HURRICANE HUGO

OPERATION DURING MAJOR NATURAL DISASTERS

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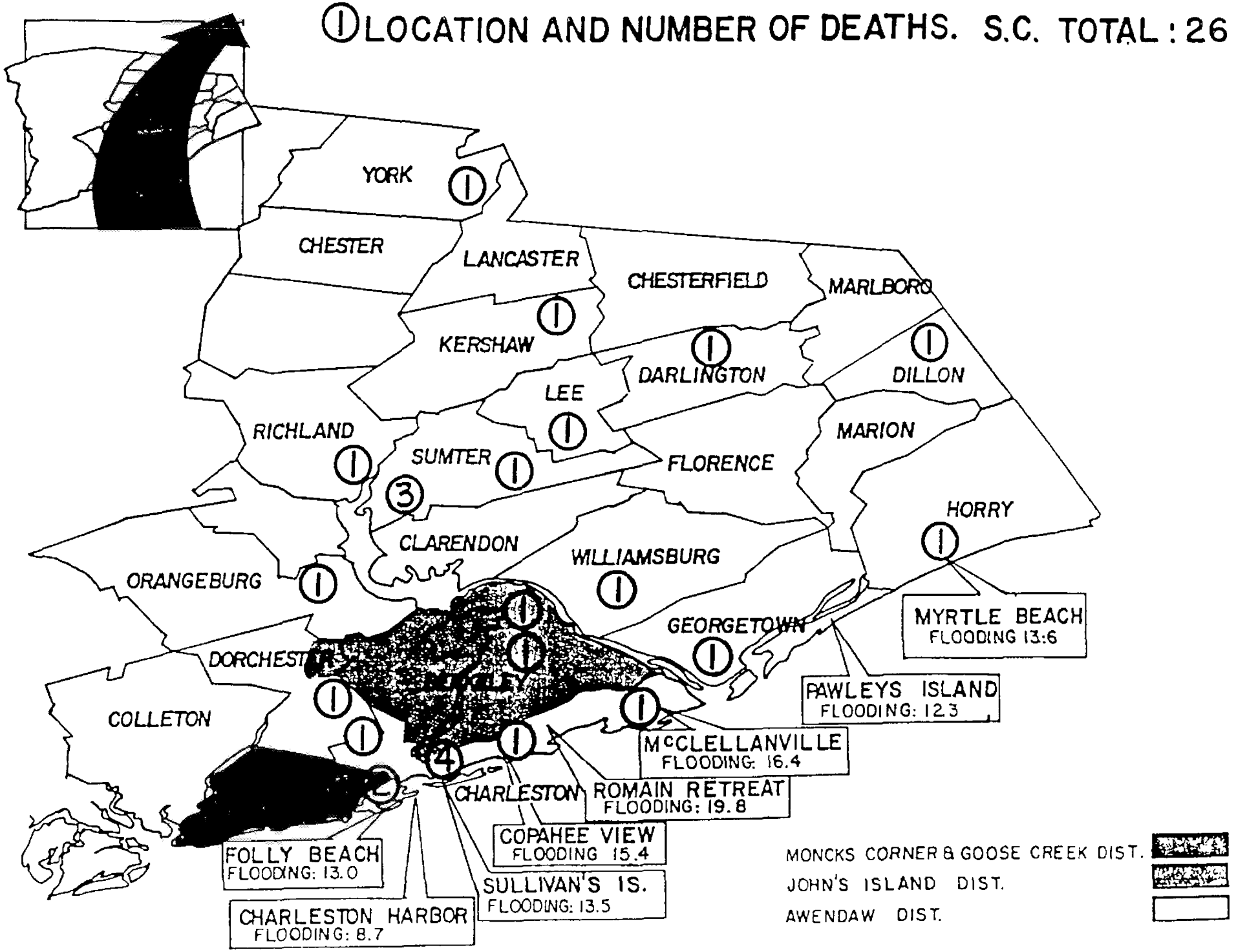
Presented at the

1992 NRECA ENGINEERING AND OPERATIONS CONFERENCE

Anaheim, California

February 6, 1992


① LOCATION AND NUMBER OF DEATHS. S.C. TOTAL : 26
YORK
CHESTER
LANCASTER
CHESTERFIELD
MARLBORO
KERSHAW
DARLINGTON
DILLON
LEE
RICHLAND
SUMTER
FLORENCE
MARION
3
CLARENDON
WILLIAMSBURG
HORRY
ORANGEBURG
GEORGETOWN
MYRTLE BEACH
FLOODING 13.6
DORCHESTER
BERKELEY
PAWLEYS ISLAND
FLOODING: 12.3
COLLETON
McCLELLANVILLE
FLOODING: 16.4
4
CHARLESTON
ROMAIN RETREAT
FLOODING: 19.8
COPAHEE VIEW
FLOODING 15.4
FOLLY BEACH
FLOODING: 13.0
SULLIVAN'S IS.
FLOODING: 13.5
CHARLESTON HARBOR
FLOODING: 8.7
MONCKS CORNER & GOOSE CREEK DIST.
JOHN'S ISLAND DIST.
AWENDAW DIST.

Berkeley Electric Cooperative, Inc., is located on South Carolina's east coast. Its service territory includes Berkeley, Charleston and Dorchester counties. We have three separate electric systems that are not electrically connected, two of which are in Charleston County. They are our Awendaw and Johns Island districts. The other system, which consists of the Moncks Corner and Goose Creek service areas, serves Berkeley and Dorchester counties. Today, with all the districts combined, Berkeley Electric presently bills approximately 51,000 meters.

I feel the need to set the stage for today's session. We'll learn from "Professor Hugo" how to be better prepared for the next disaster that strikes our service area.

As the week of September 15, 1989 began, Berkeley Electric was paying close attention to a tropical storm as it turned into a hurricane named Hugo. As the hurricane passed between the Virgin Islands and Puerto Rico, we closely monitored its progress on network television and on the weather channel. They showed almost total destruction left behind by Hurricane Hugo as it traveled toward the eastern part of the United States.

In our dispatch area, we keep a hurricane tracking chart; so we plotted Hugo's path every three hours. We also notified personnel that all vacations were canceled due to the storm.

On Tuesday, September 19, Hugo's direction still put the storm heading straight for the coast. It was expected to hit Florida, Georgia, North Carolina or South Carolina sometime Friday. Winds were to be in excess of 100 miles per hour. At that point, the

hurricane was rated a category four and could reach a category five if the winds continued to increase.

Berkeley Electric, like all other businesses, has an emergency plan. We put that plan into effect as we prepared for Hurricane Hugo. During the week of the storm, we increased our stock of fuses, handlights, batteries and tree saws in all four of our district warehouses.

We inspected all chainsaws to insure proper and safe operation and made sure none were in need of repair.

We checked all safety equipment, such as hoses, blankets and rubber gloves to make sure enough of this equipment was available.

We checked all first aid kits and fire extinguishers to make sure they were complete and ready for use.

We informed all employees that they were to be on call for the balance of the week. As the storm got closer, it looked like South Carolina was going to receive a direct hit. On Wednesday, we advised employees to secure their homes and their families. They also prepared themselves to spend a couple of days and nights at work.

Our purchasing agent began the process of updating his vendor list with names and phone numbers of all of our suppliers. He also got a complete list of all of their key personnel and their home phone numbers.

The assistant to the manager of engineering and operations contacted all of our contractors and got an updated list of contact personnel and their phone numbers. We contacted each name on the

list to alert them that we might need crews if Hugo continued on its course for the South Carolina coast.

Meanwhile, our dispatchers continued plotting the path of Hugo. They marked the reported coordinates as Hugo picked up speed and it became more evident that Charleston, South Carolina, was its target.

We picked up with our preparations. As outlined in our emergency plan, we always top off all our gas tanks when we are alerted of emergency conditions. In this case, we had three vehicles equipped with bulk tanks of gas and fuel to transport to field personnel if necessary to fuel up vehicles and equipment. This proved to be a good move. We had to deliver gas to one of the districts and went out into the field to 'gas up' some of the service vehicles.

At offices that had gas pumps, the emergency generators had to be used to keep their only fuel source going for at least a week. We continued to gas up all vehicles for the duration of the emergency which continued for 24 days. This meant contractors, as well as other Cooperatives, equipment was furnished fuel from our supply vehicles without being billed.

We usually lease five portable generators for emergency use during hurricane and ice storm conditions. During Hugo, we found that we would have been better off with larger generators and more of them. Normally, 5KW generators are used for miscellaneous purposes. The generators that we needed for Hugo should have been at least 10KW generators mounted on wheels. And, even larger sizes

such as 300 to 500 KW generators should have been used for hotels, motels, restaurants, etc.

Our member service personnel normally handles food and lodging for personnel working on restoration of power. They carefully followed our emergency plan and made preparations for Hurricane Hugo as they had made preparations for storms in the past.

We also contacted, by phone and by letter, our consumers that are on life support equipment and let them know what emergency measures were available in Berkeley, Dorchester and Charleston counties. We gave them the phone numbers of the emergency medical service, Social Services Emergency Preparedness Division and their sheriff's department. We also informed them that the Cooperative can never guarantee uninterrupted electric service.

Organizing personnel was next on the list of preparations. We assigned all personnel to various storm tasks. Meter readers and other office personnel were assigned to line crews. We attempted to have a right of way crew assigned to each construction crew. Staking engineers and right of way procurement personnel were prepared to direct contract personnel.

Daily briefing sessions were conducted to make sure everyone knew his or her responsibilities for the restoration process ahead of us and to make sure every single point in the emergency plan had been covered.

Local officials were also busy preparing the Lowcountry for the storm. They began their evacuation process in preparation of Hurricane Hugo and set up disaster preparedness centers, or

emergency operation centers in each county. Berkeley Electric assigned operations-type people to represent us at the Charleston center during evacuation and during the storm itself.

The Charleston center was nearly destroyed during the storm. The operation's center had to be moved during the night to another building, because portions of the roof had blown away. The hurricane caused flooding in our Awendaw district of up to 19.8' above sea level. Hugo's winds exceeded 130 miles per hour with gusts up to 180 miles per hour.

Hurricane Hugo began pounding the coast early Thursday evening. Before the strongest part of the hurricane hit, our engineers put all circuits feeding Kiawah and Seabrook Islands on "one shot." The rest of the system was left on normal operation so we could maintain power as long as possible. We watched, as one by one, we lost power in all four of our office locations.

Emergency lights at the district office went on standby generators. Two of our districts had problems due to air pressure caused by the hurricane and they were left in total darkness. The next day, thankfully all of our emergency generators functioned normally.

Microwave communications between the Awendaw office and our main office in Moncks Corner were lost. We communicated with them through the manager's mobile phone in his company car. Communications between all other offices were limited due to busy circuits and Southern Bell's own problems with downed and severed lines. We managed to order replacement microwave discs from

Motorola and have them shipped with a local G & T's (Santee Cooper) microwave equipment. This allowed us to share the freight expenses. Also, Motorola personnel helped Santee Cooper restore their microwave communications and were able to utilize the same crew to restore our system. We had to completely re-align all discs to get our system back in good working order.

The morning after the storm, we almost threw out the book on our emergency plan. I don't think any plan could have prepared us for the devastation we saw done to our system. Not one single one of our 50,000 meters was turning. We quickly evaluated our situation and found we had over two thousand miles of power lines on the ground. Our most optimistic estimate for complete restoration of power was by Christmas. We had to re-write the book on a number of problems we encountered.

We began calling in the calvary at 5:45 a.m. Our statewide organization called outside co-op crews for assistance, and we called the private contract crews. The trucks began rolling in by the afternoon. Consumers and local residents also began coming in, offering their assistance. Unfortunately, we had to turn many away, because they wouldn't be covered by Worker's Compensation and insurance. But, we were able to refer them to outside contractors who hired many of them.

Contractors can be of great help, too. One large contractor sent a supervisor to Berkeley to evaluate our needs. This person was given the freedom to enter the Manager of Engineering and Operations' office at anytime to listen to our needs. The

supervisor then would telephone various companies to locate equipment, manpower or anything else we needed. This service was an enormous help in our restoration.

Hugo removed nearly all road signs. This created severe difficulty for the out-of-town crews in finding their way to our facilities.

The restoration effort, food and lodging were an immense problem. Everyone was looking for food and a place to stay -- not just Berkeley Electric. The food we had reserved in our preparations for the storm ran out quickly. In order to obtain motel or hotel rooms, we had to travel long distances. In fact, the search for housing in our various districts became so confusing, we handed the job of obtaining crews' lodging over to one individual which proved to be a wise move.

Again, food wasn't available locally; we had to travel over 100 miles to find adequate food and ice. Our statewide association along with other co-ops helped us over this problem. Refrigerator trailers and trucks were delivered to each district office to store food, ice and drink. In one district, we even managed to set up a military field kitchen to prepare meals.

Rural fire departments and churches played a big role in the beginning by furnishing meals to crew members working in their communities. Some fire departments even furnished sleeping facilities until we could make other arrangements. We also coordinated with local restaurants and hotels to accommodate our crews. In exchange, we provided some of them with generators and

manpower. Employees, local businesses and consumers all pulled together to feed, house and even do laundry for all of the crews.

Assisting personnel didn't realize how long they were going to be working on restoring power. Some didn't have enough clothing and in some case, no clothing for cold weather. This created the need to do laundry. One of our districts set up washers and dryers at the garage and did laundry for the assisting personnel. This turned out to be a big task. At breakfast, crew members turned in their laundry and, at the day's end, picked it up cleaned. Some districts had volunteers to do the laundry in their homes.

Communications continued to be a major problem the first few days after the storm. It was almost impossible to get an outside telephone line to even attempt to call vendors. At first when we did get through to them, we ordered everything they had available. Then as we developed our strategy, we ordered only what we needed as we needed it to prevent our inventory from becoming overstocked, this meant purchasing on a daily basis. The support we received from the majority of our suppliers was outstanding, and we could not have accomplished what we did, within the time frame without their cooperation.

The majority of our power lines had to be completely rebuilt or replaced. The poles, transformers and conductors were under debris from the clearing efforts of the South Carolina Highway Department and National Guard in an attempt to make roads passable. We restored all power before we began picking up broken poles, damaged transformers, other equipment and conductors. Nearly all

poles, copper and aluminum wire had been stolen before the clean up process began. Over 3,000 poles and over 100 tons of conductor were used in the restoration process.

Dispatching of crews was handled by each district. The main office dispatching/mapping personnel were kept informed and closely monitored activity on the radio.

We saw a definite need to let our consumers know about our progress. Television stations and radio stations were set up at the emergency operations center in Charleston, and we had a representative there every day, giving them updates on our restoration process. Many of our consumers didn't have access to radio, television or newspaper, so we went out to several communities with our service map and showed them our progress in their particular area.

At the end of each day, crew leaders met to discuss the progress of the day and to give information on areas where power had been restored. This helped us a great deal in determining how quickly we would be able to restore power.

We had a great deal of rain after the storm and since we are known as the low-country, several areas on our system were submerged in water and required special equipment. We made good use of track backhoes, large logging skidders, an 8-wheel digger derrick, a bucket skidder and flex tracts. Some crews arrived without pole trailers, chain saws, rain suits, compression tools, screw anchor attachments for line trucks, hand lights, grips or any of the other necessary tools. We also had to acquire and

distribute this equipment to assisting crews.

All inside and outside personnel at Berkeley Electric were involved and busy with operations around the clock. Our garage personnel worked on any and all cooperative, utility and contractor's vehicles that assisted us with the storm. Several cooperatives sent mechanics with their crews. This helped us a great deal in the districts. Other types of assistance which we utilized were engineers, consultants, safety, purchasing and staking personnel.

Consultants helped prepare information needed for FEMA and supervise construction of a temporary substation and three-phase feeder to serve customers in our Ravenel area. This was the only way we could restore power to that area after Hugo had taken down two 150' towers at a river crossing. Our permanent solution was to replace the overhead D/C lines with cables running under the river. This was accomplished while we were still in the process of restoring power.

It took more than three weeks to restore power to everyone who was ready to receive it.

The restoration of power at Berkeley Electric involved more than 30 electric cooperatives and more than 12 different contractors. Between weeks number two and three, it was estimated that more than 1,000 people were here at one time. We had at least 1,500 people besides our own personnel assisting Berkeley Electric. Some cooperatives and contractors did rotate their personnel from week to week. We have approximately 180 people employed at

Berkeley Electric. We were overwhelmed with the task of taking care of our own personnel, plus the 1,500 that were working with us to rebuild our system.

We started out working more than 16 hours a day in the beginning, but early on, we discovered this could not continue. Throughout the rest of the restoration, crews worked 16 hours daily. The day began with breakfast before daylight; crews had sandwich lunches in the field, and dinner was never served before dark.

We had only minor injuries during the 24 days. Back feed from a portable generator caused one electric shock and others received cuts from power saws, axes and the like.

We learned many lessons from Hugo. We would have been in better condition if we had dropped all substations before the hurricane struck. We might have prevented some hard fault from going through our substation transformers. We had one 15,000 KVA transformer that failed during the hurricane. The replacement was shipped fourteen months later.

We also discovered for future recommendations that a private water system in each district office and is necessary and that water heaters and kitchen should be connected to generators, so each office can function normally.

We found that it is wise that generators are available for use at the cooperative or for commercial use such as service stations, restaurants, and etc.

Developing an organization structure for emergency situations

is another lesson we learned from Hugo. An emergency organization structure makes it clear who each employee is to report to and that it might be someone different than their usual supervisor.

I suggest that you get with your cooperatives in the adjoining state and find out what equipment they can share with you if needed.

Food and lodging plans should be kept continuously updated. For example, coordinate with restaurants for menus and hotels with lodging. You should really get to know these people because their services are crucial to your recovery after an emergency.

Fax road maps of office and service areas to adjoining cooperatives in advance, especially out-of-state assistance.

Communication is always the most important thing to remember. Use word of mouth to key people in communities, T.V., radio, newspaper, etc.

Always plan with appropriate personnel the worst case scenario before a disaster hits, and have proposed solutions ready to implement when necessary.

Berkeley has only one mobile substation (20,000 kva). At one point after Hugo, we had two borrowed 3 phase station transformers in service in order to keep the mobile free for emergencies. During Hugo, we had to lease another mobile substation from another Cooperative.

Not allowing employees to go home before the hurricane hit allowed us to quickly clear power lines. Even though there were no transmission lines hot, we were visible and putting up lines. Even

employees whose homes were damaged or destroyed stayed on the job for at least the next 30 days.

We furnished medicines and even doctors to employees and contractors alike for colds, fevers, etc. Everyone was treated as if he or she was our employee for any medical need that came up.

We found that our statewide organization played a big role with our cooperative help. We were constantly in touch with them before and throughout the restoration of power. There were isolated cases where co-ops did not go through the statewide agency for help. Because of this, there was some confusion. At times, we were notified that crews had left their home base and were coming to assist Berkeley, but they never arrived.

We also had co-ops that had their own contract crews during Hugo that would not release them, instead rendering assistance to Berkeley as if they were in-house crews. This allowed the crews to stay with the co-ops in restoring power and not help our competition restore power ahead of us.

At the present time, our outages are up from previous years. Since the high winds of the hurricane, we have had to deal with a lot of damaged trees which do not require much wind to blow them on power lines.

A few days after Hugo, FEMA was on site to estimate damages. Initial damage estimates to Berkeley Electric were given at $50 million. However, after working closely with FEMA and a private consulting firm, the damage estimate was reduced to $34 million. After sixteen months of Hugo restoration, the final cost was just

below $20 million.

We have also had to keep separate records on debris and construction clean up measures. A damage survey report (DSR) number is assigned to the monies for the clean ups. In order to receive reimbursement quickly, we filed almost weekly. Approvals and monies came immediately afterwards.

Our accounting department keeps all bills on file with the DSR number for FEMA's accounting purposes. To date, no final audit has been performed on Berkeley by FEMA.

Field inspectors visited Berkeley regularly during the construction clean up. Clean up was completed in sixteen months. Debris removal was completed in nine months. All crews were released the end of January, 1991.

We hand-carried our bills to FEMA, most others mailed theirs. We feel that we were getting better results and quicker turn around time on monies.

In closing, here are just a few more facts about Hurricane Hugo. One year after the hurricane, local newspapers reported:

* The total miles of downed power lines was enough to stretch from Charleston to Los Angeles.

* The downed poles, laid end to end, would stretch from Charleston past Greenville, which is approximately 200 miles.

* The cost of damages to utilities was enough to equal $67 for every man, woman and child in the United States.

* The number of customers left without power after Hugo equals 43 percent of the state's population.

* Twenty-six people in South Carolina died because of the hurricane.

* Over $100 million in timber losses to the U.S. Francis Marion National Forest was due to Hugo.

* South Carolina received more than $4 billion in disaster assistance.

* Hugo insurance claims totalled $3.23 billion with 486,827 claims made.

Berkeley Electric has updated its emergency plan and the board has adopted our new emergency assistance plan. The assistance plan identifies who will respond first and names the back up personnel if an extended outage occurs. The plan addresses supervisors, mechanics, safety directors, equipment to be used and living expenses.

We learned a lot from Hurricane Hugo, and I am glad to have the opportunity to share my experience with you. I hope that none of you will ever have to go through what Berkeley Electric Cooperative went through, but if you do, I hope you will find the same cooperative spirit in your sister companies, your statewide organization, your employees and your members that we found. We couldn't have done it without them.

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