RESEARCH DESIGN

The degree of success or failure in incorporating community behavioral characteristics into the San Luis Obispo County Nuclear Power Plant Emergency Response Plan was tested by a questionnaire survey completed in the spring of 1982.[1] Utilizing stratified random digit dialing, the survey was administered by telephone to 200 households in communities near Diablo Canyon. The telephone survey technique was chosen after considering factors of cost, time, randomness, bias, and spontaneity. The sample size and target population were chosen to generate statistically valid inferences about the population, but at the same time to still constitute a manageable unit (French, 1982). A target population is that group about

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[1]The questionnaire appears in Appendix A.

which information is being sought. It may be the group of people constituting the general population, a group of professionals, organizations, agencies, or any other subgroup of individuals or combinations of individuals. The target population in this study consisted of households in proximity to the Diablo Canyon Nuclear Power Plant site--the "Basic Emergency Planning Zone" (Basic EPZ) being chosen as the outer boundary of the population. The household is an appropriate unit for study because of the nature of emergency response and the logistics of administration. This choice intentionally excludes transient populations such as tourists, sportspersons and hikers, shoppers, and commuters.

Figure 6 outlines the boundaries of the EPZs for San Luis Obispo County. An EPZ is defined in the Draft Emergency Response Plan as:

> The State of California Nuclear Power Plant Emergency Response Plan area is enclosed by a boundary with a minimum radius of ten miles but which is enlarged for each nuclear power plant to include areas where protective actions may be required (The range of protective actions includes total evacuation) (San Luis Obispo County, 1981c, p. I.3(1)).

The Basic EPZ is an easily definable geographic area, and worked well for this survey, providing a manageable, statistically representative sample.

To obtain results truly indicative of respondents' attitudes and awareness, spontaneity and lack of bias on the part of respondents were sought. Using the telephone to conduct the survey eliminated the possibility of researched answers or collaborative efforts. Bias and ambiguity were reduced through careful pretesting and ordering of questions and responses, and through the screening and training of interviewers.

The "Communities Speak" questionnaire was administered over a period of one month, at different times, alternating days and evenings, work days and weekends. Respondents were told the nature of the survey and asked if

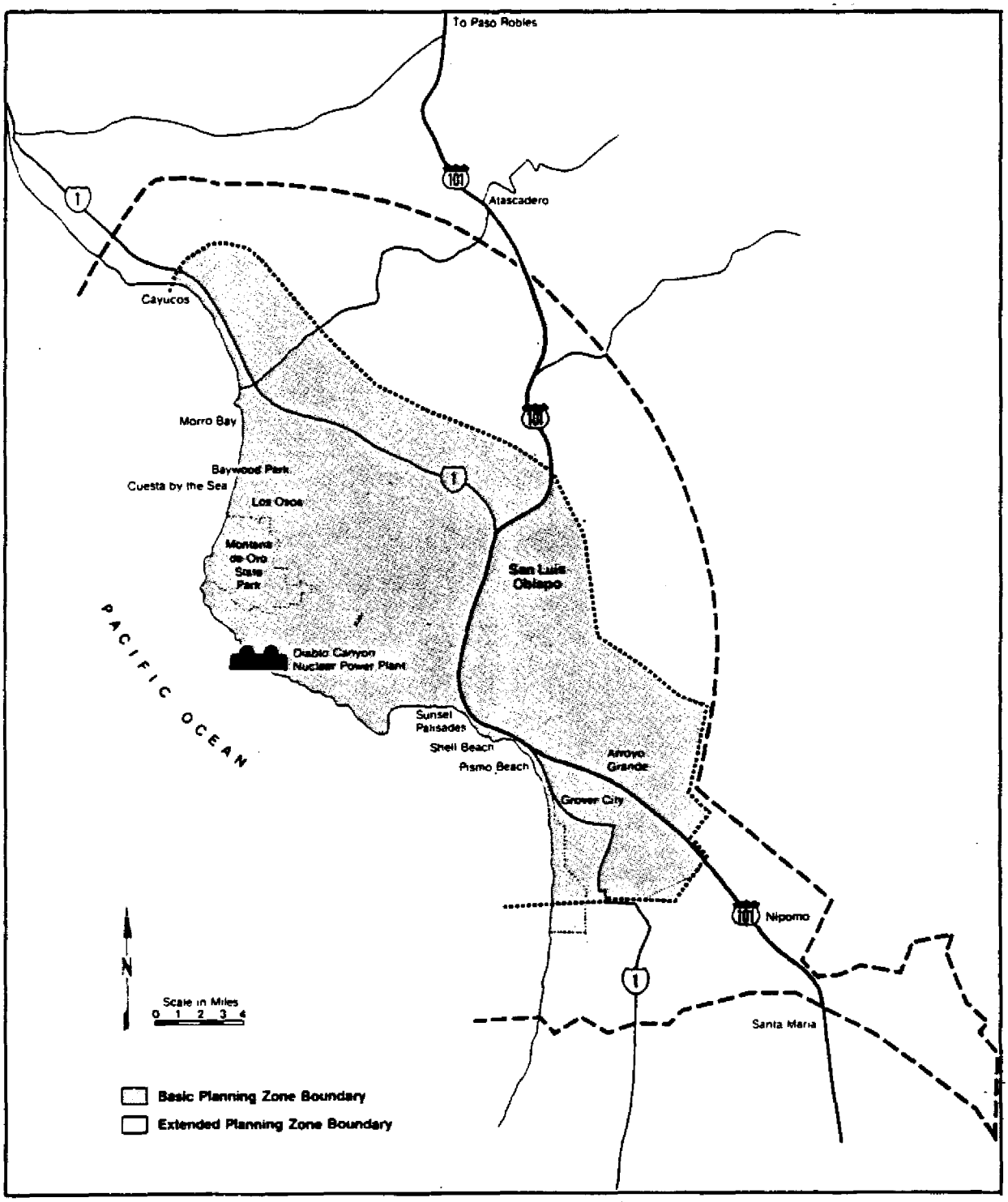

FIGURE 6

EMERGENCY PLANNING ZONES FOR
SAN LUIS OBISPO COUNTY

(Pacific Gas and Electric Company, 1982)

they would be willing to respond. Additional comments were encouraged and recorded.[1] Closed answer categories were immediately coded, while open-ended answers were categorized after the survey's completion. The length of time needed to conduct the "Communities Speak" interview ranged from 8 to 45 minutes.

At the completion of the survey, all responses were statistically analyzed by computer to produce information on frequencies of response, percentages, and comparisons of responses to demographic profiles. Cross tabulations were also generated to compare selected responses, and chi-square tests were used to determine correlation and dependence.

The interviews provided data on residents' attitudes and awareness concerning emergency planning for the Diablo Canyon Nuclear Power Plant. Not insignificantly, they also provided a channel of communication between decision makers and local residents, and acted as an educational tool. Analysis of the data provided insight into several questions pertinent to effective response planning:

1. How effective has the public notice and education program been?
2. How involved have communities been in the preparation of the Emergency Response Plan?
3. How knowledgeable are residents about the plan, and what is the level of emergency preparedness?
4. What is the perceived risk of residents towards the power plant's operation, and how does that affect response?
5. What is the contribution of local residents to plan development and maintenance, and what can it be?

[1]A complete record of comments is listed in Appendix B.

COMMUNITIES SPEAK: ANALYSIS OF RESIDENTS' AWARENESS AND ATTITUDES

As stated earlier, Diablo Canyon Nuclear Power Plant rests on an oceanside bluff surrounded by several hundred acres of rolling hills. It sits at the mouth of Diablo Creek, and is separated from U.S. Highway 101 by the Irish Hills, part of the San Luis Mountain Range. Nearby communities are small, but growing. The area economy relies largely upon agriculture, fishing, and tourism.

To the north of the plant lies Baywood-Los Osos, the city of Morro Bay, Cambria, and Cayucos. They are picturesque seaside communities with a combined population of under 25,000.[1] The residents of these areas are mostly white and middle class, with a high percentage of senior citizens. Often considered to be bedroom communities of the county's inland capital (San Luis Obispo), these towns are buffered from that city by agricultural lands and open space.

The city of San Luis Obispo is the largest in the county and is also the county seat. It has a population of slightly more than 34,000 according to 1980 census data. During most of the year, San Luis Obispo is a college town, being adjacent to California Polytechnic State University. The summer population dwindles to two-thirds of its school year size. Its climate is warm and temperate because of the protection provided by nearby hills.

South of San Luis Obispo and towards the coast, the climate is cooler. The small towns and cities on the gateway side of the Diablo Canyon site range in population from under 1,000 to somewhat over 11,000. The beachfront areas rely on tourism, and the summers bring scores of

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[1]This and all other census/demographic data were obtained from the "1980 Census Summary Report (File 1)," California State Census Data Center.

sunbathers and vacationers in recreational vehicles. The economic base of the inland towns is agriculture.

All of these areas lie within the Basic EMZ. There are five incorporated cities, six unincorporated town sites, and surrounding rural lands included in the study area. Together, they include approximately 75% of the county's population. There are 42,277 dwelling units inside this planning zone (see Table 3). Residents of those units (over 100,000 people) were the target population of this study. Only three households fall within a two mile radius of the Diablo Canyon Nuclear Power Plant, and just 30 are located inside a six mile zone. Consequently, the vast majority of the study population is between six and 15 miles from the plant site. The outskirts of the largest city, San Luis Obispo, are 12 miles from the power plant.

The Communities

Survey results are only valid if the sample survey has similar characteristics to the study population. To test this, the survey respondents were asked a series of descriptive questions, and their demographic characteristics were compared to the communities' demographic profiles.

The respondents tended to be slightly younger than the county's population as a whole, but in the final analysis, the overall results were affected little. The margin of error was within 5% of county figures, a number small enough to infer validity. The percentages of males and females fell well within 5% of county statistics. Fifty-two percent of the respondents were female and 48% were male, compared to 49% female and 51% male in the county as a whole. The ratio of owners to renters was 1:1, compared to 1.3:1 for the county. The study's close correlation to

Protective Action Zone Number and Title		Residential Population	Dwelling Units
1	2-mile	5	3
2	6-mile	58	27
3	Avila/San Luis Bay	949	502
4	See Canyon/Prefumo Canyon/ Los Osos Valley	57	29
5	Baywood/Los Osos	11,554	4,691
6	City of Pismo Beach	5,286	3,315
7	Squire Canyon	210	79
8	San Luis Obispo Area	41,803	15,561
9	Morro Bay/Cayucos	11,830	6,172
10	Five Cities, Southern portion	25,459	10,555
11	Price Canyon, Orcutt Road Lopez Drive, Route 227	1,386	599
12	Nipomo north of Willow Rd.	2,000	744
	Sub-total, Basic EPZ	100,588	42,277
13	Nipomo	7,137	2,474
14	Cuesta Pass/Santa Margarita	1,151	455
15	Rte. 41/ Cypress Mtn. Drive	171	66
	Total, Basic and Extended EPZ	109,047	45,272

TABLE 3

PROTECTIVE ACTION ZONE ESTIMATED 1980
POPULATION AND DWELLING UNITS

(San Luis Obispo County, 1981c)

demographic measures for the general population strengthens the validity of the results for the study population.

Additional descriptive information was asked of respondents to provide clearer insight into the character of the communities. Analysis of education levels showed that over half (67.4%) of those questioned had at least some college background. One-quarter (24.6%) of the respondents had high school diplomas, and 8% had somewhat less than a high school education.

People in the survey population were relatively active in their communities. The majority (55.1%) had participated in or attended community meetings. Public meetings were most frequently mentioned, drawing involvement from over one-third (37%) of the respondents. Neighborhood social gatherings and school meetings were also attended by 14.5% and 16%, respectively. Generally speaking, levels of education and citizen participation indicated that residents were educated and informed.

The communities were aware of the Diablo Canyon Nuclear Power Plant and had some idea of its location. Over one-quarter (25.8%) had been living in the area since the time the site was originally approved for construction. (Approval was made in the late 1960s, and construction began in 1970.) Ninety percent of those surveyed had lived in their communities for the bulk of the licensing hearings and anti-nuclear protests.

Respondents were asked how far they lived from the plant site. The purpose was to give some indication of perceived notions of proximity. A strong relationship was found between real and perceived distances from the plant site (Figure 7). Overall, most thought themselves to be much closer to Diablo Canyon than they were. Over half (52%) believed that they were less than ten miles away. Actual figures show that only 12% of the households are within that distance. Twelve percent of all respondents estimated the plant to be over 15 miles away, but it is interesting to note that in the city of Morro Bay, 44.4% of those interviewed fell into this category. Morro Bay, however, is clearly within the boundaries of the Basic EPZ. One explanation of this perception may be that the entrance to the plant is on Avila Bay Drive--more distant from Morro Bay. For some, the entrance point may provide a gauge for estimating distance. No significant ties were found between these results and education level, length of

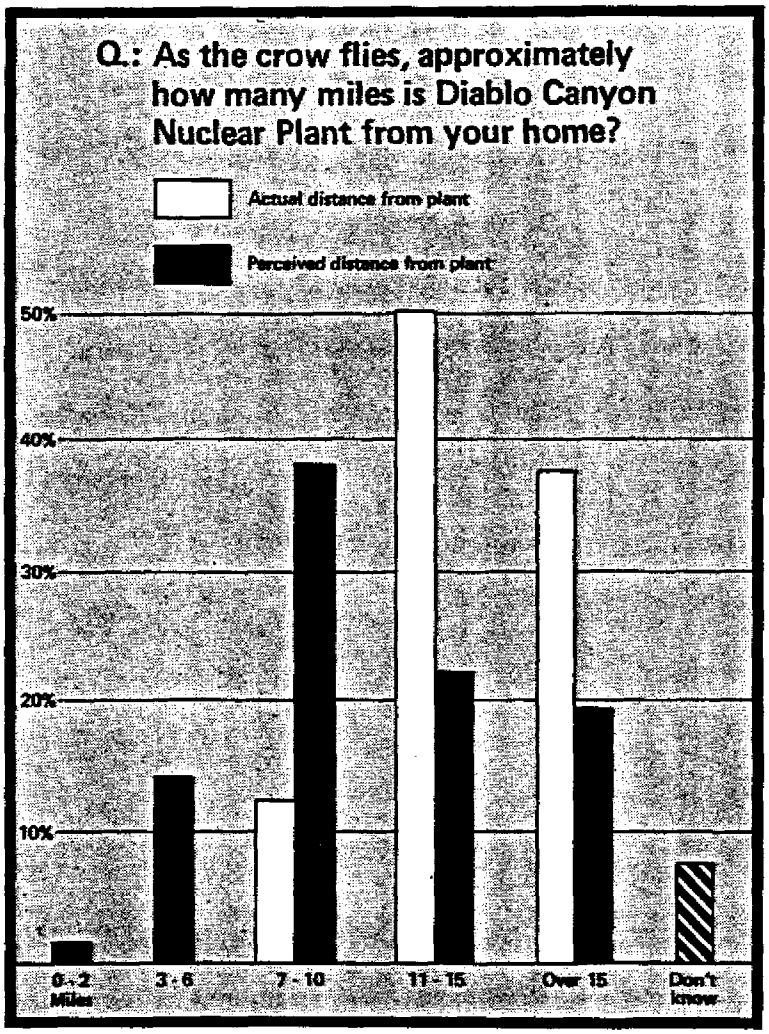


FIGURE 7

PERCEIVED AND ACTUAL DISTANCE FROM
DIABLO CANYON NUCLEAR POWER PLANT

residence, or knowledge of the emergency response plan. Perceptions of proximity to Diablo Canyon appear to be based upon some general knowledge of its location and its felt presence.

Public Exposure to the Emergency Response Plan

At the time of this study, the legal requirements for informing the public about the emergency response plan (as set forth by federal criteria) had all been met. Yet, only 35% of those questioned had any familiarity

with the San Luis Obispo County Nuclear Power Plant Emergency Response Plan draft. Those who did know about it tended to be citizens that were generally more active in the community. Although only three people reported having attended a public meeting specifically concerning the plan, almost three-quarters (72.1%) of those who knew something about the plan had also been active in the community in some way (Figure 8). The newspaper was the major source (65%) of information about the emergency response plan. To a lesser degree (43.1%), respondents mentioned hearing news through radio or television broadcasts. A few (17.2%) also received pamphlets from either the Pacific Gas and Electric Company or the County Office of Emergency Services. A variety of other sources were quoted as well, including friends, classes, and "inside" information from plant employees.

Emergency preparedness by individuals seems to bear some relationship to knowledge of the plan. Those who knew something about the plan tended to also have given some thought to how they would reunite their families if an evacuation were necessary. One-third of the respondents who had some familiarity with the plan also had thought about the problem of reuniting their families, while only 14.2% of all others had given it any thought. Results indicated only a small increase in knowledge about sirens on the part of those with some knowledge of the plan. (The newly installed sirens were designed to warn residents of impending danger and signal them to tune into the Emergency Broadcast System for further information.)

Because resourcefulness can be critical in an emergency, knowing where to find information about emergencies is important in itself and is a good indicator of public awareness. Respondents were asked if they had any information close at hand telling them what to do if there was a radiation emergency at Diablo Canyon. Only 5.5% answered "yes" and, more

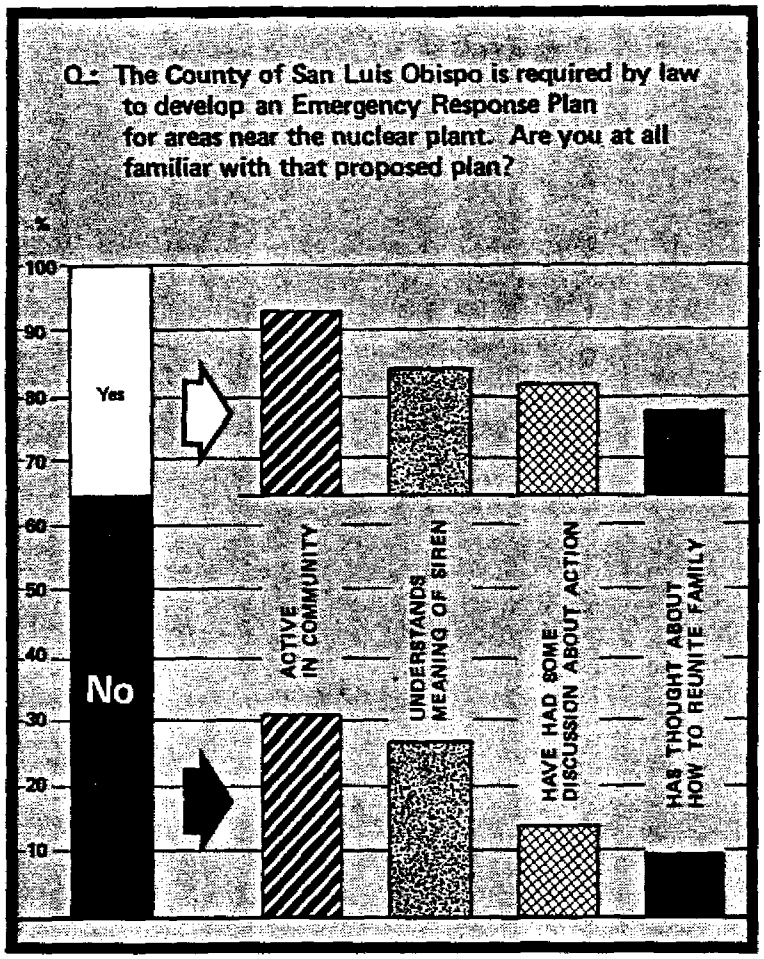


FIGURE 8

KNOWLEDGE OF THE
SAN LUIS OBISPO COUNTY NUCLEAR RESPONSE PLAN DRAFT

significantly, only two people out of the 200 who were interviewed referred to the information in the telephone directory. The San Luis Obispo directory contains a full page of information for nuclear emergencies (Figure 9).

The majority of the public was not familiar with the San Luis Obispo County Nuclear Power Plant Emergency Response Plan, and those who were

tended to have only a vague understanding of its content. Almost all information intended to reach household members had gone unnoticed.

Community Preparedness

The plans and actions residents individually decide upon are very important to community or area emergency planning. Generally, people react rationally based upon their knowledge and experience (Fogelman and Parenton, 1959, p. 130). Thus, whether or not to follow someone else's instructions is a conscious choice by most people. In the survey, questions were asked to determine possible decisions under current levels of understanding. Approximately one-half (48.5%) of those interviewed indicated that they would probably follow their own plans during an emergency, rather than those issued by someone else. Many expressed the hope that their plans would match those of authorities but gave their own decisions priority. Close to one-third (30%) of those interviewed would not take shelter in their homes, even if those were the instructions given. A strong correlation showed up in the answers to these two questions. The overwhelming majority (88.6%) of respondents who would make their own plans also would not take shelter even if instructed. Approximately two-thirds (67.3%) of those who would follow instructions also would take shelter if advised. It is interesting to note that over half (61.3%) of those who would not take shelter in their homes felt the chances of a major accident to be somewhat high. In contrast, the majority (63.6%) of those who would take shelter perceived the chances of a major accident to be either low or very low (Figure 10). There seems to be a connection between residents' perceptions of risk and actions they would be willing to take.

An indication of the extent of deliberate preparations was also obtained by the survey. The survey population was asked if they had ever

Nuclear Emergency Information

A4

San Luis Obispo Area Nuclear Power Plant Emergency Response Plan

A radiological emergency can occur as the result of an accidental release of radioactive material from a nuclear power plant or as the result of an accident involving vehicles carrying radioactive material. Health hazards can result from prolonged exposure to radiation levels above normal background radiation, from short exposure to high levels from breathing in radioactive materials or from taking in radioactive materials through food and drink.

Local government agencies have instruments and trained personnel to detect the presence and level of radioactivity. If necessary, warning will be given so that protective measures can be taken.

Siren System

In the event of a threat to public safety because of an actual or potential unplanned release of radiation from Diablo Canyon Nuclear Power Plant, warning sirens will be sounded. The sirens are placed throughout the shaded area shown on the map at right and are designed to be heard clearly by everyone in the area.

In some cases, mobile sirens, telephone calls, Coast Guard vessels offshore or home visits may be used as an alternative or additional means of alert.

If You Hear Sirens

If you should hear sirens sounding a loud, steady tone (about three to five minutes in duration), you should turn on your radio or television and listen for instructions over the Emergency Broadcast System (EBS). You will be kept informed as long as the emergency or threat of an emergency exists. Please do not use your telephone except for personal emergencies.

The primary EBS stations in this area are:

KVEC	**920 AM**
KSLY	**1400 AM** (evening hours)
KSBY-TV	**(Channel 6)**

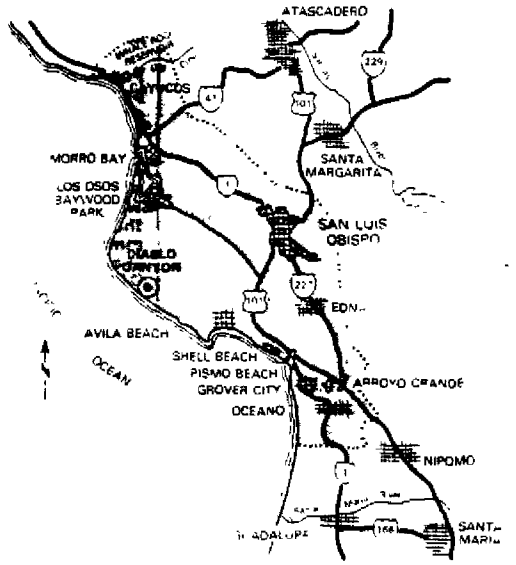
Other area AM and participating FM stations will repeat EBS broadcasts from these primary stations.

Emergency Actions

The sounding of sirens requires nothing more than your tuning into an EBS station for information. County officials will provide current information on the emergency and advise you to take any protective actions which may be necessary. Protective actions may involve staying indoors with doors and windows closed and ventilating or air conditioning systems turned off. Temporary evacuation of certain affected areas might be recommended. Such instructions would be given over the local radio or television stations through the Emergency Broadcast System.

Local Emergency Telephone Numbers

County Sheriff	**543-7911**
County Office of Emergency Services	**549-5011**



For More Information

If you would like more information on the emergency response plan or on the Diablo Canyon Nuclear Power Plant, write or call the San Luis Obispo County Office of Emergency Services or Pacific Gas and Electric Company.

San Luis Obispo County Office of Emergency Services Courthouse Annex, Room A205 San Luis Obispo, CA 93408 Telephone **549-5011**	Pacific Gas and Electric Company **894 Monterey Street** San Luis Obispo, CA 93401 Telephone **544-3334**

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Effective date for telephone listings and addresses on this page is July 24, 1981.

SAN LUIS OBISPO

FIGURE 9

NUCLEAR RADIATION EMERGENCY INFORMATION
AVAILABLE IN THE LOCAL TELEPHONE DIRECTORY

(Pacific Telephone and Telegraph Company, 1981, p. A4)

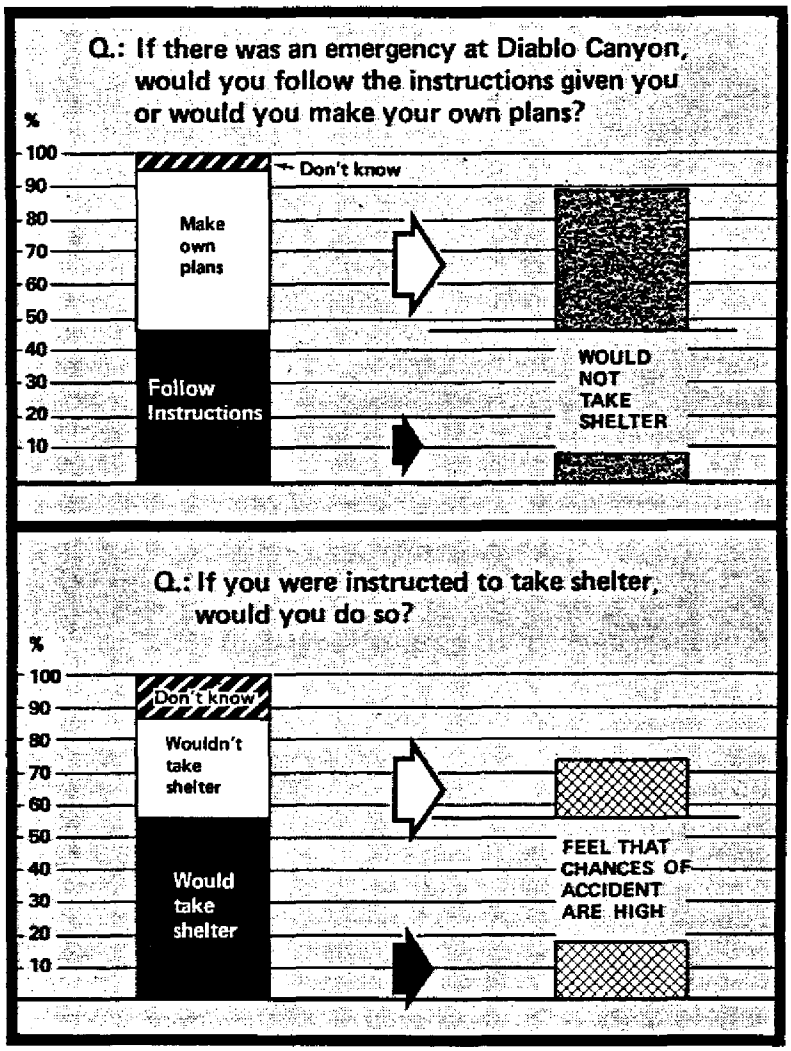

FIGURE 10

DECISIONS AND ACTIONS

discussed with either family or friends possible actions to take in case of an emergency at Diablo Canyon. A moderate number (34.5%) had had at least some conversation generally concerning the problem, and those who had some knowledge of the emergency response plan had pursued the subject more often than those who knew nothing of the plan.

Most of those questioned (76.1%) had no idea how they would reunite with their families if an evacuation was necessary. Those who preferred to