for the most part a training exercise rather than a systematic study. Also important in the DRC's decision to send a field team to Los Angeles was the fact the disaster took place in a major metropolitan area. While most disaster studies have involved urban areas, very few have had metropolitan areas as their chief focus. Finally, the DRC felt that a study of the Baldwin Hills disaster afforded an opportunity to obtain greater insight into group and organizational problems and responses in a dam disaster occurring in a domestic setting. Some observations concerning this type of disaster in

a foreign setting were obtained from a study by the DRC of the Vaiont Dam disaster which occurred in northeastern Italy on October 9, 1963.<sup>1</sup>

The DRC team remained in Los Angeles for four days. During this period a great deal of time was spent directly observing key organizations and groups in action. Most of the data was acquired by interviewing key personnel in several organizations actively involved in the disaster. Thirty five representatives from the following organizations were interviewed:

- Los Angeles Police Department
- Los Angeles City and County Fire Departments
- Los Angeles Office of Civil Defense
- Los Angeles Chapter of The American Red Cross
- Southwest District Los Angeles Public Health Department
- Los Angeles Department of Public Works
- Small Business Administration
- Culver City Fire Department
- Paramount Civil Defense

#### The Setting

Los Angeles is spread out over an area of approximately 450 square miles. According to the 1960 census it has a population of 2,479,015 which makes it the third largest city in the United States.

Water is a major problem in the area and the city pipes in large quantities to be stored in reservoirs. The rolling contour of the land makes it

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Generalizations and observations on the Vaiont Dam disaster appear in, E. L. Quarantelli and J. Eugene Haas, "A Preliminary Report on The Vaiont Dam Disaster", Working Paper #1, Disaster Research Center, Ohio State University, 1963.

feasible to construct earthen dams throughout Los Angeles. The Baldwin Hills Dam was one of these earth-fill type structures.

Baldwin Hills is a Los Angeles suburb located between the downtown section of the city and the International Airport. It is an area of gently rolling hills and fashionable residences. The 19 acre Baldwin Hills Dam was completed in 1950. Los Angeles Department of Water and Power officials, whose agency is responsible for the operation and maintenance of city owned dams, assert that it was one of the best designed and constructed earth-fill dams built.

The bowl-shaped Dam is located at the top of one of the many hills in the Baldwin Hills area. A 66 foot asphalt and concrete lined wall surrounds the Dam. The reservoir held 900 acre-feet of water prior to the break. Below the Dam, on the immediate hillside and the valley beyond, is a highly populated residential section. Homes in this section of Baldwin Hills are valued between \$35,000 and \$100,000. Many fashionable apartment buildings are located in the area, and there are also large shopping centers and other retail businesses catering to the residents.

#### The Disaster

On Saturday, December 14, 1963 at 11:15 A.M. a caretaker at the Baldwin Hills Dam, while making a routine inspection, discovered what was described as a pencil-thin crack in its northeast face. Fifteen minutes later, further inspection by helicopter from the County Sheriff's Department led to the discovery of a small leak at the northeast wall of the Dam. Shortly after the presence of the crack was confirmed by the

Sheriff's Department, officials of the Department of Water and Power ordered workmen to begin placing sandbags at the site of the crack in an effort to prevent it from widening. As an additional emergency measure, officials also ordered the opening of release gates on the Dam to permit water to escape. This was done to relieve some of the pressure on the weakened wall from the tons of water in the reservoir. Officials thought that these two emergency measures would prevent a total collapse of the Dam wall.

As the threat of a major emergency became more pronounced, Water and Power officials alerted the Police Department around 1:30 P.M. Other emergency organizations in the city were also notified. Further inspection of the damaged Dam by officials seemed to warrant the conclusion that a break was imminent and, consequently, at 2:00 P.M. the Los Angeles Chief of Police ordered the evacuation of residents from the threatened area. Police officers in cars and on motorcycles sped into the area. The police set up road blocks on the perimeter and door to door warnings were made with the cooperation of the Los Angeles City Fire Department. Police helicopters equipped with public address systems announced the warning to residents from the air. Los Angeles radio and television stations also made appeals for an evacuation of the threatened residential and business area.

Sometime after the evacuation order was given, the Police Department alerted the Los Angeles Chapter of the American Red Cross. (It is not clear exactly when this notification was received by the Red Cross, but it was probably shortly after 2:00 P.M.) Upon receiving the alert, the Red Cross

began mobilizing. By about 3:30 P.M., emergency shelters were opened at three schools to receive disaster victims.

At 2:00 P.M., as workmen continued their sandbagging operation, the crack began to widen slowly. Only a small volume of water emptied from the reservoir through the release valves at one time and the damaged wall was beginning to give under the pressure from the weight of the water in the reservoir. At 3:38 P.M., as the work crew ran to safety, a triangular-shaped breach, 75 feet wide at the top, collapsed at the face of the Dam. A huge wave of water estimated to have been 30 feet high and 50 to 75 feet wide rushed toward the houses below.

Within a matter of seconds, homes on the hillside and other buildings in the giant wave's path were swept away by its force. The wave then engulfed the residential section in the valley below. As the wave cascaded from the hillside to the valley section, the area became a sea of mud and debris. Materials from destroyed and damaged homes were carried by the water; household articles such as furniture and appliances were scattered every where. Hundreds of cars, many of them still occupied, tumbled in the swiftly moving current.

The area hardest hit was the eastern section of Cloverdale Street approximately a half-mile from the Dam. This area was completely cleared of homes. In another section an apartment development housing 650 families suffered considerable damage. Flood waters reached the rooftops of many parts of this development. In many other sections of the affected areas, the water was as deep as 10 feet. As the water emptied from the reservoir,

streets and neighborhoods further away were flooded and covered by tons of mud and debris. Several shopping centers and many other places of business were also damaged by flood waters.

The total affected area was a fan-shaped, approximately one square mile area, between Jefferson Boulevard and La Ballona Creek and La Brea Avenue. This section contained 16,500 people and 9,000 homes in addition to places of business.

Several hundred people in the area either did not become aware of the warning or chose not to evacuate. These included both shoppers and residents of the areas. Many were swept along in the flood as they tried to escape on foot and some were trapped in their automobiles. These people, other persons in the process of evacuation, and others in more outlying neighborhoods who were not alerted, climbed rooftops and were rescued by helicopters operated by the Los Angeles Police Department, the Los Angeles County Fire Department, the Coast Guard, and private citizens. Helicopter pilots, many of whom operated in the dark, evacuated 1,000 residents during the disaster.

Water flowed out of the reservoir for about 77 minutes; by 4:55 P.M. all the water had escaped through the break in the wall. By nightfall, much of the water had drained down sewers and into La Ballona Creek on the northern perimeter of the damaged area and was carried out into the Pacific Ocean. The Los Angeles Public Works Department then began the task of clearing away debris.

It is not clear as to the exact extent of damage to homes and other private

and public property. The Los Angeles County Assessor estimated a loss of at least \$50 million. The Red Cross reported that 1,001 families suffered some loss from the flood.

When the Dam broke, the Mayor declared the Baldwin Hills section a disaster area. The police ordered all persons to stay out or be subject to arrest. The Mayor also telegraphed both Governor Brown and President Johnson requesting state and federal disaster aid, which was later granted.

#### Some General Observations

1. The slowness of the break and the rapid response of emergency organizations contributed to keeping the number of injuries and the death toll low. The period between the early warning and actual break permitted extensive evacuation.

The Police Department received official notification on the critical condition of the Dam from the Department of Water and Power at 1:30 P. M. At this time, there was in process a meeting of city officials in the Mayor's office. Present at this meeting were the Mayor and his staff, the city Civil Defense Director, the Chief of Police, and several other department heads and city councilmen. It was very fortunate circumstance that such a meeting was being held at this time as it provided an unusual opportunity for rapid inter-organizational communication and cooperative decision-making.

The Chief of Police conferred with the Mayor about the alert from the Department of Water and Power and at 2:00 P. M. they announced the decision to evacuate the area. The Police Department alerted radio and

television stations and beginning shortly after 2:00 P.M. continuous warnings to evacuate were broadcast.

From 2:00 P.M. until the break came at 3:38 P.M., police officers and personnel from the Fire Department went from house to house alerting and evacuating residents in the most critical section of the threatened area. Their efforts appear to have been effective. At 3:30 P.M., the police reported that everyone in the direct path of the flood waters had been evacuated. That there were no deaths in the section immediately below the Dam although it was the hardest hit, is further testimony to the effectiveness of the warning.

2. One fortunate circumstance of the disaster was its occurrence during the daylight hours instead of at night. If the break had occurred at night, early detection of the damaged wall might not have occurred. Also, problems of rescue and evacuation would have been significantly complicated.

There was no 24-hour watch at the Baldwin Hills Dam although such a watch is maintained at larger reservoir structures in Los Angeles. Only a daytime watch was kept at the Baldwin Hills Dam and, consequently, it is possible that the wall might have collapsed without any type of warning.

Many of the residents near the Dam became aware of a potential danger upon seeing an unusual quantity of water in the street coming from the vicinity of the Dam. The Fire Department reported that by 2:00 P.M., they had received numerous calls from such residents asking them to investigate. Such an indicator of danger could conceivably have gone unnoticed if it had

occurred later in the evening. The death toll and the number of injured also might have been much higher if the disaster had occurred at night because most of the residents would have been asleep and might not have received the warnings to evacuate; during the immediate post-impact period it would have been much more difficult for rescuers to spot people on rooftops and elsewhere who needed their assistance.

3. When there is an absence of direct sensory evidence of danger, people sometimes respond reluctantly to suggestions to evacuate. For example, at Baldwin Hills there was difficulty in convincing all residents of the necessity for evacuation because of a lack of visual evidence suggesting a serious threat. This was particularly true of residents who were not in a position to see such danger signs as the unusual quantity of water in the streets apparently coming from the Dam site.

Some people were reluctant to leave their homes because they were unaware that the Dam was located nearby. The Dam was built in such a fashion that many people living in the valley below could not see the site and would have known of its close proximity only if they had seen it from another vantage point or had been told of its location. Many of these residents upon receiving the evacuation warning, not knowing of the Dam and seeing only a little water in the streets, found it difficult to accept the notion that there was a real threat. There was a problem with some of these people during the time period between warning and impact. Not seeing any danger, many of them had to be prevented from going back into the area to retrieve belongings.

4. The Police Department was the key organization involved in disaster operations. This was in accordance with local emergency and disaster planning in which specific organizations or departments of the government assume major responsibility in particular types of disasters or emergencies. For example, in fires and explosions within the city, the Los Angeles Fire Department assumes the major responsibility and other departments and organizations take on supporting roles. Because the major requirements during the Baldwin Hills crisis were evacuation, perimeter control, and protection of private property, it was immediately defined as primarily a police problem.

The emergency command center, located in the police building in downtown Los Angeles, went into operation at 1:30 P.M. after word had been received from the Department of Water and Power. Coordination and liaison between the Police Department and other departments and organizations are the normal functions of this command center during major disasters. The command center is equipped with telephone and radio communication equipment. During the Baldwin Hills crisis, this center served as over-all disaster headquarters. Officials from other departments, Civil Defense personnel and State Police officers, in addition to the Los Angeles Chief of Police and his staff, worked from the emergency command center.

A field command post was established in the threatened area at 2:20 P.M. This mobile command post became the field headquarters for disaster operations as other organizational officials and residents were referred there for information and direction.

Since the primary responsibility in this disaster fell to the Police Department, the city Fire Department assumed a supporting role with regard to warning and evacuation activities. Particularly significant in the division of labor was the fact that the Fire Department had heavy equipment which could operate in rather deep water.

The police maintained a tight net around the affected area before and after the impact period. The first officers to arrive on the scene shortly after 2:00 P. M. immediately set up road blocks at strategic intersections and prevented vehicular movement into the threatened area. These barriers were maintained after clean up operations began Saturday evening and a pass system was initiated by the Police Department. Residents and authorized personnel such as governmental officials and voluntary relief workers had to report first to the Police Department's mobile command post to receive passes in order to enter the disaster area.

Prior to the Dam break, the police had made plans to protect private property from possible looting. These plans were put into effect after the crisis. An anti-looting patrol of over 100 officers was set up. Patrolling was done in vehicles and on foot.

Because of the Police Department's pass system, systematic anti-looting patrol, and warnings to the public via the mass media to stay out of the area, the problem of looting was kept under control. Residents of the area, as well as the police, reported few cases of looting. Only eleven persons were booked Saturday night for theft or burglary.

5. During the impact period, much of the activity on the part of rescue

groups was uncoordinated. The Police Department and Fire Department, the principal organizations involved in rescue work, for the most part worked independently of each other in the 77 minutes during which water poured from the reservoir.

The necessity for making on the spot decisions and adjustments also led to a great deal of uncoordinated activity within the same department. Officers in the Police or Fire field command posts had no way of knowing first hand what the problems in the impact area were and to a considerable extent what people did depended on "what they saw that needed to be done" rather than on specific directives from higher officials.

The importance of first hand visual assessment in determining what rescue workers did during this period is illustrated in the case of the helicopter pilots. All of the pilots monitored a preset aircraft radio frequency and could communicate with one another but this did not necessarily lead to coordination. Each pilot acted on his own to a considerable degree and in most instances his own perception as to where he was most badly needed determined what he did.

6. The large number of automobiles in the disaster area interfered with emergency operations. The Police Department cordoned off the threatened area against in-coming traffic prior to the onslaught of the flood. Automobiles already in the area, however, became a problem. As people fled from the impending disaster, automobile traffic became very heavy. The Fire Department had difficulty moving their equipment from one area to another because of the congestion. The problem was

further complicated by the unusual volume of traffic on hand due to the thousands of Christmas shoppers visiting the shopping centers.

After the flood, hundreds of abandoned automobiles had to be towed away so that they would not interfere with the Department of Public Works' clean-up activities.

7. The evaluation of an organization's disaster-related activity reflects pre-disaster attitudes concerning the organization. Individuals and groups tend to interpret the performance of an organization in a crisis in such a fashion as to support a previous position taken in regard to the organization.

The Baldwin Hills disaster raised anew a controversy regarding the Los Angeles Civil Defense Office which had received a great deal of attention several months before.

In June of 1963, the City Council voted, against strong opposition from the Mayor, to reduce the budget allocated for Civilian Defense by \$209,000 and to reduce the staff of the Civil Defense Office from 26 to 3 paid employees. Apparently there was a considerable amount of dispute in local politics concerning this action. Some groups strongly supported the Council's action and some were very much against it.

During the disaster, Civil Defense operated with its reduced staff of three people. The staff arrived at the Police Department's emergency command center from which it functioned shortly after 1:30 P.M. Civil Defense, according to local disaster planning, operated as a liaison between the several operating departments, gathering information and checking on needed resources.

The Los Angeles Civil Defense Office had what they considered to be one of the best civil defense organizations in a metropolitan area. In evaluating their own efforts during the Baldwin Hills crisis, the Civil Defense office felt that it had done a creditable job despite the handicap of working with so few people. The staff believed that a much better over-all community disaster effort would have resulted if the budget and staff of their office had not been so drastically reduced by the City Council.

Opponents of the Council's June action, including the Mayor, in interpreting the community's response to the disaster, concurred with Civil Defense officials that a larger Civil Defense budget and staff would have made an important difference. Some observed that, while there was enough "muscle" in the various departments to meet the needs of the emergency, there was also a need for more coordination between departments and the small Civil Defense staff was not capable of meeting such a need.

Supporters of the Council's action accused the Mayor and other critics of "playing politics." This group felt that a larger local Civil Defense organization would not have made any difference in the city's ability to meet the demands of the crisis. They claimed that the disaster proved the new Civil Defense organization to be adequate and thus justified the action of the Council.

8. Sometimes an organization with a dual structure will be able to initiate operations more quickly than would otherwise be the case.

The Civil Defense organization from Paramount, a city located in the Los Angeles area, established a much needed communication system through its

headquarters in Paramount and mobile communication posts stationed around the disaster area. Through this radio system, information concerning the safety and plans of evacuees was relayed to concerned friends and relatives. At the request of evacuees, radio messages were even sent free of charge to friends and relatives living in other cities. This had the effect of reducing the load on telephone exchanges in Los Angeles.

It is not clear exactly when Paramount CD was activated but it was some time before the flood Saturday. The organization worked all night Saturday and had 45 persons involved during the peak period of activity.

Because of a dual organizational structure, Paramount CD was able to activate quickly. Its personnel, all volunteers, are also members of the Amateur Radio Emergency Corps. Radio equipment operated by Paramount CD was purchased with municipal funds rather than state or federal funds. Consequently, as members of an amateur radio association operating equipment purchased entirely with municipal funds, the personnel of Paramount CD did not have to wait for an official state or federal declaration of disaster in order to begin operations. The personnel initially went into action as an amateur radio group. Following the Governor's declaration of a state of disaster, the State Disaster Office contacted Paramount CD and informed them that they were to function as a Civil Defense unit rather than as an amateur radio group. The transition from one organizational status to another required no change in personnel or major alterations in the organization's activities.

9. In major metropolitan areas, there exists a high concentration of skilled and professional men, and equipment which can be utilized in emergency situations. These resources will be found in organizations whose normal function is to meet emergencies of some kind, e. g., police and fire departments, and in non-crisis organizations or groups that can be called upon to contribute their capabilities in an emergency. Generally, these important community resources for meeting crises are not as readily available in less populated areas. Because the Baldwin Hills Dam disaster occurred in a large metropolitan area, necessary resources could be easily assembled.

On Saturday, the Police Department had 512 men in the Baldwin Hills area; officers were drawn from all divisions in the city. Police officials felt that the concentration of such a large force in one place did not significantly reduce police protection in other parts of the city. If such a need to concentrate this kind of force had arisen in a smaller community, normal police activities might have been drastically curtailed. The Los Angeles Police were also supported by the Culver City Police, the California State Highway Patrol and the Los Angeles County Sheriff's Department. These law enforcement agencies were involved in patrolling and traffic control in areas outside of the Los Angeles city limits.

The city Fire Department mobilized extensively in anticipation of a much larger emergency. Although it never became necessary to use them, some 26 additional fire fighting units were mobilized and placed at the disposal of stations around the perimeter of the threatened area. On Saturday,

25 units manned by about 125 men were active in the flooded section.

Just as police activities during the crisis did not significantly reduce police protection throughout the city, the Fire Department's operation had a negligible effect on fire protection in the city. On Saturday night there were five second alarm fires in Los Angeles, all of which were handled adequately.

In addition to being a very strong department with well trained personnel and modern equipment, the Los Angeles City Fire Department is part of a very effective mutual aid system which includes about 50 fire departments. These could have been drawn up on for aid if necessary.

The Los Angeles Public Works Department is another example of the emergency resources existing in a large metropolitan community. The Public Works Department, using its experienced personnel and specialized equipment, proceeded rapidly to clear debris and wreckage from the impact area.

10. One of the problems emergency organizations face is the necessity for informing the public of the action they have taken to relieve the consequences of a disaster and the services which they can render to those who need help. This problem appears to be twofold: (1) In order for an organization to maintain community support and good will, it must inform people what it has done and will continue to do which will contribute to the re-establishment of community stability. (2) If the services offered by a particular organization are to be utilized, the victims of a disaster must be informed of the precise nature of such services and the procedures

involved in their procurement.

In a sense, this becomes a problem of public relations and to the extent organizations are concerned with surviving as entities, they have to be cognizant of this problem. Voluntary emergency organizations which depend upon public financial contributions and emergency organizations which are not supported by much historical tradition seem to have to exert an extra amount of effort in this direction. The Red Cross and Civil Defense are two such organizations.

During the Baldwin Hills crisis, one of the means which the emergency organizations used to solve this problem of communication was a property owners' meeting held at a church in the disaster area on Wednesday evening, December 19. Residents who owned property in the area and representatives of the mass media attended. The meeting was billed as an opportunity for organizations to inform residents how those organizations could aid in rehabilitation efforts.

Representatives from several levels of government and officials from many emergency organizations appeared on the program and gave an account of the activities of their organization during the crisis. Among the people who spoke were: a city councilman, an assistant to the Mayor, a state assemblyman, and representatives from the Civil Defense Office, the Police Department, the local Red Cross and the Small Business Administration. Most speakers observed that their organizations performed to the capacity of their resources during the crisis and were prepared to do so throughout the rehabilitation phase. They also gave specific in-

formation as to how the residents could receive further help from the organizations. At times, the meeting took on aspects of a "pep rally" as various speakers attempted to generate enthusiasm concerning their organization's past performances and future service.

The preceding paragraphs contain a few general observations on some salient aspects of organizational responses to this disaster: They also include brief comments on certain other aspects of group behavior in disasters. No attempt was made to develop a systematic analysis of the limited data gathered in what was essentially a training exercise for the DRC team.