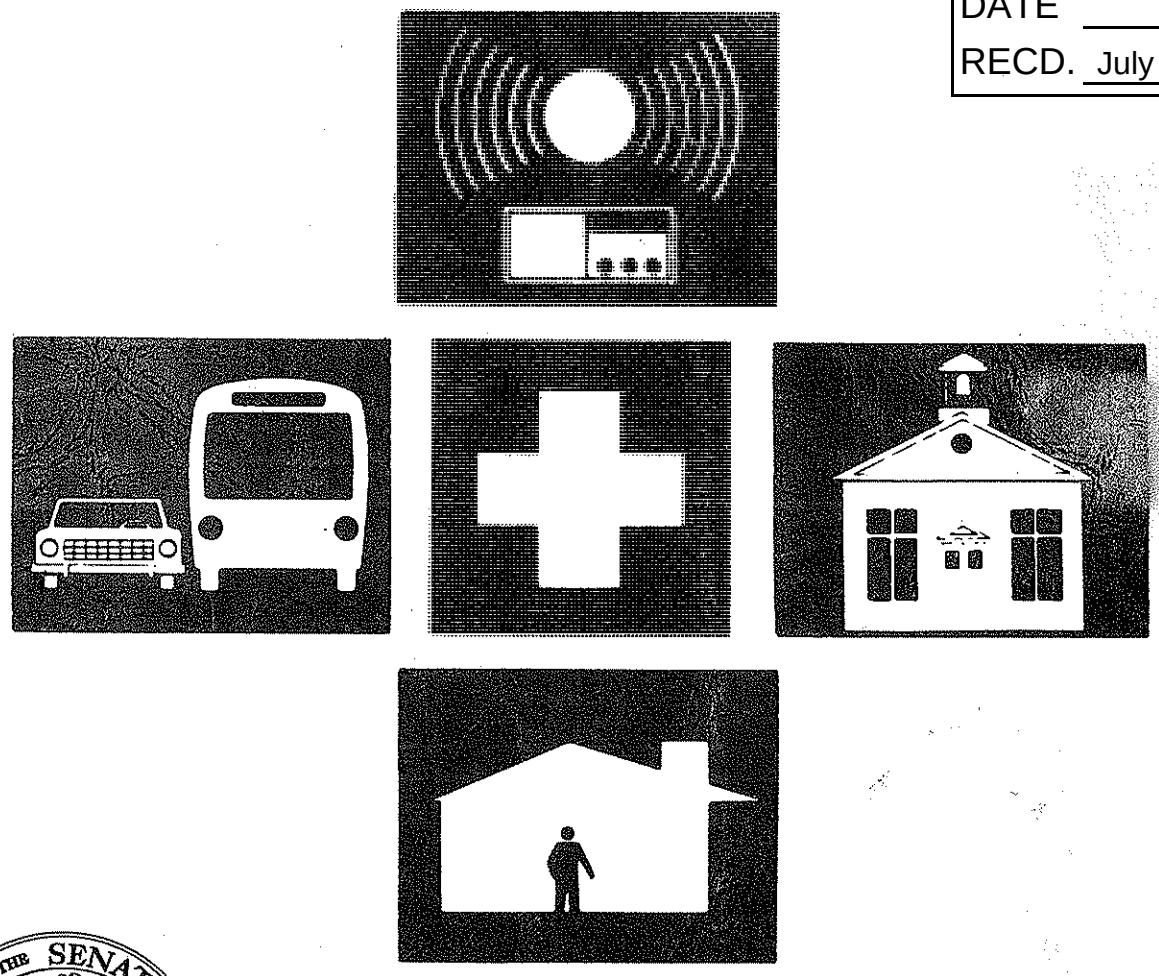
Senate Task Force on California Nuclear Emergency Response

FINAL REPORT

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California State Senate

TASK FORCE ON CALIFORNIA NUCLEAR EMERGENCY RESPONSE

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April 20, 1988

Enclosed is the Final Report of the Senate Task Force on California Nuclear Emergency Response. The report is the product of the Task Force's examination of California's emergency response plans for a nuclear power plant accident.

The Task Force was established by the State Senate on August 29, 1986. Beginning in February, 1987, the Task Force held monthly meetings, as well as public hearings near each of the State's commercial nuclear power facilities.

Co-chairs of the Task Force were Dr. Robert Peter Gale and Dr. Marvin Goldman, two internationally-known authorities on the Chernobyl nuclear accident. The Task Force included experts in medicine, radiation biology, nuclear engineering, health care, media, law, government, and law enforcement.

The Task Force has made 31 recommendations on how the State may improve preparations for responding to a nuclear power plant emergency. Task Force members brought a wide range of viewpoints to their discussion of nuclear emergency response issues. After extensive debate, all members agreed to the recommendations contained in the report.

Thank you for your interest in the Task Force.

Sincerely,

DAN FLYNN
Executive Administrator

FINAL REPORT OF THE

SENATE TASK FORCE ON CALIFORNIA NUCLEAR EMERGENCY RESPONSE

Submitted to the California State Senate
April 18, 1988

Dan Flynn
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EXECUTIVE SUMMARY

The Chernobyl nuclear power station accident, occurring in the Soviet Union on April 26, 1986, raised considerable international concern regarding emergency preparedness for nuclear accidents.

Several states decided to evaluate their emergency response plans in light of the enormous resource mobilization required at Chernobyl. In California, State Senator Gary K. Hart sponsored legislation, SR 48, which established a Task Force to "formulate a report on the State of California's present medical and emergency response capacity in the event of a major nuclear facility accident, including recommendations as to how the state might improve this capacity and limit damage from, or limit exposure to, radiation in the event of such an accident." This legislation was unanimously approved by the State Senate on August 29, 1986.

Fourteen individuals were appointed to the Task Force by the Senate Rules Committee. Task Force members were specialists in the fields of medicine, radiation biology, nuclear engineering, health care, media, law, government, and law enforcement. The Task Force met eleven times over the course of one year, which included a public hearing near each of the State's commercial nuclear power facilities.

The Task Force studied data related to the Chernobyl accident, reviewed emergency plans for California's three commercial nuclear power stations, and listened to members of the public living near the facilities. Task Force subcommittees focused on the issues of medical response, emergency response management, and public education/information.

The Task Force agreed to 31 recommendations aimed at improving the State's capability to respond to a nuclear emergency. This report describes the Task Force findings and recommendations.

SUMMARY OF TASK FORCE RECOMMENDATIONS

MEDICAL RESPONSE

1. The Task Force recommends that the State develop plans for designating one or more special treatment facilities to respond to nuclear radiation casualties. The guidelines should consider strategic geographic location(s) in placement of the facilities. Desirable features of the facilities would include, but not be limited to:

Expertise in hematology, burns, radiation biology, and critical and supportive care.

Capability to provide radiologic and microbiologic isolation for up to 10-25 casualties.

Capability for radioactivity measurements.

Capability to quickly mobilize and augment the treatment staff to care for a sudden influx of casualties.

The Task Force did not develop specific guidelines, a selection process or other details associated with the designation of special nuclear radiation emergency treatment facilities. The Task Force recommends that a state agency such as the Department of Health Services be charged with the task of developing guidelines and designating a facility (or facilities) to serve in this capacity. The guidelines should incorporate input from relevant state or federal organizations such as the California Conference of Local Health Officers, the California Medical Association, and the California Association of Hospitals. The Task Force recommends that such guidelines be developed and facilities established within one year.

2. The Task Force recommends that the State designate a radiation accident screening team. This team should be composed of three persons with collective expertise in medicine, radiation biology, radiation casualty management, emergency preparedness and disaster response, public health, and government organization and responsibilities. The team would be tasked with assisting the nuclear power plant accident incident-commander and other relevant persons or agencies in making decisions regarding initial patient management and casualty evacuation. This team would need to be continuously available on short notice to travel to the scene of a nuclear power plant accident.

3. The Task Force recommends that the Administration and the Legislature examine the mandate, organization, and functions of the Emergency Medical Services Authority to determine how the Authority's capabilities can be used most effectively.

EMERGENCY RESPONSE MANAGEMENT

4. The Task Force recommends that state and local emergency response planners work with cities and counties outside the Emergency Planning Zones (EPZ)s to address local concerns regarding nuclear emergency response plans. Emergency

response planners should pay particular attention to the concerns of local jurisdictions that might, in the event of an evacuation from an EPZ, be the site of reception and care facilities for evacuated individuals and absorb traffic coming from the EPZ.

5. The Task Force recommends that local jurisdictions within the EPZs appoint a chairperson from among the individuals responsible for making protective action decisions during a nuclear power plant emergency. The chairperson would be the discussion leader and decision-making facilitator during a nuclear power plant emergency. The Task Force further recommends that relevant jurisdictions amend their emergency response plans to identify the authority and responsibility of such a chairperson.

6. The Task Force recommends that the Office of Emergency Services (OES) encourage training and education programs for relevant state and local government personnel. In doing so the OES should develop a list of consultants (from sources such as the California Specialized Training Institute) capable of providing training in various aspects of nuclear power plant emergency response planning and implementation. The OES should distribute this list to local agencies.

7. The Task Force recommends that the OES review local agency training programs prior to allocating funds for training from the Special Account to that agency. The OES should pay particular attention to whether each agency is making a satisfactory effort to train line personnel such as peace officers, public works officials, and school bus drivers. The OES should provide, when possible, additional funds from the Special Account to local agencies that demonstrate a satisfactory training and education program.

8. The Task Force recommends that the Legislature clarify existing state law to give the OES explicit ultimate authority for allocating and reimbursing funds from the Nuclear Planning Assessment Special Account to local jurisdictions.

9. The Task Force recommends that state and local planners consider that emergency response personnel, as well as the public, may respond differently to a nuclear power emergency than to a naturally-occurring emergency and to take this difference into account when developing training programs.

10. The Task Force recommends that the OES continue participating in or observing all emergency response exercises that involve off-site agencies.

11. The Task Force recommends that the OES participate in annual exercises of the state plan for responding to nuclear power plant emergencies. The exercises should include relevant state agencies and the OES should activate the State Operations Center for each exercise.

12. The Task Force recommends that the OES annually provide a report to the Legislature on the following:

    Describe the purpose of all nuclear power plant emergency response evaluated exercises in the state during the year involving local and state authorities and the role that the OES played in each. Note any serious OES deficiencies discovered in the exercises and what actions should or will be taken to correct them.

    Account for revenues into the Nuclear Planning Assessment Special Account from each utility, describe expenditures of Special Account funds by each local jurisdiction and state agency, and provide explanations for any denied funding requests.

    Describe all training and education efforts undertaken by the OES and identify any additional training and education needs of state and local agencies. Make specific reference to agencies that have not demonstrated adequate training of management and line personnel in nuclear power plant emergency response.

13. The Task Force recommends that relevant state and local law enforcement agencies evaluate whether officers who might be involved in an evacuation following a nuclear power plant accident have an adequate understanding of evacuation procedures specific to such an accident. These agencies should ensure that their officers continue to receive the necessary training and refresher courses specific to nuclear power plant emergency response. The Task Force recommends that the relevant law enforcement agencies offer refresher courses at least once per year.

14. The Task Force recommends that the Legislature adopt legislation specifically allowing the OES to allocate funds from the Special Account for acquisition and maintenance of equipment that is necessary for state and local nuclear power plant emergency response.

15. The Task Force recommends that the OES not deny requests for funding from the Special Account for equipment solely on the basis that the equipment could be used for purposes other than for nuclear power plant emergency response.

16. The Task Force recommends that the OES, in cooperation with the utilities and local jurisdictions, evaluate the adequacy of the Federal Emergency Management Agency's (FEMA)'s audibility requirements for nuclear power plant emergency alert sirens used in California. The OES should make recommendations to the utilities and FEMA on its findings by June 30, 1989.

17. The Task Force recommends that the state and local law enforcement traffic flow plans for the EPZs and surrounding areas take into account the possibilities for flooding and other impediments to evacuation. These agencies should also designate alternative routes in the event primary routes are not passable.

18. The Task Force recommends that the Department of Transportation (DOT) provide funds to ensure that evacuation routes do not become flooded when there are no reasonable evacuation alternatives available.

19. The Task Force recommends that the DOT include within its criteria for funding repair and construction projects the need for adequate emergency evacuation routes.

20. The Task Force recommends that state and local law enforcement agencies ensure that traffic flow plans for areas outside the EPZs adequately reflect the possible responses of the residents outside the EPZ to actual or perceived emergencies.

21. The Task Force recommends that the Legislature enact legislation that limits (or eliminates) liability of public agencies, their officers, directors and agents, and all persons duly registered by any agency or any unregistered person duly impressed into service by any agency in the course of responding to a public emergency. Legal recourse to injured parties should be confined to statutorily defined remedies; liability sounding in tort for actual, general or exemplary damages sustained by persons injured or damaged as a consequence of emergency response actions should be eliminated, so long as the action taken was for the health and safety of the public at large. Such legislation, we believe, would ensure that emergency response decisions would be made in the public interest.

22. The Task Force recommends that the OES, in cooperation with local emergency response authorities and the utilities, periodically assess the integrity of the emergency communications systems for the three nuclear power plant emergency response plans. In particular, the OES should ensure adequate redundancy in the communications system.

23. The Task Force recommends that the OES, in cooperation with the CHP and local law enforcement agencies, investigate options available for providing inter-agency and inter-jurisdiction communication capacity among mobile emergency response vehicles. In doing so, the OES should determine the feasibility, cost, and possible funding mechanisms for providing programmable scanners.

24. The Task Force recommends that the DHS develop and implement additional systems which would allow the Department to quickly disseminate public health information to local governments, physicians, communication media, and any other entities likely to need such information in a nuclear power plant emergency.

25. The Task Force recommends that the DHS catalogue food interdiction resources within and available to the Department. The DHS should also assess the adequacy of these resource to measure radiation at levels consistent with current federal Protective Action Guidelines (PAG)s and the PAGs recommended by international and national organizations such as the International Commission on Radiation Protection and the National Council on Radiation Protection.

PUBLIC EDUCATION/INFORMATION

26. The Task Force recommends that the emergency information materials discuss the negative consequences which may result if members of the public choose not to follow recommended protective actions. The materials should specifically address:

    Why one should not evacuate immediately upon activation of the outdoor siren system.

    Why one should not call local authorities during the first stages of an emergency.

    Why one should not attempt to pick up children at school during an emergency.

27. The Task Force recommends that the DHS or other appropriate state agency obtain and distribute to licensed physicians in California informational materials on radiation. The materials should include information on the nature and effects of radiation, potential sources of radiation release, the proper emergency procedures one should implement at each level of a radiation emergency, a glossary of terms, and sources where one may request additional information.

28. The Task Force recommends that, as part of the public education program undertaken by utilities, a tear-out/send-back form be provided on the EPZ and Public Education Zone (PEZ) printed materials for physicians who wish to become better acquainted with the procedures they should recommend to their patients during a nuclear power plant emergency. Physicians who send in the form will be provided, by the utility, with more detailed information than provided the general public and/or given the opportunity to participate in seminars on the subject.

29. The Task Force recommends that the State Senate memorialize the President and Congress to improve the operation of the Emergency Broadcast System (EBS) for use in state or local nuclear power plant emergencies. The Senate's resolution should call on the federal government to:

    Require stations within the EPZ who do not participate in the EBS to cease broadcasting upon activation of the EBS during state or local nuclear power plant emergencies.

    Require primary EBS stations to participate in exercises of nuclear power plant emergency response plans.

    Require regular training for EBS station staff and emergency officials charged with providing status updates to EBS stations.

    Provide maintenance of EBS equipment.

    Require counties who activate their EBS to inform surrounding counties of the action.

    Provide appropriate funding for the above.

30. The Task Force recommends that the State provide instruction on radiation and other technological issues to students in California schools.

31. The Task Force recommends that the Legislature establish a Citizens' Advisory Committee on Nuclear Emergency Planning. The Task Force believes that the Committee should be an independent, ongoing forum for citizens to have input into nuclear emergency planning. The Committee should have the following responsibilities:

    Assessing whether emergency information materials convey information and recommendations that the public will be inclined to follow in an emergency.

Soliciting and receiving, on a regular basis, public comment regarding the adequacy of nuclear power plant emergency response plans.

Assessing the validity of assumptions in nuclear emergency response plans that are related to citizen response (e.g., is it a valid assumption that the public will not evacuate unless told to do so by authorities?)

Examining and making recommendations regarding citizen participation in nuclear emergency response plan exercises.

Assessing whether efforts should be made to provide emergency information to non-English-speaking populations within the EPZ.

Assessing the need for additional information for special response personnel such as bus drivers and teachers.

Providing an annual report to the OES and the Legislature with recommendations on how the emergency plans can be improved.

INTRODUCTION

The Chernobyl nuclear power station accident, occurring in the Soviet Union on April 26, 1986, raised considerable international concern regarding emergency preparedness for nuclear accidents.

Several states decided to evaluate their emergency response plans in light of the enormous resource mobilization required at Chernobyl. In California, State Senator Gary K. Hart sponsored legislation, SR 48, which established a Task Force to "formulate a report on the State of California's present medical and emergency response capacity in the event of a major nuclear facility accident, including recommendations as to how the state might improve this capacity and limit damage from, or limit exposure to, radiation in the event of such an accident." Hart's legislation was unanimously approved by the State Senate on August 29, 1986.

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The Task Force studied data related to the Chernobyl accident, reviewed emergency plans for California's three commercial nuclear power stations, and listened to members of the public living near the facilities. Task Force subcommittees focused on the issues of medical response, emergency response management, and public education/information.

The Task Force agreed to 31 recommendations aimed at improving the State's capability to respond to a nuclear emergency. This report describes the Task Force findings and recommendations.

TASK FORCE MEMBERS

Co-Chairs

Robert Peter Gale, M.D., Ph.D.

Dr. Gale is an Associate Professor of Medicine at the UCLA Medical Center's Department of Medicine, Division of Hematology/Oncology. He led the medical response team that assisted the Soviet Union after the accident at the Chernobyl nuclear power facility. Recently he directed a similar team following a major (although non-nuclear) radiation accident in Brazil.

Marvin Goldman, Ph.D.

Dr. Goldman is a Professor of Radiation and Toxicology at the University of California, Davis. He has engaged in bioenvironmental radiation research for the past 35 years and has been a consultant to several state and federal agencies. Dr. Goldman recently chaired a U.S. Department of Energy Committee which studied the health and environmental consequences of the Chernobyl nuclear power plant accident.

Phillip N. Angelides

Mr. Angelides is President of River West Developments in Sacramento. He is a former Senior Consultant to the Assembly Committee on Housing and Community Development and is active in numerous civic organizations.

Kenneth P. Baskin

Mr. Baskin is Vice President of Nuclear Engineering, Safety and Licensing with the Southern California Edison Company. A registered professional mechanical and nuclear engineer with the State of California, Mr. Baskin has been associated with the design, construction, and operation of nuclear generating plants since 1962.

Glen Craig

Mr. Craig is Sheriff of Sacramento County. He is a former police officer, CHP Commissioner, and Director of the Division of Law Enforcement in the California Department of Justice. He has served on several State task forces on emergency preparedness.

Kenneth W. Kizer, M.D., M.P.H., F.A.C.E.P., F.A.C.P.M., F.A.O.M.A.

Dr. Kizer is the Director of the California Department of Health Services. The former Director of the State Emergency Medical Services Authority, he has had substantial involvement in emergency preparedness and disaster response

activities, and he also has formal training in radiation biology and military experience with nuclear matters.

Frances J. Malinoff, M.D., F.A.A.P.
Dr. Malinoff is a Pediatrician at the Santa Barbara Medical Foundation Clinic. She has been practicing medicine since 1979 and is a Member-At-Large and Media Liaison of the American Academy of Pediatrics.

Jess Marlow
Mr. Marlow is Senior Editor for KNBC News in Los Angeles. In addition to anchoring nightly news broadcasts, Mr. Marlow has received several awards for investigative news features.

Clyde A. Romney
Mr. Romney is an attorney specializing in water resources and government relations. He is the former Chief-of-Staff for Congressman Ron Packard in Washington, D.C..

Judy B. Rosener, Ph.D.
Dr. Rosener is the Assistant Dean and faculty member of the Graduate School of Management, University of California, Irvine. She is the author of numerous articles and reports on citizen participation in government and is a former Commissioner on the California Coastal Commission.

Dennis Smith
Mr. Smith is the Chief of the Radiological Programs Division in the Office of Emergency Services (OES). He was the OES representative to the Task Force beginning in November, 1987.

Anne Vasquez
Ms. Vasquez is the Chief of Administration at the Office of Emergency Services (OES). She is the former Chief of the Radiological Programs Division of OES and was a member of the Task Force until November, 1987.

Joseph O. Ward
Mr. Ward is a private consultant. He is the former Chief of the Radiologic Health Branch at the Department of Health Services and had participated in the development of the Department's nuclear emergency response plans.

Don J. Womeldorf
Mr. Womeldorf is the Chief of the Environmental Management Branch in the Department of Health Services and the Department's low-level radioactive waste program. Nuclear emergency response management and environmental radiation management are administered by the Environmental Management Branch. Mr. Womeldorf was Dr. Kizer's alternate on the Task Force.

Alan J. Wyner, Ph.D.

Dr. Wyner is an Associate Professor of Political Science at the University of California, Santa Barbara, specializing in state and local government. He has been active in local planning issues and has served on several national earthquake research committees.

CHAPTER 1

OVERVIEW OF NUCLEAR EMERGENCY PLANNING IN CALIFORNIA

The federal government requires states to provide emergency response planning for areas surrounding nuclear power plant facilities. In California these facilities are located at San Onofre (near the Orange County/San Diego County line), Diablo Canyon (near the City of San Luis Obispo) and Rancho Seco (near Sacramento). (See Appendix for maps of the facility sites).

The State of California and local jurisdictions share responsibility for off-site nuclear emergency planning. The local jurisdictions manage plans, provide regular training, and conduct periodic exercises.

Up until the late 1970s, nuclear emergency planning was limited to a 2-4 mile low population zone around plant sites. In 1978 the Nuclear Regulatory Commission (NRC) acknowledged that this zone was too small, and issued a proposal to expand planning zones to 10 miles. While the NRC gathered comments on the proposal, an accident at Three Mile Island (TMI) occurred.

TMI spurred the NRC to adopt the 10-mile-zone (known as the Emergency Planning Zone or EPZ) as well as develop extensive standards for nuclear emergency planning. These standards, NUREG 0654, are the bedrock of nuclear emergency planning in the United States.

California's EPZs take into account site-specific characteristics such as population centers and wind patterns, and, in some areas, extend beyond the NRC's 10-mile minimum standard.

The State also has established Public Education Zones (PEZs) which extend out to a 20-35 mile radius of the sites. The State requires utilities to send information regarding nuclear emergency response plans to residents within these PEZs.

The Legislature established the Nuclear Planning Assessment Special Account to provide funds for the state and local costs associated with nuclear emergency response planning. The account is funded by annual contributions from the utilities and is administered by the Governor's Office of Emergency Services (OES).

The State, through the nuclear power plant emergency response plan, would provide support to local jurisdictions when the demands of nuclear emergency response exceed local resources. The State agencies most likely to become involved in emergency operations are:

The Governor has ultimate administrative authority and responsibility over all state administrative agencies, provides overall direction to the state agencies both in planning for and responding to a nuclear power plant emergency, and assumes direct decision-making responsibility in declared state emergencies.

The Governor's Office of Emergency Services (OES) coordinates state and local government emergency response activities, is a liaison to federal emergency response agencies, and provides support resources to local jurisdictions.

The Department of Health Services (DHS) is responsible for ensuring the health and safety of the public by conducting radiation monitoring, interdicting the movement or sale of potentially harmful food and water, leading post-emergency ingestion pathway responses, and providing training and assistance to local jurisdictions.

The California Highway Patrol (CHP) provides traffic control during an emergency in order to facilitate evacuation and control access to an evacuation zone.

The Department of Food and Agriculture (DFA) helps with food sampling and interdiction efforts in an emergency.

The National Guard provides assistance to state agencies and local jurisdictions by providing communication, transportation, and traffic control.

The Department of Corrections (DOC) ensures the safety of inmates at a level consistent with security needs.

The Emergency Medical Services Authority (EMSA) coordinates medical resources needed by local health officials.

The Attorney General provides legal advice to state agencies and the Governor.

The Department of Transportation (Caltrans) assists law enforcement agencies with traffic control measures, such as providing traffic barricades during an emergency.

CHAPTER 2

MEDICAL RESPONSE TO A NUCLEAR POWER PLANT EMERGENCY

DISCUSSION

Utilities provide on-site radiation monitoring and first-aid resources for those who may be injured or exposed to radiation from a nuclear power plant accident. Off-site radiation monitoring is provided at designated centers. Emergency response plans have designated hospitals near Emergency Planning Zones (EPZs) which will accept injured and contaminated patients. These facilities conduct periodic exercises for the treatment of a few such patients. Current emergency plans might be adequate for the initial medical treatment of approximately 50 injured and contaminated persons among numerous facilities. The state is required to provide medical resources when injuries caused by a radiation accident exceed local resources.

↑ State provides; 450-250?? 60

The Three Mile Island nuclear reactor event a decade ago provided the first significant American experience in nuclear emergency response involving the general public. The Chernobyl accident required the first medical disaster response for a commercial nuclear power plant accident. These events indicate that specific plans should be developed for radiation accidents involving 50-250 casualties. These casualties will likely include a relatively small number (approximately 10-20%) of people who will ultimately develop severe radiation sickness needing very sophisticated and highly technical medical treatment. The remaining injuries and contamination levels will vary from serious to negligible.

Initially, intensive medical and radiobiological evaluation and monitoring will be needed for many of the casualties. During the first few weeks following an accident, these needs will decrease as results of the screening become known and as the biological effects of the radiation exposures become manifest.

FINDINGS

- The Task Force finds that the State does not have a coordinated plan or designated facilities for intensive treatment of individuals injured from a nuclear power plant accident which exceed local resources (estimated as over 50 injured and/or contaminated patients).

- The Task Force finds that the State likely has the resources and facilities to treat approximately 50 to 250 injured and contaminated patients. These resources are distributed among several facilities in the State.

- The Task Force finds that the effective treatment of large numbers of persons with radiation-related injuries and

contamination is best achieved if the patients are treated in a limited number of medical facilities (and are not widely distributed). This allows for efficient use of medical expertise and limits the spread of contamination.

- The Task Force finds that a major release of radiation would likely require the prompt assistance of specialists familiar with the treatment of multiple radiation injuries.

- The Task Force finds that there may be statutory and organizational impediments which prevent emergency medical services capabilities from being fully realized in the State.

RECOMMENDATIONS

1. The Task Force recommends that the State develop plans for designating one or more special treatment facilities to respond to nuclear radiation casualties. The guidelines should include strategic geographic location(s) in placement of the facilities. Desirable features of the facilities would include, but not be limited to:

   - Expertise in hematology, burns, radiation biology, and critical and supportive care.

   - Capability to provide radiologic and microbiologic isolation for up to 10-25 casualties.

   - Capability for radioactivity measurements.

   - Capability to quickly mobilize and augment the treatment staff to care for a sudden influx of casualties.

   The Task Force did not develop specific guidelines, a selection process, or other details associated with the designation of special nuclear radiation emergency treatment facilities. The Task Force recommends that a state agency such as the Department of Health Services be charged with the task of developing guidelines and designating a facility (or facilities) to serve in this capacity. The guidelines should incorporate input from other relevant state or federal organizations such as the California Conference of Local Health Officers, the California Medical Association, and the California Association of Hospitals. The Task Force recommends that such guidelines be developed and facilities established within one year.

2. The Task Force recommends that the State designate a radiation accident screening team. This team should be composed of three persons with collective expertise in medicine, radiation biology, radiation casualty management,

emergency preparedness and disaster response, public health, and government organization and responsibilities. The team would be tasked with assisting the nuclear power plant accident incident-commander and other relevant persons or agencies in making decisions regarding initial patient management and casualty evacuation. This team would need to be continuously available on short notice to travel to the scene of a nuclear power plant accident.

3. The Task Force recommends that the Administration and the Legislature examine the mandate, organization, and functions of the Emergency Medical Services Authority to determine how the Authority's capabilities can be used most effectively.

CHAPTER 3

EMERGENCY RESPONSE MANAGEMENT

EP2 - 50 mile KM

A. EMERGENCY PLANNING ZONES

DISCUSSION

The federal Nuclear Regulatory Commission (NRC) requires that each nuclear power facility have an Emergency Planning Zone (EPZ) that extends 10 miles from the plant in all directions. This zone is the focus of nuclear power plant emergency response planning by local jurisdictions, the state, and utilities. Please see Appendix for maps of the EPZs in California.

Intensive activities aimed at notifying, protecting and evacuating the populace within the EPZ have been planned by government agencies and the utilities. Primary planning focuses on areas within the EPZs, although there is also a high level of interest and concern on the part of some residents living beyond the EPZ.

In emergency response plans reviewed by the Task Force, the ten-mile regulation was found to be more of a minimum standard than a uniformly followed guideline. Local plans take many factors into account in establishing the EPZ, including topographical features, prevailing weather conditions, political boundaries of local jurisdictions, and transportation facilities. The Diablo Canyon EPZ, for example, extends to 20 miles at some points.

The size of the EPZ has been controversial since the time it was first established by the NRC; however, the Task Force has not attempted to independently evaluate the scientific basis for the current EPZs. Furthermore, the Task Force has not seen any evidence that it feels compels the state to require either a larger or smaller EPZ.

If future studies or actions by cognizant regulatory authorities determine that the size of the ten-mile EPZ requires modification, the recommendations of the Task Force should be re-evaluated accordingly.

FINDINGS

- The Task Force finds that site-specific plans which take into account unique local conditions are superior to any arbitrary change in the size of the EPZ.

- The Task Force finds that the response of persons and agencies inside and outside the EPZ to an actual or perceived nuclear power plant emergency might not be a

direct function of the actual probabilities of danger from a release of radioactivity from a power plant.

- The Task Force finds that additional limited planning beyond the EPZ is necessary because a nuclear power plant emergency may affect resources, transportation systems, and public actions outside the EPZ.

RECOMMENDATION

4. The Task Force recommends that state and local emergency response planners work with cities and counties outside the Emergency Planning Zones (EPZs) to address local concerns regarding nuclear emergency response plans. Emergency response planners should pay particular attention to the concerns of local jurisdictions that might, in the event of an evacuation from an EPZ, be the site of reception and care facilities for evacuated individuals and absorb traffic coming from the EPZ.

B. DECISION-MAKING RESPONSIBILITY AMONG MULTIPLE JURISDICTIONS

DISCUSSION

State and local jurisdictions share responsibility for developing and implementing off-site emergency response plans for nuclear power plant accidents. Each Emergency Planning Zone (EPZ) contains many jurisdictions (for example, the San Onofre EPZ includes the City of San Clemente, the City of San Juan Capistrano, the County of Orange, the County of San Diego, the United States Marine Corps at Camp Pendleton, and the California Department of Parks and Recreation).

Local jurisdictions work cooperatively with utilities to develop off-site emergency response plans for nuclear power plant accidents. Joint regulations of the federal Nuclear Regulatory Commission (NRC) and the Federal Emergency Management Agency (FEMA) require utilities to (1) classify nuclear power plant accidents by severity, (2) notify local, state, and federal authorities in a specified manner in such an event, and (3) recommend appropriate actions to emergency response agencies. Government jurisdictions and utilities share responsibility for making protective action recommendations such as evacuation or sheltering.

The plans do not specify a single decision-making authority. The Task Force believes, however, that assignment of an individual (such as from the state or one of the major local entities) as the single responsible decision-maker is not practical and would not increase the effectiveness of emergency response. While decision-making would be centralized and simplified, the individual's lack of day-to-day knowledge of all involved local communities, response organizations, and

site-related situations would make him or her less effective than the current organizational arrangement.

FINDING

- The Task Force finds that the lack of explicit single decision-making authority among multiple jurisdictions may prevent quick, coordinated decision-making during an emergency.

RECOMMENDATION

5. The Task Force recommends that local jurisdictions within the EPZs appoint a chairperson from among the individuals responsible for making protective action decisions during a nuclear power plant emergency. The chairperson would be the discussion leader and decision-making facilitator during a nuclear power plant emergency. The Task Force further recommends that relevant jurisdictions amend their emergency response plans to identify the authority and responsibility of such a chairperson.

C. TRAINING AND EDUCATION PROGRAMS

DISCUSSION

Successful implementation of nuclear emergency response plans requires careful training of key personnel. Training must be a continuous activity: new personnel must be taught their responsibilities, veteran staff must be provided refresher courses, and staff must be apprised of changes that occur in the plans.

Most plans call for major tasks to be conducted by line personnel near the bottom of the organizational hierarchy. Planners must ensure that line personnel are aware of the rationale behind response procedures because these personnel might not have been involved in the plan's development.

The Office of Emergency Services (OES) is required by the Federal Emergency Management Agency (FEMA) to conduct an exercise of the plume phase of a nuclear power plant emergency in the State Operations Center every two years. The FEMA requires that the OES conduct an ingestion pathway exercise every six years.

The California Highway Patrol (CHP) provides general nuclear power plant emergency response training to all recruits statewide. The CHP also provides officers assigned to areas around nuclear power plants with training specific to the nuclear power plant emergency response plans. The CHP provides officers training updates every two years and participates in local emergency response drills.

FINDINGS

- The Task Force finds that, while local jurisdictions have expended considerable effort and expense in training personnel for nuclear power plant emergencies, training is not always performed on a regular basis.

- The Task Force finds that jurisdictions that do not have adequate training must be given additional resources, incentives or mandates to augment their training activities.

- The Task Force finds that the state has an oversight role in emergency response planning but has not provided adequate training to local jurisdictions.

- The Task Force finds that the public and emergency response personnel might respond to a nuclear power plant emergency differently than to a natural disaster. As a result, planning needs for these two types of emergencies are different.

RECOMMENDATIONS

6. The Task Force recommends that the Office of Emergency Services (OES) encourage training and education programs for relevant state and local government personnel. In doing so the OES should develop a list of consultants (from sources such as the California Specialized Training Institute) capable of providing training in various aspects of nuclear power plant emergency response planning and implementation. The OES should distribute this list to local agencies.

7. The Task Force recommends that the OES review local agency training programs prior to allocating funds for training from the Special Account to that agency. The OES should pay particular attention to whether each agency is making a satisfactory effort to train line personnel such as peace officers, public works officials, and school bus drivers. The OES should provide, when possible, additional funds from the Special Account to local agencies that demonstrate a satisfactory training and education program.

8. The Task Force recommends that the Legislature clarify existing state law to give the OES explicit ultimate authority for allocating and reimbursing funds from the Nuclear Planning Assessment Special Account to local jurisdictions.

9. The Task Force recommends that state and local planners consider that emergency response personnel, as well as the public, may respond differently to a nuclear power plant emergency than to a naturally-occurring emergency and to take this difference into account when developing training programs.

10. The Task Force recommends that the OES continue participating in or observing all emergency response exercises that involve off-site response agencies.

11. The Task Force recommends that the OES participate in annual exercises of the state plan for responding to nuclear power plant emergencies. The exercises should include relevant state agencies and the OES should activate the State Operations Center for each exercise.

12. The Task Force recommends that the OES annually provide a report to the Legislature on the following:

    - Describe the purpose of all nuclear power plant emergency response evaluated exercises in the state during the year involving local and state authorities and the role that the OES played in each. Note any serious OES deficiencies discovered in the exercises and what actions should or will be taken to correct them.

    - Account for revenues into the Nuclear Planning Assessment Special Account from each utility, describe expenditures of Special Account funds by each local jurisdiction and state agency, and provide explanations for any denied funding requests.

    - Describe all training and education efforts undertaken by the OES and identify any additional training and education needs of state and local agencies. Make specific reference to agencies that have not demonstrated adequate training of management and line personnel in nuclear power plant emergency response.

13. The Task Force recommends that relevant state and local law enforcement agencies evaluate whether officers who might be involved in an evacuation following a nuclear power plant accident have an adequate understanding of evacuation procedures specific to such an accident. These agencies should ensure that their officers continue to receive the necessary training and refresher courses specific to nuclear power plant emergency response. The Task Force recommends that the relevant law enforcement agencies offer refresher courses at least once per year.

D. EQUIPMENT

DISCUSSION

There are several types of equipment which are necessary for response to a nuclear power plant emergency (for example, protective clothing, radiation monitoring badges, dose

measurement devices, and road barricades). The equipment must be readily accessible and operable to ensure effective response to a nuclear power plant emergency.

Historically, through an informal agreement with the utilities, the Office of Emergency Services (OES) has prohibited expenditure of Nuclear Planning Assessment Special Account funds for equipment. Section 8610.5 of the California Government Code, however, does not explicitly address whether funds from the Special Account can be used for equipment maintenance or purchase.

FINDINGS

- The Task Force finds that there are some equipment needs within local and state agencies.

- The Task Force finds that some equipment deficiencies might be due to insufficient local and state funding.

RECOMMENDATIONS

14. The Task Force recommends that the Legislature adopt legislation specifically allowing the OES to allocate funds from the Special Account for acquisition and maintenance of equipment that is necessary for state and local nuclear power plant emergency response.

15. The Task Force recommends that the OES not deny requests for funding from the Special Account for equipment solely on the basis that the equipment could be used for purposes other than for nuclear power plant emergency response.

E. NUCLEAR POWER PLANT EMERGENCY ALERT SIRENS

DISCUSSION

The Federal Emergency Management Agency (FEMA) requires each utility to provide an alert system capable of warning Emergency Planning Zone (EPZ) residents of an emergency at a nuclear power facility. All three California utilities use outdoor siren systems to meet this requirement.

The FEMA requires utilities to conduct monthly and quarterly low volume tests, as well as annual complete-cycle tests of the system. Utilities advise EPZ residents of the date of complete-cycle tests, and advise the counties of the date of low-volume tests.

FINDING

- The Task Force finds that, even though the siren systems satisfy the FEMA's audibility specifications, some residents within the EPZ have not been able to hear the sirens during tests.

RECOMMENDATION

16. The Task Force recommends that the Office of Emergency Services (OES), in cooperation with the utilities and local jurisdictions, evaluate the adequacy of the FEMA's audibility requirements for nuclear power plant emergency alert sirens used in California. The OES should make recommendations to the utilities and FEMA on its findings by June 30, 1989.

F. EVACUATION ROUTES

DISCUSSION

Each emergency response plan has detailed provisions for the evacuation of Emergency Planning Zone (EPZ) residents. The California Highway Patrol (CHP) is responsible for developing and implementing procedures for evacuating persons on the state highways.

FINDINGS

- The Task Force finds that several designated evacuation routes are impassable under certain weather conditions.
- The Task Force finds that the current evacuation time assessments, at least for the Diablo Canyon EPZ, do not take into consideration impassable routes.
- The Task Force finds that an EPZ evacuation may place stresses on the transportation network of areas adjacent to EPZs.
- The Task Force finds that those living adjacent to EPZs may decide to evacuate during both perceived and actual nuclear power plant emergencies.

RECOMMENDATIONS

17. The Task Force recommends that the state and local law enforcement traffic flow plans for the EPZs and surrounding areas take into account the possibilities for flooding and other impediments to evacuation. These agencies should also designate alternative routes in the event primary routes are not passable.

18. The Task Force recommends that the Department of Transportation (DOT) provide funds to ensure that evacuation routes do not become flooded when there are no reasonable evacuation alternatives available.

19. The Task Force recommends that the DOT include within its criteria for funding repair and construction projects the need for adequate emergency evacuation routes.

20. The Task Force recommends that the state and local law enforcement agencies ensure that traffic flow plans for areas outside the EPZs adequately reflect the possible responses of the residents outside the EPZ to actual or perceived nuclear power plant emergencies.

G. LIABILITY IN EMERGENCY RESPONSE DECISIONS AND ACTIONS

DISCUSSION

In many emergencies, response authorities must make quick decisions in choosing between various response options. Even with utmost care by local governmental and law enforcement officials, decisions by these authorities could potentially lead to injury or damage to persons and property.

FINDING

- The Task Force finds that the threat of public liability should not be the driving force in guiding the emergency response decisions of authorities (e.g., recommending public evacuation).

RECOMMENDATION

21. The Task Force recommends that the Legislature enact legislation that limits (or eliminates) liability of public agencies, their officers, directors and agents, and all persons duly registered by any agency or any unregistered person duly impressed into service by any agency in the course of responding to a public emergency. Legal recourse to injured parties should be confined to statutorily defined remedies; liability sounding in tort for actual, general or exemplary damages sustained by persons injured or damaged as a consequence of emergency response actions should be eliminated, so long as the action taken was for the health and safety of the public at large. Such legislation, we believe, would ensure that emergency response decisions would be made in the public interest.

H. INTER-AGENCY AND INTER-JURISDICTIONAL COMMUNICATIONS CAPACITY

DISCUSSION

Communications systems are a critical component of emergency response plans. The systems provide the link between decision-makers and response personnel. The systems must maintain integrity throughout the course of an emergency. If one component of a system fails (e.g., a telephone) a back-up system should be available (e.g., a radio).

Utilities are required by the Nuclear Regulatory Commission (NRC) to notify local jurisdictions within 15 minutes of a major

nuclear power plant accident. The utilities can alert the local emergency communication centers through dedicated (i.e., direct) phone lines, the public telephone system, or two-way radios.

Each emergency plan has designated mobile response units which may be dispatched by local decision-makers through existing emergency radio frequencies. Mobile response units from several agencies may share responsibility for a particular emergency response function (for example, the California Highway Patrol (CHP), county sheriff department, and local police department may collaborate in guiding an evacuation). Individual mobile units do not have the capability to communicate with each other directly; messages must be relayed through a base station.

In addition to these more formal communication systems, emergency response authorities at the state and local level have lists of amateur radio operators that have volunteered to provide field assistance in a nuclear power plant emergency.

FINDINGS

- The Task Force finds that the communications systems might not be entirely redundant. For example, the Task Force is concerned that a major earthquake might incapacitate microwave relay towers, affecting both telephone and radio communication and computerized telephone switchboards, thereby potentially compromising the entire communication system.

- The Task Force finds that mobile response units should be able to monitor communications of units from other agencies so that each unit could be quickly informed of plan changes, implementation orders, and problems which may suddenly occur.

RECOMMENDATIONS

22. The Task Force recommends that the Office of Emergency Services (OES), in cooperation with local emergency response authorities and the utilities, periodically assess the integrity of the emergency communications systems for the three nuclear power plant emergency response plans. In particular, the OES should ensure adequate redundancy in the communications systems.

23. The Task Force recommends that the OES, in cooperation with the CHP and local law enforcement agencies, investigate options available for providing inter-agency and inter-jurisdictional communication capacity among mobile emergency response vehicles. In doing so, the OES should determine the feasibility, cost, and possible funding mechanisms for providing programmable scanners.

I. DEPARTMENT OF HEALTH SERVICES' COMMUNICATION CAPABILITY

DISCUSSION

In a nuclear power plant emergency, the Department of Health Services (DHS) is responsible for minimizing public exposure to radiation by interdicting the movement or sale of potentially harmful food and water. The DHS also is responsible for issuing public health advisories to limit the public's long-term radiation exposure.

In such an emergency, the DHS would need to be able to quickly respond to inquiries from elected officials, medical personnel, the media, and the public.

FINDING

- The Task Force finds that the DHS should be prepared to respond to the large number of inquiries the department likely will receive following a major nuclear power plant accident.

RECOMMENDATION

24. The Task Force recommends that the DHS develop and implement additional systems which would allow the Department to quickly disseminate public health information to local governments, physicians, communication media, and any other entities likely to need such information in a nuclear power plant emergency.

J. FOOD INTERDICTION

DISCUSSION

The U.S. Food and Drug Administration and the U.S. Environmental Protection Agency provide guidance to states with respect to safe levels of radiation in food and water. These federal agencies have established two levels of protective action guides (PAGs): preventive protective action guides (PPAGs) and emergency protective action guides (EPAGs).

In the event that food and water supplies are exposed to radiation from a nuclear power plant accident, the Department of Health Services (DHS) would be responsible for blocking distribution and consumption of the exposed products. The federal guidelines stipulate that food and water with levels of radiation above the EPAG's be blocked while levels below PPAGs be released. Release of food in the range between the EPAGs and PPAGs would be at the discretion of the Department. Based on the DHS's response in interdiction drills, it appears that the Department would choose to interdict foods if radiation levels approached the lower PPAG level.

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The federal government is currently working with other nations to establish international PAGs. The Task Force supports these efforts.

FINDING

- The Task Force finds that the State should be prepared to quickly assess the extent of food and water contamination in the aftermath of a major nuclear power plant accident.

RECOMMENDATION

25. The Task Force recommends that the DHS catalogue food interdiction resources within and available to the Department. The DHS should also assess the adequacy of these resources to measure radiation at levels consistent with both current federal PAGs and the PAGs recommended by international and national organizations such as the International Commission on Radiation Protection and the National Council on Radiation Protection.

CHAPTER 4

PUBLIC EDUCATION/INFORMATION

A. EMERGENCY INFORMATION MATERIALS

DISCUSSION

Utilities are required by the Nuclear Regulatory Commission to provide annual nuclear emergency information to homes and businesses within Emergency Planning Zones (EPZ)s. In addition, the State of California requires utilities to provide less detailed emergency information for Public Education Zones (PEZ)s. The PEZs extend to a 20-35 mile radius of the State's nuclear power facilities.

Utilities, in cooperation with local jurisdictions, send emergency information materials directly to homes and businesses. These materials include information on the Emergency Broadcast System, evacuation routes, and sheltering procedures.

Utilities provide nuclear power plant emergency information in telephone directories within the EPZ and the PEZ. In addition, San Onofre and Diablo Canyon send materials (a booklet and newsletter, respectively,) to each home and business within the PEZ.

The materials must convey information that citizens will take seriously while at the same time not raising undue fear about a nuclear power plant accident.

FINDINGS

- The Task Force finds that there was little citizen participation in the development of emergency information materials.

- The Task Force finds that the booklets would be enhanced if there were discussion of the negative consequences which may result from failing to follow recommended emergency procedures.

RECOMMENDATION

26. The Task Force recommends that the emergency information materials discuss the negative consequences which may result of members of the public choose not to follow recommended protective actions. The materials should specifically address:
    - Why one should not evacuate immediately upon activation of the outdoor siren system.
    - Why one should not call local authorities during the first stages of an emergency.

- Why one should not attempt to pick up children at school during an emergency.

B. EDUCATION OF MEDICAL COMMUNITY

DISCUSSION

During a major nuclear power plant emergency, an anxious public would likely turn to physicians for health information. However, it is likely that few physicians in the State of California are fully informed of the proper emergency response to such an accident.

FINDING

The Task Force finds that it is desirable for California physicians to have a basic understanding of emergency response to a nuclear power plant accident.

RECOMMENDATIONS

27. The Task Force recommends that the Department of Health Services or other appropriate state agency obtain and distribute to licensed physicians in California informational materials on radiation. The materials should include information on the nature and effects of radiation, potential sources of radiation release, the proper emergency procedures one should implement at each level of a radiation emergency, a glossary of terms, and sources where one may request additional information.

28. The Task Force recommends that, as part of the public education program undertaken by utilities, a tear-out/send-back form be provided on the EPZ and PEZ printed materials for physicians who wish to become better acquainted with the procedures they should recommend to their patients during a nuclear power plant emergency. Physicians who send in the form will be provided, by the utility, with more detailed information than provided the general public and/or given the opportunity to participate in seminars on the subject.

C. EMERGENCY BROADCAST SYSTEM

DISCUSSION

The Emergency Broadcast System (EBS) allows the President to advise the public during a national emergency. Federal law requires nearly every television and radio station in the country to have equipment capable of receiving EBS notification. While stations are not required to carry the President's message, nonparticipating stations must cease broadcasting while the President is on the air.

The EBS may also be used for broadcasting information during state and local emergencies; however, nonparticipating stations may continue regular programming during these emergencies. Emergency information materials advise the public to tune into listed EBS stations upon hearing the nuclear emergency alert sirens.

In a nuclear power plant emergency, a designated primary EBS station is notified by emergency response personnel in the local jurisdictions. The primary EBS station alerts other stations to activate their EBS and relays information to these other stations.

The Federal Government does not require EBS stations to participate in a nuclear power plant emergency exercises, although primary EBS stations sometimes do participate.

The Federal Government does not require a county which activates its EBS to inform surrounding counties of the action.

FINDINGS

- The Task Force finds that there is no assurance that stations will participate in the EBS during an emergency. To the extent that stations will not participate in the EBS, the chance that the public will be informed in an emergency is diminished.

- The Task Force finds that, since broadcast frequencies overlap jurisdictional boundaries, counties which activate their EBS should inform surrounding counties of the action.

RECOMMENDATION

29. The Task Force recommends that the State Senate memorialize the President and Congress to improve the operation of the Emergency Broadcast System for use in state or local nuclear power plant emergencies. The Senate's resolution should call on the federal government to:

    - Require stations within the EPZ who do not participate in the EBS to cease broadcasting upon activation of the EBS during state or local nuclear power plant emergencies.

    - Require primary EBS stations to participate in exercises of nuclear power plant emergency response plans.

    - Require regular training for EBS station staff and emergency officials charged with providing status updates to EBS stations.

- Provide maintenance of EBS equipment.

- Require counties who activate their EBS to inform surrounding counties of the action.

- Provide appropriate funding for the above.

D. PUBLIC EDUCATION

DISCUSSION

The Task Force believes that it is desirable for the general public to understand the nature and effects of nuclear power and other technological risks in our society. Lack of knowledge in these issues may lead to scientific illiteracy, ignorance, and fear.

FINDING

- The Task Force finds that little instruction about radiation and other technological issues currently takes place within California schools.

RECOMMENDATION

30. The Task Force recommends that the State provide instruction on radiation and other technological issues to students in California schools.

E. THE ROLE OF CITIZENS IN NUCLEAR EMERGENCY PLANNING

DISCUSSION

The viability of the plans depends upon the public's trust in authorities who will be directing emergency operations. The public is more inclined to cooperate with the recommendations of emergency planners when citizens see the planners as credible authorities.

FINDINGS

- The Task Force finds that emergency response plans do not adequately address how the public would behave during a nuclear power plant emergency.

- The Task Force finds that the public does not have sufficient input into the emergency planning process. While the public is allowed to send comments to the appropriate government and utility authorities, there is no official forum for the public to comment on and suggest changes to the emergency plan. The lack of public input may decrease the public's confidence in the plan, as well as prevent legitimate flaws in the plan from being addressed by emergency planners.

- The Task Force finds that the utilities lack credibility in the eyes of many residing within the EPZs. This is due, in part, to a dilemma the utility faces: the utility must produce materials which are strong enough to warrant the attention of nearby residents as to the potential effects of an accident while at the same time not raising unwarranted fears about plant safety.

RECOMMENDATION

31. The Task Force recommends that the Legislature establish a Citizens' Advisory Committee on Nuclear Emergency Planning. The Task Force believes that the Committee should be an independent, ongoing forum for citizens to have input into nuclear emergency planning. The Committee should have the following responsibilities:

    - Assessing whether emergency information materials convey information and recommendations that the public will be inclined to follow in an emergency.
    - Soliciting and receiving, on a regular basis, public comment regarding the adequacy of nuclear power plant emergency response plans.
    - Assessing the validity of assumptions in nuclear emergency response plans that are related to citizen response (e.g., is it a valid assumption that the public will not evacuate unless told to do so by authorities?)
    - Examining and making recommendations regarding citizen participation in nuclear emergency response plan exercises.
    - Assessing whether efforts should be made to provide emergency information to non-English-speaking populations within the EPZ.
    - Assessing the need for additional information for special response personnel such as bus drivers and teachers.
    - Providing an annual report to the Office of Emergency Services and the Legislature with recommendations on how the emergency plans can be improved.

    The Task Force believes that the Committee should ideally have no more than 9 members. The Governor should appoint one member who is an employee of a utility which operates a nuclear power facility, one member who is an expert in the field of risk communication, and one public member that

resides in the San Onofre EPZ. The Senate Rules Committee should appoint one member who is a medical expert familiar with radiation emergency procedures, one member from a local government jurisdiction which participates in the development and implementation of nuclear emergency response plans, and one public member who resides in the Diablo Canyon EPZ. The Speaker of the State Assembly should appoint a member from a known environmental organization familiar with radiation issues, a public member who resides in the Rancho Seco EPZ, and one public member of the Speaker's choice.

While the Committee's recommendations should be accorded serious consideration by the OES and the Legislature, the Committee should not have the authority to prevent emergency planning materials from being distributed.

The Committee should receive reimbursement for expenses and adequate support staff from the State.

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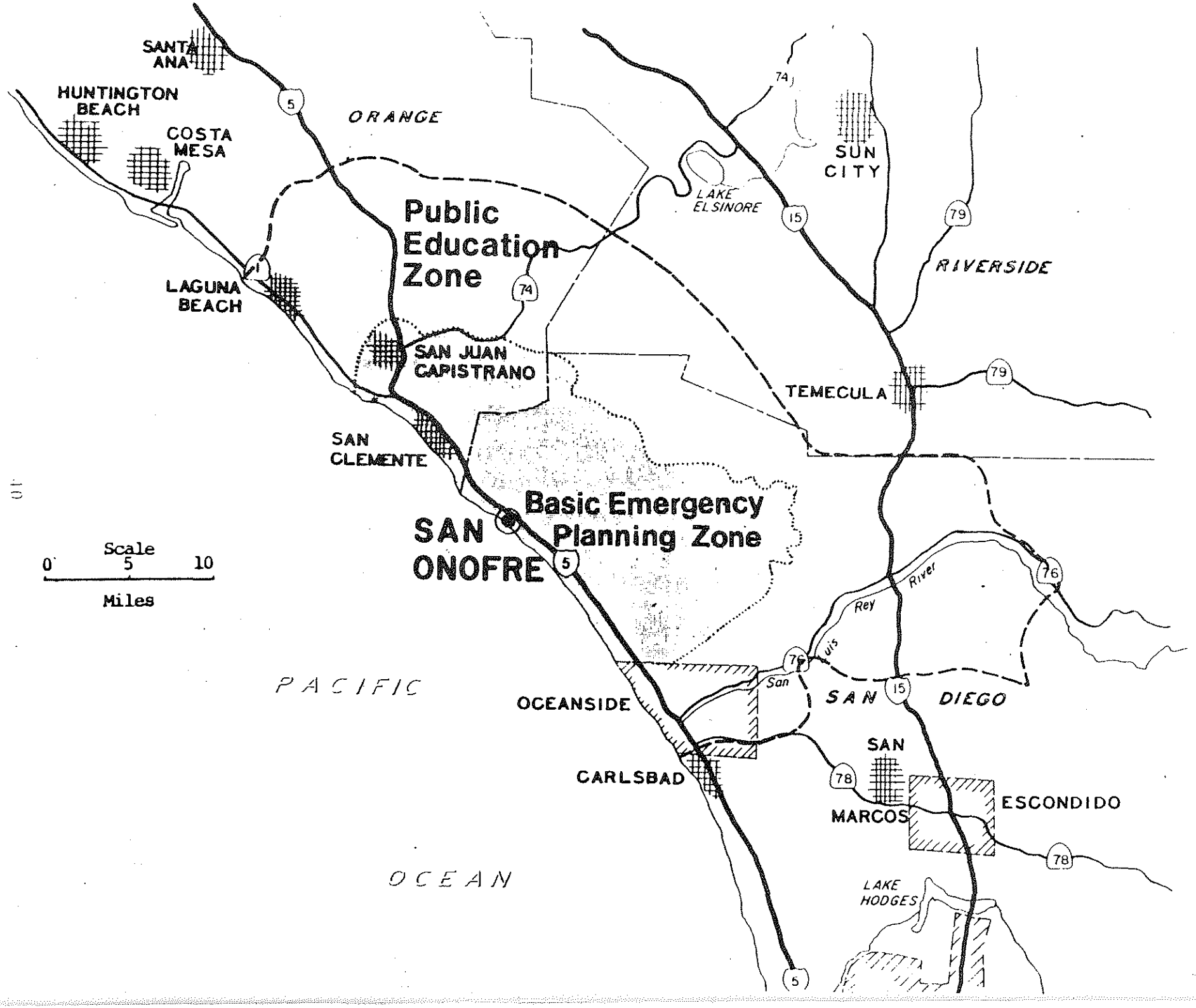
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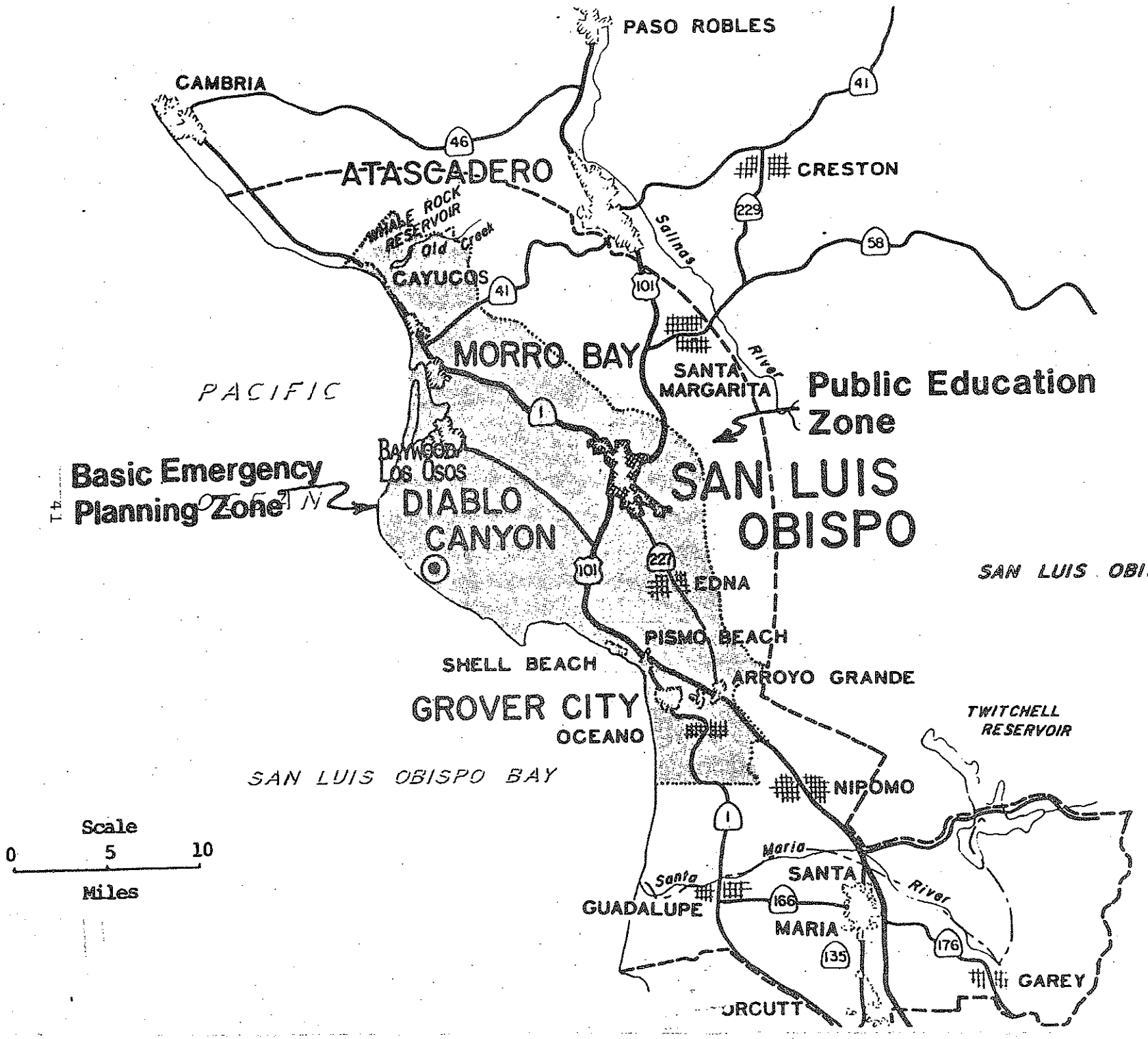
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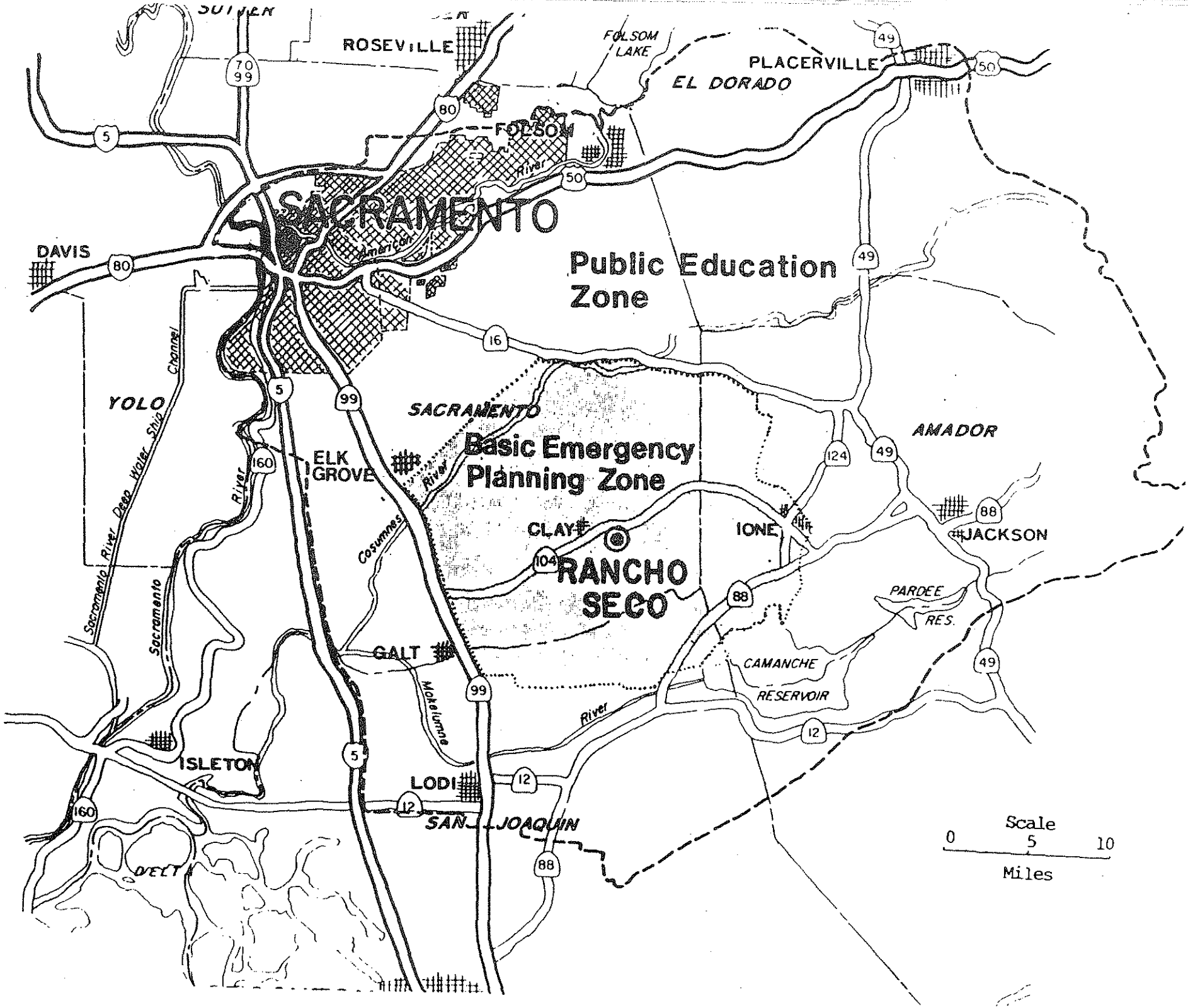
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APPENDIX

MAPS OF THE EMERGENCY PLANNING ZONES


SANTA ANA
HUNTINGTON BEACH
COSTA MESA
ORANGE
LAGUNA BEACH
Public Education Zone
SAN JUAN CAPISTRANO
SAN CLEMENTE
Basic Emergency Planning Zone
SAN ONOFRE
LAKE ELSINORE
SUN CITY
RIVERSIDE
TEMECULA
Scale
0 5 10
Miles
PACIFIC
OCEANSIDE
CARLSBAD
SAN DIEGO
SAN MARCOS
ESCONDIDO
LAKE HODGES
OCEAN
Rey
River
San Luis
5
15
74
76
78
79


PASO ROBLES
CAMBRIA
ATASCADERO
CRESTON
WHALE ROCK RESERVOIR
Old Creek
CAYUCOS
Salinas
MORRO BAY
SANTA MARGARITA
River
PACIFIC
Public Education Zone
Basic Emergency Planning Zone
Baywood Los Osos
DIABLO CANYON
SAN LUIS OBISPO
SAN LUIS OBISPO
EDNA
PISMO BEACH
SHELL BEACH
ARROYO GRANDE
GROVER CITY
OCEANO
TWITCHELL RESERVOIR
SAN LUIS OBISPO BAY
NIPOMO
Scale
0 5 10
Miles
Maria
Santa
SANTA MARIA
River
GUADALUPE
MARIA
GAREY
ORCUTT
46
41
229
58
101
1
227
166
135
176


ROSEVILLE
FOLSOM LAKE
PLACERVILLE
EL DORADO
FOLSOM
SACRAMENTO
DAVIS
Public Education Zone
YOLO
Deep Water Ship Channel
SACRAMENTO
Basic Emergency Planning Zone
AMADOR
ELK GROVE
CLAY
IONE
JACKSON
RANCHO SECO
PARDEE RES.
CAMANCHE RESERVOIR
GALT
ISLETON
LODI
SAN JOAQUIN
DELTA
Scale
0 5 10
Miles