HOUSTON LIGHTING & POWER COMPANY
ALLENS CREEK NUCLEAR GENERATING STATION - UNIT NO. 1
PRELIMINARY SAFETY ANALYSIS REPORT
AMENDMENT NO. 55
INSTRUCTION SHEET

This amendment contains information which is submitted to clarify the applicants position with regard to Emergency Planning. Each revised page bears the notation Am. No. 55, 1/9/81 at the bottom of the page. Vertical bars with the number 55 representing Amendment No. 55 have been used in the margin of the revised pages to indicate the location of the revision on the page. Vertical bars have not been used in the margins of Appendices 13.3A and 13.3B as these Appendices are being included for the first time.

The following page removals and insertions should be made to incorporate Amendment No. 55 into the PSAR.

CHAPTER 13

Remove (Existing Pages)	Insert (Amendment No. 55 Pages)
1*	1*
3*	3*
4*	4*
ii	ii
iii	iii
-	iiia
-	iiib
iv	iv
13.3-1 thru 42	13.3-1 thru 35
13.3-42a	-
13.3-43 and 44	-
-	APPENDIX 13.3A
-	13.3A-1 thru 13.3A-16
-	APPENDIX 13.3B
-	13.3B-i thru 13.3B-v
-	13.3B-1 thru 13.3B-49
-	A-i
-	A-1
-	B-i
-	B-1 thru B-7
-	C-i
-	C-1 and C-2

Included is an additional ACNGS-PSAR binder, which is to be retained by those individuals/organizations possessing copies of the ACNGS-PSAR.

*Effective Pages/Figures Listings

ACNGS-PSAR
LIST OF EFFECTIVE PAGES
CHAPTER 13
CONDUCT OF OPERATIONS

Page	Amendment
1*	55
2*	48
2a*	48
3*	55
4*	35
5*	48
i	33
ii	55
iii	55
iiia	55
iiib	55
iv	55
v	33
13.1-1	33
13.1-2	46
13.1-3	48
13.1-4	46
13.1-5	46
13.1-6	46
13.1-7	46
13.1-8	46
13.1-9	48
13.1-10	48
13.1-11	48
13.1-11a(deleted)	46
13.1-12	48
13.1-12a	48
13.1-12b	48
13.1-13	33
13.1-13a	33
13.1-14	33 (deleted)
13.1-15	33 (deleted)
13.1-16	33 (deleted)
13.1-16a	33 (deleted)
13.1-17	33 (deleted)
13.1-17a	33 (deleted)
13.1-18	33 (deleted)
13.1-19	33 (deleted)
13.1-19a	33 (deleted)
13.1-20	33 (deleted)
13.1-21	33 (deleted)
13.1-22	33 (deleted)
13.1-23	33 (deleted)
13.1-24	33 (deleted)
13.1-24a	33 (deleted)
13.1-25	33 (deleted)
13.1-26	33 (deleted)

*Effective Pages/Figures Listing

LIST OF EFFECTIVE PAGES (Cont'd)

CHAPTER 13

Page	Amendment
13.2-1	42
13.2-1a	42
13.2-2	33
13.2-3	33
13.2-4	45
13.2-4a	42
13.2-5	33
13.2-6	42
13.2-7	33
13.2-8	33
13.3-1	55
13.3-2	55
13.3-3	55
13.3-4	55
13.3-5	55
13.3-6	55
13.3-7	55
13.3-8	55
13.3-9	55
13.3-10	55
13.3-11	55
13.3-12	55
13.3-13	55
13.3-14	55
13.3-15	55
13.3-16	55
13.3-17	55
13.3-18	55
13.3-19	55
13.3-20	55
13.3-21	55
13.3-22	55
13.3-23	55
13.3-24	55
13.3-25	55
13.3-26	55
13.3-27	55
13.3-28	55
13.3-29	55
13.3-30	55
13.3-31	55
13.3-32	55
13.3-33	55
13.3-34	55
13.3-35	55

LIST OF EFFECTIVE PAGES (Cont'd)

CHAPTER 13

Page	Amendment
13.3A-1 thru 13.3A-16	55
i-v (Appendix 13.3B)	55
1-49 (Appendix 13.3B)	55
A-i	55
A-1	55
B-i	55
B-1 thru B-7	55
C-i	55
C-1 and C-2	55
13.4-1	33
13.5-1	16
13.6-1	16
13.7-1	33
13.7-2	33
13.7-3	33
13.7-4	33

TABLE OF CONTENTS (Cont'd)

(U)-Update
Am. No. 55, (1/81)

TABLE OF CONTENTS (Cont'd)

55

TABLE OF CONTENTS (Cont'd)

(C)-Consistency
Am. No. 55, (1/81)

TABLE OF CONTENTS (Cont'd)

(C)-Consistency
Am. No. 55, (1/81)

LIST OF TABLES

13.3 EMERGENCY PLANNING

13.3.1 INTRODUCTION

This section describes the preliminary plans for responding to emergencies at the Allens Creek Nuclear Generating Station, Unit 1 (ACNGS) in accordance with recently revised 10CFR50 Appendix E. Detailed plans will be provided in the Final Emergency Plan as part of the Final Safety Analysis Report.

The purpose of this section is to provide reasonable assurance, by means of describing preliminary plans, that adequate final emergency plans can be developed and that these preliminary plans are compatible with the ACNGS facility and its location.

The overall objective of emergency planning for the ACNGS will be to provide dose savings for a wide spectrum of postulated accidents that could produce offsite doses in excess of Protective Action Guides. Planning will include a wide range of protective actions designed to prevent or mitigate the potential consequences of an accident. Protective actions will range from simple notification of certain offsite organizations that an Unusual Event is taking place or has occurred to the full activation of offsite organizations and evacuation of the public in the event of a General Emergency.

The ACNGS Final Emergency Plan will be part of an overall coordinated emergency response plan involving Federal, State and local emergency response organizations. State and local emergency plans approved by the Nuclear Regulatory Commission will be in place prior to operation of the ACNGS. Emergency planning for the ACNGS will include, but not be limited to, the following important elements. 55

1) The establishment of Emergency Planning Zones (EPZ) for the plume exposure and the ingestion pathways.

2) The use of emergency action levels to determine the need for notification and emergency response. These action levels will be based on plant and offsite conditions which would indicate potential or actual hazards.

3) The use of the same event classification system by Federal, State and local organizations and the licensee.

4) The administrative and physical means to promptly notify and instruct the public and appropriate Federal, State and local emergency response organizations.

5) The establishment of emergency facilities and equipment to assess and monitor an accident and to carry out protective measures and recovery operations.

6) A program to disseminate to the public information about how they will be notified in the event of an accident and what protective actions might be taken.

7) A comprehensive program to provide scheduled training to appropriate employees of the licensee and to persons associated with offsite organizations whose assistance may be needed in the event of an emergency.

8) Provisions for conducting drills and exercises to thoroughly test the preparedness of Federal, State and local organizations and Houston Lighting & Power Company (HL&P).

9) Agreements with offsite organizations to provide a wide range of services that may be needed to augment the HL&P organization.

Emergency planning for the ACNGS will include detailed planning for evacuation of the public within the plume exposure EPZ (i.e., within about 10 miles). Adequate egress routes which will facilitate timely evacuation of the plume exposure EPZ in the event such action is deemed necessary have already been identified. A preliminary study has been performed which verifies the feasibility of conducting timely evacuation of the public within all sectors of the plume exposure EPZ. This study, which is provided as Appendix 13.3B to this section, takes into consideration present and projected populations, adverse weather conditions, transient populations and special facilities.

13.3.2 EMERGENCY ORGANIZATION

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The organization for responding to emergencies at the ACNGS will initially consist of the on-duty operating staff, will be augmented by off-duty plant and other designated HL&P personnel and Federal, State and local response organizations. This organization may also be augmented by additional offsite resources and support. A major objective of emergency planning for the ACNGS will be to ensure that responsibilities are unambiguously defined, that adequate staffing is maintained, and that timely augmentation of response and recovery capabilities is available. The final ACNGS Emergency Plan will describe in detail the emergency response and recovery organization, its functions, responsibilities and authority.

13.3.2.1 Onsite Emergency Organization

The ACNGS plant organization for normal operations will be trained and qualified to adequately respond to a wide spectrum of emergency conditions. The minimum shift crew will consist of a sufficient number of qualified personnel to perform at least the following functions:

- Plant system operations
- Accident assessment
- Notifying and communicating with offsite organizations

- Inplant and near-site radiological monitoring
- Offsite dose projections
- Decontamination
- First aid
- Fire fighting
- Rescue operations
- Damage control and minor repair
- Security
- Personnel accountability
- Record keeping

Houston Lighting & Power Company will establish an onsite emergency response organization, under the direction of an Emergency Director, capable of responding to an emergency situation. The personnel comprising the onsite emergency organization may be from the plant or site staffs, from the HL&P corporate organization, or from outside organizations with whom HL&P has made prior arrangements. These personnel and their alternates will be either onsite or on call continuously for the duration of the emergency.

The ACNGS emergency organization under the direction of an Emergency Director will consist, as a minimum, of persons capable of functioning in the following areas:

- Plant operations
- Technical support
- Operations support
- Radiation protection
- Public affairs
- Administrative and logistics support

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The functions are discussed further in the following sections. In addition, personnel in such areas as maintenance, security, quality assurance, engineering and construction may be called upon by the Emergency Director to respond. The offsite personnel can be available at the ACNGS within eight hours following the initiation of response activities. The final ACNGS Emergency Plan will describe in detail the onsite emergency organization.

13.3.2.1.1 Emergency Director

The Emergency Director is the designated individual in charge of all accident mitigation efforts at the site. Other individuals will be designated as alternates to provide relief for the Emergency Director.

An Operating Supervisor, who is on duty in the plant at all times, is the individual in the immediate position of authority who has responsibility for safe plant operation. The Operating Supervisor is responsible for the initial evaluation of abnormal or emergency conditions and for initiating response efforts. Upon the occurrence of an event which indicates an actual or potential emergency situation, the Operating Supervisor will immediately

assume the role of Emergency Director. The Emergency Director will classify the event, initiate appropriate emergency actions, implement emergency procedures as necessary, and notify appropriate organizations and personnel. Emergency procedures will detail the specific actions to be taken by the Emergency Director. In the event that the Operating Supervisor is incapacitated, the immediate role of the Emergency Director will assumed by the Watch Supervisor Nuclear.

The Operating Supervisor will fill the role of Emergency Director until properly relieved by that individual designated to serve as Emergency Director through the remainder of accident response activities. HL&P presently anticipates that this individual will be the Plant Superintendent.

13.3.2.1.2 Plant Operations

The control of plant systems during an accident will be performed in the control room. During an accident, full shifts of appropriately trained and licensed personnel will occupy the control room.

13.3.2.1.3 Technical Support

An onsite Technical Support Center (TSC) will be established at the ACNGS to provide technical support and recommendations regarding emergency actions. The TSC will be staffed with personnel qualified in the areas of reactor engineering, thermal hydraulics, mechanical engineering, instrumentation and control, chemistry, radiochemistry, overall plant design and engineering, and electrical systems. A TSC Supervisor will be designated to direct the activities of the TSC staff. The TSC staff will be available to occupy the TSC within two hours of notification. HL&P anticipates that NRC representatives will be present in the TSC during the course of an accident. 55

13.3.2.1.4 Operations Support

An onsite Operations Support Center (OSC) will be established at the ACNGS as an assembly area for plant support personnel. Personnel assigned to the OSC will have expertise in at least the areas of plant chemistry, electrical systems, mechanical systems, instrumentation and control and health physics. An OSC coordinator will be designated to coordinate the activities of the individuals assembled at the OSC.

13.3.2.1.5 Radiation Protection

A Radiation Protection Manager (RPM) will have responsibility for directing the activities of plant and near-site radiation monitoring teams, performing radiological assessments and reviewing results and findings. The RPM will communicate with and coordinate activities with the offsite Radiological Emergency Manager.

The Radiological Emergency Manager (REM) will be responsible for directing the activities of offsite radiological monitoring teams, performing offsite dose calculations and projected dose estimates and reviewing results and findings. The REM will represent Houston Lighting & Power Company in interfacing with other agencies performing offsite monitoring. The REM will communicate with and coordinate activities with the onsite Radiation Protection Manager and operations personnel in order to be kept knowledgeable of the plant status.

13.3.2.1.6 Public Affairs

Houston Lighting & Power Company will designate a spokesperson to interface with news media personnel, release public information and interface with spokespersons of other response organizations. The HL&P spokesperson and alternates will be trained in conducting news media briefings and public speaking. Public Affairs personnel will have direct communications with the plant in order to be kept knowledgeable of the plant status.

13.3.2.1.7 Administrative and Logistics Support

If requested by the Emergency Director, designated HL&P personnel will be called into service, to perform activities in the areas of purchasing, stores, insurance claims, accommodation and commissary needs, clerical help, transportation, finance, human resources, communications and other logistics requirements. Furthermore, the entire HL&P organization will provide, at the request of the ACNGS Emergency Director, all available manpower, equipment and facilities to assist in responding to the emergency.

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13.3.2.2 Recovery Organization

As plant systems become stabilized and any consequences of an accident are mitigated, accident response gradually changes to accident recovery. Activities associated with recovery could take place over a long period of time and could involve a wide range of support and resources. Furthermore, recovery activities could very well begin before emergency response has terminated.

13.3.2.2.1 Recovery Manager

In the event recovery activities are required following an accident at the ACNGS, a designated HL&P individual, with alternates, will assume the role of Recovery Manager who will be in overall charge of these activities. The Recovery Manager will be an individual with the authority, experience and technical expertise to manage recovery and reentry activities.

The recovery organization, under the direction of the Recovery Manager, will consist, as a minimum, of persons capable of functioning in the following areas:

- Technical support management
- Site support management
- Radiological support management
- Public affairs support management
- Administrative support management

These functions are discussed further in the following sections. The final ACNGS Emergency Plan will describe in detail plans for recovery and reentry operations.

13.3.2.2.2 Technical Support Management

A technical support staff will be assigned to support recovery operations. This staff will consist of HL&P personnel and may include personnel from the reactor vendor, the Architect-Engineer and Constructor, and other support organizations. The technical support staff is expected to contain personnel with expertise in the following areas:

- Transient analysis and system interaction
- Nuclear engineering and fuel management
- Core physics, design and control
- Electrical power systems
- Process computers
- Instrumentation and control systems
- Refueling
- Engineering mechanics of systems and components
- Thermal-hydraulics
- Plant structural and containment design
- Metallurgy

13.3.2.2.3 Site Support Management

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A staff composed of plant personnel will be assigned the function of providing liaison between the site and the recovery team in order to minimize the number of organizations and individuals communicating directly with the site. The site support staff is expected to contain personnel with expertise in the following areas:

- Plant operations and maintenance
- Radiation control and health physics
- Radwaste management
- Decontamination
- Radiochemistry and chemical engineering
- Fire protection

13.3.2.2.4 Radiological Support Management

Radiological support to recovery operations will be provided by the Radiological Emergency Manager, whose activities and responsibilities are described in Section 13.3.2.1.5.

13.3.2.2.5 Public Affairs Support Management

Personnel will be assigned to provide public affairs support to recovery operations by preparing and disseminating public information and interfacing with the news media.

13.3.2.2.6 Administrative Support Management

Personnel will be assigned to provide necessary administrative and logistics support to recovery activities. Specific support activities are essentially the same as those provided to the Emergency Director and are described in Section 13.3.2.1.7.

13.3.2.3 Offsite Government Agencies

A major element of ACNGS emergency planning will be the mutually supportive role of Federal, State and local response organizations. A wide range of support and resources are available from each of these levels of government to assist HL&P in ACNGS emergency response and recovery operations.

13.3.2.3.1 Federal Agencies

The following Federal agencies are available to provide support to HL&P in the event of a serious accident at the ACNGS: 55

a) Nuclear Regulatory Commission (NRC)

If called upon to support emergency response at the ACNGS, NRC operations in and around the plant will be managed by the Regional Director of the NRC's Region IV office in Arlington, Texas. The NRC's role will include monitoring the event, independently evaluating the emergency and providing technical advice and assistance to HL&P if requested or required. The Regional Director will be supported by the NRC Operations Center in Bethesda, Maryland. A letter of agreement/understanding with NRC Region IV is provided in Appendix 13.3A.

b) Department of Energy (DOE)

The DOE will provide radiological environmental surveying and monitoring support through its Radiological Assistance Program (RAP) and the Federal Interagency Radiological Assistance Plan (IRAP). A letter of agreement/understanding with DOE is provided in Appendix 13.3A.

c) Other Agencies

A variety of emergency resources are available from such agencies as the Environmental Protection Agency, the Department of Health and Human Services, the Federal Emergency Management Agency (FEMA), the Bureau of Radiation Health and national laboratories. The role of Federal agencies is to be defined in a national contingency plan presently under development by FEMA. In the final ACNGS Emergency Plan, HL&P will provide a detailed description of the role of Federal agencies, as well as any necessary letters of agreement/understanding.

13.3.2.3.2 State Agencies

In the State of Texas, State-level response to any type of emergency is the responsibility of the Governor's Division of Disaster Emergency Services. These responsibilities are carried out by the Disaster Emergency Services Council (DESC), which is presently composed of representatives from 33 major State agencies. By gubernatorial appointment, the Director of the Texas Department of Public Safety (DPS), an agency represented on the DESC, chairs the DESC.

The DPS operates several district offices throughout the State. In the event of an emergency in a district, State response would be managed from the district office through its District Disaster Committee (DDC). The DDC is composed of field representatives from each of the State agencies represented on the State's DESC. The DPS District Commander chairs and directs the DDC. 55

In the event of an emergency at the ACNGS requiring the notification of State agencies, the DPS District Office in Houston, Texas will be the first agency contacted and the DDC will be activated if necessary. If greater State response were required, the DESC in Austin, Texas will be activated. The DESC operates from the State Emergency Operations Center (EOC) in the DPS headquarters in Austin, Texas. Although as many as 33 State agencies could be called upon to respond to an emergency, the primary agencies with respect to the ACNGS are the Texas Department of Health, the Department of Public Safety, and the Texas Parks and Wildlife Department.

The response of State agencies will be detailed in the State Emergency Plan and Standard Operating Procedures which will be approved by the NRC and FEMA prior to commercial operation of the ACNGS.

a) Texas Department of Health

The Texas Department of Health, Division of Occupational Health and Radiation Control (OH & RC), is the lead State agency for coordination of State response to a radiological emergency. Support activities of the OH & RC include environmental surveying and monitoring, dose assessment, dose projections, health physics, State public affairs onsite, and recommending protective actions. Representatives from OH & RC will operate onsite in the event of a

serious accident at the ACNGS. The OH & RC is also responsible for preparation of State emergency plans for fixed nuclear facilities and for coordinating the State's involvement in exercises, drills and radiological training. A letter of agreement/understanding from the OH & RC is provided in Appendix 13.3A.

Other divisions within the Texas Department of Health are available to provide such services as the coordination of medical services and the control of foodstuffs, milk and crops.

b) Texas Department of Public Safety

The Texas Department of Public Safety (DPS), through its district offices and headquarters, is responsible for the overall management of the State's response to emergencies. In addition, the DPS is responsible for coordinating State communications, public information (offsite), law enforcement, traffic control and transportation.

c) Texas Parks and Wildlife Department

The Allens Creek Lake and State Park will be operated by the Texas Parks and Wildlife Department (TP & WD). Two TP & WD attendants will be assigned to the park, with at least one of them present in the park at all times. During the day, tollgate attendants and maintenance and groundskeeping personnel will also be present in the park. The on-duty park attendants will receive all emergency notifications from the plant and are responsible for directing park evacuation. 55

13.3.2.3.3 Local Agencies

In the State of Texas, the County Judge has the ultimate authority for emergency operations within each county. The County Judge is the local official responsible for authorizing emergency response and protective actions. Emergency response and protective actions are implemented under the direction of the County Sheriff.

The ACNGS is located in Austin County, Texas with the plume exposure Emergency Planning Zone (about 10 miles) extending into portions of Fort Bend, Wharton, Colorado and Waller Counties. The Austin County Sheriff's Department is the primary local response agency for the ACNGS and will provide, as a minimum the following support services:

- A major communications link between the ACNGS and participating State and local organizations
- Receive initial emergency notification (a dispatcher is on duty 24 hours)
- Activate public alert systems

- Implement protective actions

- Traffic control and law enforcement

Letters of agreement/understandig with the five County Sheriff's Departments of the counties affected by the plume exposure EPZ are provided in Appendix 13.3A.

Approximately four miles from the site of the ACNGS is the city of Wallis, Texas. Due to their proximity to the site, it is quite likely that the first on-scene response personnel will be the resident Deputy Sheriff in Wallis, the Wallis police or Wallis Volunteer firemen who will have been notified by the County Sheriff. These personnel would most likely be the first to implement offsite protective measures. Letters of agreement/understanding with the Wallis Police Department and Wallis Volunteer Fire Department are provided in Appendix 13.3A.

Other services available at the local level include rescue, ambulance service, medical treatment, shelter and transportation. Local emergency plans detailing specific local response activities will be prepared and approved by the NRC before the ACNGS begins commercial operation.

13.3.2.4 Additional Support and Resources

HL&P will make arrangements with other organizations and individuals which can be relied upon to provide assistance in an emergency. These may include, but are not limited to, the following: 55

- Laboratories - e.g., analytical analysis of monitoring samples

- Universities - e.g., technical and medical consultation, laboratory services, computer services

- Equipment suppliers - e.g., filters, shielding, system components

- Consultants - e.g., engineering analysis, health physics services

- Other utilities - e.g., personnel, spare parts, equipment

- Industry organizations - e.g., Institute for Nuclear Power Operations (INPO), Nuclear Safety Analysis Center (NSAC)

Agreements with outside organizations for support and resources will be described in the final ACNGS Emergency Plan.

13.3.2.5 Planning Responsibility

Houston Lighting & Power Company, the State of Texas and local counties presently have qualified personnel assigned responsibility for the development of fixed nuclear facility emergency plans. The final ACNGS Emergency Plan, and the State and local plans approved by the NRC and FEMA, will describe those persons responsible for maintaining, reviewing, distributing and updating applicable emergency plans. HL&P will ensure that these responsibilities are executed.

13.3.3 EMERGENCY CLASSIFICATION SYSTEM

Emergency conditions at ACNGS will be classified into four categories which will cover the entire spectrum of probable and postulated accidents. The four classes will be:

Unusual Event
Alert
Site Area Emergency
General Emergency

The Unusual Event and Alert categories are intended to provide early and prompt notification to the onsite and offsite emergency response organizations (see Section 13.3.2) that minor events have occurred or are in progress which could lead to more serious consequences if the plant status is in some way further complicated or which might be indicative of more serious conditions which are not yet fully realized. The Site and General Emergency categories are intended for more severe situations, which indicate that significant offsite effects are likely and require immediate action from both onsite and offsite emergency response organizations. The identification of a Site or General emergency should be assessed as quickly as possible and steps taken to mitigate the event and its effects and returning the plant to a safe status. 55

The decision to declare a particular emergency class is the responsibility of the Operating Supervisor at ACNGS, as Emergency Director. His decision will be based, to the extent feasible, on readily available information about plant and offsite conditions which would indicate potential or actual hazards. The final ACNGS Emergency Plan will specify the criteria for declaring each emergency classification, as well as the provisions for upgrading the classification level and the corresponding response in the event of change of severity of the emergency condition.

13.3.3.1 Unusual Event

Events within the Unusual Event class will represent off-normal conditions in and around the plant. These events will not, by themselves, constitute

significant emergency conditions and will have no offsite radiological consequences. Some of these events could, however, indicate a potential degradation in the level of plant safety and/or could escalate to a more severe condition if appropriate onsite action is not taken.

The primary purpose of notifying offsite agencies of an Unusual Event is to put the offsite response organization on standby, provide them with current information and provide unscheduled testing of the offsite communication link. An Unusual Event classification would initiate the augmentation of the onsite response resources to assist in the assessment and mitigation of the event. Recommendations will specify that no offsite actions are necessary.

13.3.3.2 Alert

Events within the Alert class will indicate an actual or potential degradation in the level of plant safety. The purpose of declaring this emergency class will be to assure that offsite emergency personnel and monitoring teams are ready to respond if needed. This class may also serve as an unscheduled test of the activation of the onsite and offsite emergency response facilities and the related communication systems. The response of offsite agencies will be to bring key elements of the emergency response organization into standby status, including offsite monitoring teams.

This class of emergency will also initiate the activation of the Technical Support Center and the Operations Support Center. The near-site Emergency Operations Facility will be brought to standby status.

In addition to the manning of the onsite response facilities, this emergency class might require that radiological and meteorological assessments be made and reported to the offsite agencies. No public action would be recommended in this emergency class. As a precautionary measure, visitors to the Allens Creek Lake and State Park will be evacuated. 55

13.3.3.3 Site Area Emergency

Events within the Site Area Emergency class involve actual or probable major failures of plant functions needed for protection of the public. The purpose of declaring the Site Area Emergency class is to assure the manning of all emergency response facilities, the dispatching of monitoring teams and the assembling of personnel required for evacuation if such action becomes necessary. Declaration of this emergency class will also be used as a means of informing the offsite agencies and the public that significant events are taking place. The response of offsite agencies following such a declaration will be to consider implementing protective actions and to assess information

from ACNGS and offsite monitoring teams. Protective action might include notification of the public within the 10-mile EPZ and instructions to seek shelter or evacuate. Meteorological conditions and dose estimates will be made and provided to the offsite agencies. Assessment of plant safety and release projections will be compiled for use in consultation with offsite agencies.

13.3.3.4 General Emergency

Events within the General Emergency class involve actual or imminent substantial core degradation or melting, with potential loss of containment integrity and/or releases of large quantities of radioactive material to the environment. The purpose of declaring the General Emergency class is to initiate predetermined protective actions for the public and additional measures as indicated by event releases or potential releases and to provide continuous assessment and information on events to offsite agencies. Upon declaration of this emergency class, all local, State and Federal response organizations will be fully activated. These agencies will use onsite assessments and dose estimates, in addition to offsite monitoring data, to implement the necessary protective actions. Public notification will be recommended. Protective actions might include instructions to seek shelter, the evacuation of persons within the 10-mile EPZ, and/or the distribution of thyroid-protective drugs.

The declaration of the General Emergency class will require that all of the ACNGS emergency response facilities be manned, appropriate onsite protective actions be taken and monitoring teams be dispatched. Meteorological conditions and dose estimates will be provided to the offsite agencies. Assessments of plant safety and release projections will be compiled for use in consultation with offsite agencies. 55

13.3.4 NOTIFICATION AND COMMUNICATION

Notification is the initial contact of response organizations and/or the public by the ACNGS, either directly or through another organization, which alerts these organizations and/or the public that an event has occurred at the plant which indicates an actual or potential emergency condition. The notification process proceeds promptly, is of short duration and transmits a brief, but essential, amount of information. Notification is followed by messages providing more information, instructions to the public and/or specific recommendations.

Emergency planning for the ACNGS will include provisions for the prompt notification of appropriate HL&P, State, local and Federal response personnel and organizations by the ACNGS. Sufficient communication capabilities, including backup systems, will be in place to effect prompt notification of all response organizations. Plans and procedures will be established with respect to primary contact within response organizations and means of contact, backup communications, the content of initial and follow-up messages and

message authentication. HL&P will work with appropriate State and local agencies to ensure that the physical and administrative means are in place to provide early and understandable warnings and instructions to the population within the plume exposure Emergency Planning Zone. Specific notification means, methods and procedures will be described in the final ACNGS Emergency Plan.

13.3.4.1 Unusual Event

HL&P anticipates that most emergency situations in the classification "Unusual Event" (See Section 13.3.3) can be handled by the on-shift plant personnel. For this class of event, the Emergency Director (See Section 13.3.2) will notify, on a timely basis, the following organizations:

- Texas Department of Public Safety
- Austin County Sheriff's Department
- Appropriate off-shift plant personnel
- NRC Region IV
- HL&P headquarters
- Texas Parks and Wildlife Department attendant (in the park)

In the event the emergency is solely a personnel injury not involving radioactive contamination, the Emergency Director will notify the Austin County Ambulance Corps. If the event involves fire, the Wallis Volunteer Fire Department will be notified. In both of the latter events, notification will be made to the Austin County Sheriff's Department.

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13.3.4.2 Notification of Alert

For the Alert class of emergency, the Emergency Director will notify those organizations that would be notified for the Unusual Event emergency. In addition, the Wallis Police Department will be notified. It is also possible that other police departments or fire departments may be placed on alert. Such arrangements will be specified in the final ACNGS Emergency Plan.

13.3.4.3 Notification for Site Area and General Emergencies

In the event of a Site Area or General Emergency, the Emergency Director will initiate procedures for the notification of the organizations that would be notified for Alert events. In addition, other support organizations such as the Department of Energy (See Section 13.3.2.3.1) or the organizations listed in Section 13.3.2.4 would be contacted.

13.3.4.4 Notification Priority

Notification procedures for the ACNGS will specify the order in which offsite organizations are to be notified for each class of emergency. HL&P

anticipates that many notifications will take place concurrently. The specific procedures will be developed in conjunction with State, local and Federal agencies. In any case, the planning objective will be to obtain the appropriate emergency response in the shortest possible time.

13.3.4.5 Notification of Federal Organizations

The initial notification of Federal organizations will be by telephone to the Nuclear Regulatory Commission Regional Office in Arlington, Texas (Region IV) in accordance with their procedures. HL&P anticipates that the NRC Operations Center in Bethesda, Maryland will be notified by the Regional Office.

Assistance from the DOE, as well as other Federal organizations (See Section 13 3.2.3.1), will be requested by phone from either HL&P, the Texas Department of Health or the NRC.

13.3.4.6 Notification of State Organizations

When State emergency response organizations are to be notified, the ACNGS will call the 24-hour on-duty dispatcher in the Texas Department of Public Safety District Office in Houston, Texas via a dedicated telephone line. As a backup, the DPS District Office could be reached via the local County Sheriff's Office, via radio from the plant or via the State DPS headquarters in Austin, Texas. Upon receipt of notification, the DPS District Office will immediately place the message on the DPS State teletype network, thus making the message available to every DPS District Office in the State as well as the DPS Emergency Operations Center (EOC) at its headquarters in Austin, Texas. Radio communications between the State EOC and the District Offices are also available. Receiving offices will acknowledge receipt of the notification. Message authentication procedures will be established. From the District Offices and State EOC, other State agencies having a role in ACNGS emergency response would be notified via an established emergency call list. The principal agency to be so notified is the Texas Department of Health (Division of Occupational Health and Radiation Control) whose functions are described in Section 13.3.2. 55

For any emergency situation, the ACNGS Control Room will notify the on-duty Texas Parks and Wildlife Department attendant in the Allens Creek Park. This notification will be accomplished via telephone and/or radio. In addition, the public in the lake and park areas could be notified by the same systems used to notify the general public (See Section 13.3.4.10). Procedures will be established for the prompt notification of lake and park visitors.

13.3.4.7 Notification of Local Governments

When local organizations are to be notified, the ACNGS will call the Austin County Sheriff's Department via a dedicated telephone line. The Sheriff's Office Dispatcher is on-duty 24-hours to receive emergency calls. As a backup, the Austin County Sheriff's Department can be reached via radio or

commercial telephone from the ACNGS, via the Department of Public Safety, via Sheriff Deputies located in Sealy and Wallis, Texas, or via the Wallis Police Department. Message authentication procedures will be established. The Austin County Sheriff's Department will then alert other local response organizations and local officials in the plume exposure EPZ via teletype, radio or telephone and initiate implementation of protective actions. Radio, teletype and telephone communications between the Department of Public Safety and the involved Sheriff's Departments are already in place. Final emergency plans and procedures for local governments will designate the specific actions by these organizations.

Local support organizations, from whom direct assistance may be required, such as the Wallis Police Department, Wallis Volunteer Fire Department and the Austin County Ambulance Corps, will be notified directly from the ACNGS by telephone. These organizations could also be notified via the Austin County Sheriff's Department or the Department of Public Safety.

13.3.4.8 Notification of the HL&P Organization

Off-shift ACNGS plant personnel whose assistance is required at the plant will be notified by telephone from the plant using an established call list. This call list will be kept up-to-date at all times.

The HL&P Corporate Headquarters will be notified by means of the ACNGS contacting the HL&P System Dispatcher via a dedicated telephone line. A System Dispatcher is on duty 24-hours. Corporate procedures will designate the specific actions to be taken by the Dispatcher. 55

13.3.4.9 Notification of Other Support Organizations

Assistance requests to the support organizations described in Section 13.3.2.4 will be accomplished via commercial telephone.

13.3.4.10 Notification of the Public

In the State of Texas, the local government is responsible for issuing emergency notifications and instructions to the general public. The Austin County Sheriff's Department will initiate appropriate notification to members of the public. In cooperation with the Waller, Fort Bend, Wharton and Colorado County Sheriff's Department, this notification will be made to affected individuals within the 10-mile plume exposure pathway EPZ. Effective methods to notify the public within this area in the event of an emergency have long been established. The final ACNGS Emergency Plan will describe the specific administrative and physical means which will be utilized to notify

the public. HL&P will work closely with appropriate State and local governments to ensure that, before the ACNGS begins operation, the capability will exist to notify the public in the 10-mile EPZ within 15 minutes of notification to offsite organizations. An evaluation will be made to determine the specific system which will provide this capability. This system may include sirens, in-residence tone alert devices, alarms connected to electric meters and/or multiple telephone call-up techniques.

Arrangements will be made for broadcasting emergency instructions to the public via radio and/or television following the initial notification. The public will have received prior information as to how they will be notified in the event of an accident and what protective actions might be taken.

13.3.5 EMERGENCY RESPONSE FACILITIES

Emergency facilities, as well as special systems, will be established at and near the ACNGS for assessing an event, directing response and recovery efforts, mitigating accident consequences and informing the public. The facilities and systems will be described in detail in the final ACNGS Emergency Plan.

13.3.5.1 Control Room

During an emergency, the Control Room will be the location in which actions are taken primarily to bring plant systems under control. The Control Room is the location in which an accident event is initially recognized, classified and assessed, and notification procedures initiated. The Control Room will have communications with all other emergency facilities and will be equipped with terminals of data systems. The Control Room, being inside the plant, is designed as a totally safety grade facility.

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13.3.5.2 Technical Support Center

An onsite Technical Support Center (TSC) will be established as near to the ACNGS Control Room as possible where plant management and personnel will utilize technical data and displays to assist Control Room personnel during emergency conditions. The TSC will be activated for Alert, Site Area and General Emergency levels. Staffing of the TSC may vary according to the emergency class. Plant operations data, pertinent radiological and meteorological data, and communications links to both onsite and offsite locations will be provided to the TSC. During the early stages of emergency conditions, the TSC will perform those functions that later might be shifted to other emergency facilities.

The design and location of the TSC will be described in the final ACNGS Emergency Plan. HL&P presently plans to design and develop the TSC in accordance with the functional and design criteria specified in NRC final guidance documents.

13.3.5.3 Emergency Operations Facility

An Emergency Operations Facility (EOF) will be established near the ACNGS for the management of overall emergency response, the coordination of radiological assessments, and for management of recovery operations. The EOF will be designed to provide assistance in the decision making process to protect the public health and safety and to control radiological monitoring teams. The overall management of licensee emergency response will be based in the EOF. Working spaces for Federal, State and local response organizations will be provided in the EOF, thus making it the center of coordination for all organizations involved.

The EOF will be activated for Site Area and General Emergencies and will be brought to standby status for the Alert Emergency. It will be located outside the plant security boundary, but probably not farther than five miles from the ACNGS. The EOF will be habitable under accident conditions, including those that would require evacuation of the plume exposure EPZ. The EOF will be equipped with communication links, plant safety status data, and radiological and meteorological data.

The design and location of the EOF will be described in the final ACNGS Emergency Plan. HL&P presently plans to design and develop the EOF in accordance with the functional and design criteria specified in NRC final guidance documents.

13.3.5.4 Operations Support Center

Appropriate space will be designated onsite for the assembly of operations personnel whose support is required in or near the plant, but not in the Control Room or TSC. Supplies such as protective clothing, respiratory protection, portable lighting and communications equipment will be provided. The OSC will be described in detail in the final ACNGS Emergency Plan. 55

13.3.5.5 News Media Center

HL&P will provide a location at or near the EOF to serve as a News Media Center (NMC) in which to conduct press conferences and briefings during an emergency. The NMC will be activated for the Site Area and General Emergency levels and will be brought to standby status for the Alert Emergency. The NMC will be large enough to accommodate 300-400 news media representatives. A backup location outside the plume exposure EPZ will be available, such as an auditorium or civic center. A small briefing room will be made available in the EOF in which to conduct briefings with small select groups. In the NMC, information packets or "press kits" will be available providing information about the licensee, the plant and plant surroundings. Visual aids will be provided.

HL&P will designate an official company spokesperson to interface with the news media and the spokespersons of offsite response organizations. HL&P spokespersons will be trained in conducting press conferences and briefings and will be knowledgeable of plant operations and the Emergency Plan.

13.3.5.6 Safety Parameter Display System

The ACNGS Control Room will be equipped with a Safety Parameter Display System (SPDS), with additional displays provided in the TSC and the EOF. The SPDS will be a set of displays designed to assist control room personnel in evaluating the safety status of the plant. It is solely a monitoring system to aid the operator in the detection of abnormal operating conditions.

The plant functions to be presented on the SPDS will include, but will not necessarily be limited to:

- Reactivity control
- Reactor core cooling
- Reactor coolant system integrity
- Radioactivity in containment
- Containment integrity

The design of the SPDS will be described in the final ACNGS Emergency Plan. HL&P presently plans to design and develop the SPDS in accordance with the functional and design criteria specified in NRC final guidance documents.

13.3.5.7 Data Transmission

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The ACNGS will be equipped with the capability to transmit vital plant variables, process, and radiological and site meteorological data to the NRC's Operations Center in Bethesda, Md. The data transmission system will be designed in accordance with the functional and design criteria specified in NRC final guidance documents.

The design of this system will be described in the final ACNGS Emergency Plan.

13.3.5.8 First Aid Facility

A first aid room equipped with the first aid equipment and supplies which are appropriate for a major industrial facility will be provided at the ACNGS. At least one individual onsite will be trained and qualified in advanced first aid methods.

13.3.5.9 Decontamination Facility

Personnel decontamination facilities, consisting of showers and sinks which drain to the radwaste system, will be provided. ACNGS personnel will be

trained in decontamination methods. First aid to injured individuals will, in most cases, be performed in conjunction with any necessary decontamination. However, if immediate treatment of the injury is deemed necessary, that treatment will take precedence over decontamination. This philosophy will also extend to transportation and offsite treatment of contaminated, injured individuals. 55

13.3.6 ACCIDENT ASSESSMENT

The ACNGS will have adequate systems, equipment, facilities and procedures to promptly identify and monitor actual or potential consequences of an emergency condition within and outside the site boundary. Emergency action levels will be utilized to determine the event classification and need for protective actions. The final ACNGS Emergency Plan and implementing procedures will describe in detail accident assessment methods and criteria.

13.3.6.1 Emergency Action Levels

The ACNGS will utilize a system of Emergency Action Levels (EAL's) for accident assessment. EAL's are particular in-plant conditions, instrument readings and onsite and offsite monitoring results that indicate an emergency event has occurred. The EAL's provide a basis for categorizing the event into one of the following classifications: Unusual Event, Alert, Site or General Emergency. The EAL's also provide the basis for determining the need for notification and participation of offsite organizations and for determining when and what type of protective measures should be implemented. The EAL's for the ACNGS will be agreed upon by HL&P and State and local response organizations and approved by the NRC. EAL's will be presented in the final ACNGS Emergency Plan. 55

13.3.6.2 Assessment Capability

The ACNGS will have the capability and resources to provide initial evaluation and continuing assessment of an emergency event throughout the course of an accident. This capability will include post-accident sampling capability, radiation and effluent monitors, in-plant iodine instrumentation and containment radiation monitoring. Assessment of in-plant conditions will be coordinated in the Control Room with the assistance of the Technical Support Center. Information provided by the Safety Parameter Display System (see Section 13.3.5.6) and the real-time meteorological instrumentation will be major tools in the accident assessment process. This information will be available in the Control Room and Technical Support Center, as well as in other emergency facilities.

The ACNGS will have the capability to monitor the area within and outside the site boundary and to estimate and project radiation doses. Under the direction of the Radiological Emergency Manager (see Section 13.3.2.1.5) operating out of the Emergency Operations Facility (see Section 13.3.5.3), radiological monitoring teams will be dispatched within the plume exposure EPZ. The data gathered by the monitoring teams will aid in determining the severity of the accident. The EOF, as well as other emergency facilities, will have available data from real-time meteorological monitoring instrumentation for use in computerized dose projection. The capability to manually project doses will be provided.

13.3.7 PROTECTIVE MEASURES

Protective actions will be taken as appropriate to prevent or mitigate the potential consequences to individuals during or following a radiological incident at ACNGS. Measures taken within the ACNGS site boundary will be the responsibility of HL&P, but may include some assistance by offsite organizations. The implementation of protective measures outside the ACNGS site boundary will be primarily the responsibility of State and local emergency organizations. Those offsite protective actions may be dependent upon receipt by the offsite organizations of applicable meteorological and radiological data and recommendations from ACNGS. The type and extent of onsite and offsite protective actions will be based on the severity of the emergency and will be related to the event classifications presented in Section 13.3.3.

13.3.7.1 Onsite Protective Measures

The implementation of all onsite protective measures will be the responsibility of the ACNGS Emergency Director. The decisions made by the Emergency Director will reflect the severity of the emergency as it relates to the health and safety of those persons inside the ACNGS site boundary. His decision in some cases may also relate to the health and safety of individuals outside the site boundary, such as during the removal of radioactive material. The specific criteria and detailed protective actions for onsite personnel will be specified in the final ACNGS Emergency Plan and implementing procedures. The criteria for developing protective measure includes exposure control, contamination control and personnel accountability. 55

During emergency conditions, measures will be taken to keep exposures within 10CFR20 limits. Such measures might involve respiratory protective equipment, protective clothing, radioprotective drugs or any other health physics procedures which would apply to exposure control in emergency situations. The primary protective measure for onsite personnel not engaged in emergency functions will be prompt evacuation from areas which may be affected by significant radiation, contamination or airborne radioactivity. For personnel who are engaged in emergency functions, it may be necessary in special cases to use the Environmental Protection Agency Protective Action Guides, which allow emergency workers to incur exposures greater than those during normal conditions. The decision to allow the use of these emergency exposure levels is the responsibility of the Emergency Director.

The control of radioactive contamination within the site boundary will be maintained to the extent feasible through the use of measures delineated in the ACNGS Health Physics procedures. These measures may include the restriction of access to areas within the plant, as well as the monitoring and decontamination, as needed, of personnel and equipment which are moved from those areas. In the event of significant radioactive contamination outside the fenced security area, but within the ACNGS exclusion area, access to the exclusion area will be strictly controlled by HL&P. There will be no

potentially affected public drinking water supplies nor agricultural products within the ACNGS exclusion area.

Onsite evacuation procedures will include provisions for reliable personnel accountability.

The evacuation of local areas within the site will be initiated by either area radiation monitor alarms or the in-plant public address system. Through the use of assembly areas, non-essential personnel will be accounted for to assure that all are removed from areas of significant exposure or contamination hazard. Provisions will be made for the control of visitors or contract personnel throughout the course of the emergency.

13.3.7.2 Offsite Protective Measures

13.3.7.2.1 Protective Measures for the Plume Exposure Pathway Emergency Planning Zone

The plume exposure EPZ is an area about 10 miles in radius around the ACNGS. The principal exposure sources in this EPZ are: (1) whole body external exposure from the plume and deposited material, and (2) inhalation. The principal protective actions are notification and shelter and/or evacuation. Use of the thyroid blocking agent, potassium iodide, will be considered.

The Austin County Sheriff's Department will initiate the implementation of protective measures within the 10-mile plume exposure EPZ. Specific actions to be taken will be described in the Emergency Operations Plans and procedures for each of the counties. The actual implementation of protective measures in each of the counties with portions in the 10-mile EPZ will be carried out by the respective County Sheriff's Departments. 55

Protective measures will be implemented initially in the areas directly affected by the plume from the plant as well as areas which would be affected if the plume changed direction. HL&P envisions an area of roughly a "keyhole" shape, consisting of an area immediately around the plant ranging from about 1-3 miles, plus a sector encompassing the plume and extending radially outward from the plant to a distance determined from dose projections.

The area immediately around the plant in which actions might be taken includes the Allens Creek Lake and State Park. The only applicable protective measures for the lake and park areas are notification and evacuation. For all events in the four classifications (Section 13.3.3), the Texas Parks & Wildlife Department attendants on duty in the Park will be notified. For events in the Alert, Site Area and General Emergency classes, the Emergency Director will recommend the Lake and State Park be evacuated, if only as a precautionary measure. The Texas Parks & Wildlife Department attendants are responsible for notifying and evacuating the public from lake and park areas. The park attendants will have the assistance of toll-gate attendants and maintenance and groundskeeping personnel during the day when the park is most occupied.

In addition, personnel from the Texas Department of Public Safety, the County Sheriff's Department, the Wallis Police and Volunteer Fire Departments could be called by the park attendants to assist in evacuating the public from the lake and park. After these areas have been cleared, the park attendants, being duly-appointed peace officers of the State, would be available to assist in the implementation of other offsite protective measures.

The protective measures for the public will include notification of affected individuals in the 10-mile EPZ. As described in Section 13.3.4.4, the County Sheriff's department will have the capability to notify and instruct the public of emergency conditions at ACNGS. Instructions may include the usage of radioprotective drugs, seeking of shelter, such as remaining indoors with windows and doors closed, or, under severe conditions, evacuation.

If evacuation is deemed necessary it will be carried out in accordance with detailed evacuation plans which will be contained in the Austin, Waller, Fort Bend, Colorado and Wharton County Emergency Operations Plans. These plans will include the identification of evacuation routes, traffic control points, relocation centers, mass care centers and the individuals and groups responsible for performing evacuation-related functions.

A preliminary analysis has been conducted of the time which required to evacuate various keyhole-shaped sectors within the ACNGS 10-mile plume exposure EPZ for transient and permanent populations. The analysis, provided in Appendix 13.3B, considered evacuation under a variety of circumstances. The analysis considered good and adverse weather conditions, transient populations, special facilities, such as schools and nursing homes, and projected populations. The study estimates a minimum evacuation time of 15 minutes was estimated for an area of about 2-miles in radius around the ACNGS, assuming good weather conditions and the permanent population. A maximum evacuation time of 2 hours and 15 minutes was estimated in a 10-mile radius around the ACNGS, assuming heavy rain or foggy weather conditions. and the end-of-life permanent population. The analysis demonstrated that there are no significant impediments to evacuation in the 10-mile area around the ACNGS.

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Recommendations to the local governments regarding offsite protective measures will be provided by the Texas Department of Health working closely with the ACNGS. The Texas Department of Health will perform independent evaluations of radiological consequences, conduct environmental monitoring, and provide recommendations for offsite protective actions. As the lead State agency, the Texas Department of Health will also ensure the activation of appropriate member agencies of the State of Texas Disaster Emergency Services Council.

13.3.7.2.2 Protective Measures for the Ingestion Pathway Emergency Planning Zone

The ingestion EPZ is an area about 50 miles in radius around the ACNGS. The principal exposure source is from ingestion of contaminated water or food. The principal protective action is the control of food and water pathways.

Radiological releases, prevailing meteorological data, and projected offsite doses will be provided to the Texas Department of Health from ACNGS. This information will include, as applicable, estimated concentrations of radioactive material at various locations within the 50-mile ingestion pathway EPZ. The Texas Department of Health, as the lead agency for protective measures in the ingestion pathway EPZ, will specify the appropriate protective measure, which may be based on ACNGS data, independent calculations and/or field sampling and analysis. These measures will include, as necessary, controlling drinking water supplies, impounding of milk, crops and other human or animal foodstuffs, and establishing criteria for continuing consumption of these items.

Implementation of protective measures within the 50-mile ingestion pathway EPZ will be carried out by the appropriate member agencies of the State of Texas Disaster Emergency Services Council and the responsible agencies, including agricultural agencies, within the affected counties. The counties, all or part of which are within the ACNGS 50-mile EPZ, are:

Austin
Brazoria
Brazos
Colorado
Fayette
Fort Bend
Grimes
Harris
Jackson
Lavaca
Matagorda
Montgomery
Waller
Washington
Wharton

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The communication links among the county sheriff departments will ensure timely response to Texas Department of Health protective action recommendations.

13.3.7.3 Recovery and Reentry

Recovery operations will be carried out by the organization described in Section 13.3.2. Closely related to recovery is the reentry into damaged or contaminated areas of the plant or site. Recovery and reentry operations will be conducted in such a manner as to minimize exposure to workers and with total regard for the health and safety of the public. Plans for recovery and reentry activities will be described in detail in the final ACNGS Emergency Plan.

13.3.8 EMERGENCY TREATMENT AT OFFSITE FACILITIES

Emergency planning for the ACNGS will include provisions for the treatment, at offsite facilities, of individuals injured as a result of licensed activities at the ACNGS. These provisions will consist primarily of arrangements with ambulance services and hospitals. Since it is possible that personal injuries could be complicated by the presence of radioactive contamination, offsite treatment facilities and personnel will be prepared to handle contaminated individuals. All offsite treatment facilities and personnel with whom arrangements have been made will be involved in emergency drills and exercises (see Section 13.3.9) and HL&P sponsored training (see Section 13.3.10).

13.3.8.1 Hospitals

Preliminary arrangements have been made for offsite medical treatment of injuries, including cases involving radioactive contamination. These arrangements have been made with:

Polly Ryon Memorial Hospital,
Richmond, Texas and

Arrangements will be made with a back-up hospital. These arrangements will be described in the final ACNGS Emergency Plan.

HL&P will ensure that equipment and supplies for contamination control and personnel decontamination are available and maintained at each of the above hospitals. The final ACNGS Emergency Plan will describe in detail the equipment and services available at these hospitals. A letter of agreement/understanding from Polly Ryon Hospital is contained in Appendix 13.3A. 55

13.3.8.2 Ambulance Services

Preliminary arrangements have been made for the transportation of injured persons from ACNGS to medical treatment facilities. This includes any individuals whose injuries are complicated by radioactive contamination or who may have been involved in a radiation exposure incident. Preliminary arrangements have been made with the Austin County Ambulance Corps and are summarized in a letter of agreement/understanding contained in Appendix 13.3A. This ambulance organization serves Austin County from the following locations (approximate distance from the ACNGS in parenthesis): Wallis (4 miles), Sealy (7 miles), Bellville (21 miles), New Ulm (20 miles).

13.3.9 EXERCISES AND DRILLS

Exercises will be conducted to assure that an adequate level of emergency preparedness at ACNGS is maintained. The exercises will also evaluate major portions of the onsite and offsite emergency response capabilities, will test the adequacy of the emergency plans and implementing procedures, and will

ensure that personnel are familiar with their designated emergency response functions. The exercises will also serve as a test of the adequacy of emergency facilities, equipment and communication networks. Exercises will include participation and mobilization of local response and support organizations to verify their capability to respond to emergency conditions at ACNGS. Federal and State evaluators will critique the exercise, noting any deficiencies which require correcting. Exercises will be held which involve the participation of appropriate State and Federal agencies. A preliminary exercise frequency schedule is provided in Table 13.3-1.

Drills will be conducted to test, develop and maintain the key skills necessary for the effective response to emergency conditions at ACNGS. The drills consist of supervised instructional periods directed toward particular operations in emergency response. The evaluation of the drills will be performed by a drill instructor who will use the experience to further develop the emergency response training programs for the onsite and support organizations. The drills will cover the areas of communication, medical emergencies, radiological monitoring and emergency health physics activities. These drills will involve to varying extents, the participation of State and local agencies and offsite support organizations, as well as ACNGS personnel. A preliminary drill frequency schedule is provided in Table 13.3-1.

13.3.10 TRAINING

HL&P will establish an organized and comprehensive emergency response training program for ACNGS personnel, HL&P headquarters support personnel, and participating local organizations. Personnel will receive initial training before the ACNGS begins operation, followed by annual retraining. A qualified person on the ACNGS staff will be designated as a training coordinator to manage the training program, develop programs, maintain documents and records and schedule training sessions. 55

13.3.10.1 HL&P Personnel Training

Members of the ACNGS Plant staff will receive detailed specialized training relative to their specific assignments at the plant and their role in emergency response such as radiation monitoring, first aid, rescue and damage control and repair. Individuals who will be in special positions of authority and significant responsibility, such as the Emergency Director and the Recovery Manager, will receive extensive training in all aspects of emergency planning and implementing procedures.

Persons working at the ACNGS site, but outside the plant itself, such as Security Guards, warehouse personnel, etc., will receive instructions on warning signals, assembly areas, evacuation routes and procedures.

HL&P headquarters personnel having assignments in the emergency response and recovery organizations (see Section 13.3.2) will receive orientation in the content of the Emergency Plan and appropriate implementing procedures, as well as task-specific training for their assigned functions.

Unescorted personnel within the protected area will receive orientation in the content of the ACNGS Emergency Plan and implementing procedures. Plant personnel will receive instructions regarding the protection of escorted personnel, including visitors.

13.3.10.2 Offsite Personnel Training

HL&P will provide training for local government response personnel. The personnel will include response personnel from the Sheriff's Department of Austin, Fort Bend, Wharton, Colorado and Waller Counties. Training will include an overview of the Emergency Plan and detailed instructions in the specific functions they may be expected to perform. The training will be commensurate with the potential involvement of each department.

HL&P will also provide training to personnel in the Wallis Police Department, the Wallis Volunteer Fire Department, the Austin County Ambulance Corps and hospitals whose support may be required in the event of an emergency. Training will include an overview of the Emeregency Plan and detailed instructions in the specific functions each organization will be expected to perform.

These organizations have agreed to participate in HL&P-sponsored training, as stated in their letters of agreement/understanding provided in Appendix 13.3A.

Response personnel in the State response organizations will receive training through the Texas Radiological Response Interagency Training Committee. The Committee will catalog available training programs, select and qualify course participants, maintain records and develop new training courses. Membership on the Committee includes the Director of the Texas Department of Health Division of Occupational Health & Radiation Control, a representative from each utility operating a nuclear facility, and representatives from the jurisdiction within the plume exposure EPZ of a nuclear power plant. The Committee will designate classes of local and State personnel to be trained in at least the following areas: 55

- Direction and control
- Damage assessment
- Radiation monitoring
- Law enforcement & traffic control
- First Aid and rescue
- Fire fighting
- Medical support

Provisions will be established for the periodic retraining of these personnel. Every attempt will be made to utilize training offered by various Federal agencies.

13.3.10.3 Public Education

HL&P will establish, in conjunction with Federal, State and local organizations, a program for the dissemination of information to the public in

the plume exposure EPZ regarding how they will be notified and what their actions should be in the event of an emergency. This information will include, radiation, respiratory protection, sheltering, evacuation routes and the sources of additional information. HL&P will also establish a program to regularly acquaint news media personnel with emergency plans, radiation and sources of public information in an emergency. The programs and means of implementation will be described in the final ACNGS Emergency Plan.

13.3.11 COMPATIBILITY

In conjunction with the preparation of the foregoing preliminary plans for responding to emergencies and the attached preliminary evacuation analysis, HL&P has examined the compatibility of emergency plans with the Allens Creek site layout, site location and facility design features. No factors have been identified which would indicate that the Allens Creek project will be incompatible with emergency planning.

With respect to access routes the preliminary evacuation analysis demonstrates that they are sufficient to carry out a timely evacuation of the population within the plume exposure EPZ. The population density and distribution in the site vicinity pose no problem with respect to carrying out a timely evacuation or other lesser emergency action. Similarly, land use and local jurisdictional boundaries do not present any unique or difficult problems for carrying out emergency response plans. Special facilities within the plume exposure EPZ have been identified, and these also pose no serious problems for emergency response planning. Finally, as Section 13.3.12 demonstrates, the ACNGS will satisfy the emergency planning standards of 10CFR50.47(b).

13.3.12 COMPLIANCE WITH 10CFR50 APPENDIX E, PART II

10CFR50 Appendix E, Part II requires a description of the means by which the standards of Part 50.47(b) will be met. Part II, paragraphs A-H, also set forth emergency planning criteria which must, at a minimum, be discussed. This subsection lists each of these requirements and references the particular parts of Section 13.3 in which these requirements are addressed. 55

13.3.12.1 Standards of 50.47(b)

Standard No. 1

"Primary responsibilities for emergency response by the nuclear facility licensee and by State and local organizations within the Emergency Planning Zones have been assigned, the emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis".

The subect of Standard No. 1 response organizations, is addressed in Section 13.3.2.

Standard No. 2

"On-shift facility licensee responsibilities for emergency response are unambiguously defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available and the interfaces among various onsite response activities and offsite support and response activities are specified."

The subject of Standard No. 2, onsite response organization, is addressed in Subsection 13.3.2.1.

Standard No. 3

"Arrangements for requesting and effectively using assistance resources have been made, arrangements to accommodate State and local staff at the licensee's near-site Emergency Operations Facility have been made, and other organizations capable of augmenting the planned response have been identified."

The subject of Standard No. 3, offsite assistance resources, is addressed in Subsections 13.3.2.3, 13.3.2.4 and 13.3.5.3.

Standard No. 4

"A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures." 55

The subject of Standard No. 4, emergency classification, is addressed in Section 13.3.3 and Subsection 13.6.1.

Standard No. 5

"Procedures have been established for notification by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and followup messages to response organizations and the public has been established and means to provide early notification and clear instruction to the populace within the plume exposure pathway Emergency Planning Zone have been established."

The subject of Standard No. 5, notification, is addressed in Section 13.3.4.

Standard No. 6

"Provisions exist for prompt communications among principal response organizations to emergency personnel and the public."

The subject of Standard No. 6, communication, is addressed in Section 13.3.4.

Standard No. 7

"Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency (e.g., listening to a local broadcast station and remaining indoors), the principal points of contract with the news media for dissemination of information during an emergency (including the physical location or locations) are established in advance and procedures for coordinated dissemination of information to the public are established."

The subject of Standard No. 7, public information, is addressed in Subsections 13.3.4.9, 13.3.5.5, and 13.3.2.1.6.

Standard No. 8

"Adequate emergency facilities and equipment to support the emergency response are provided and maintained."

The subject of Standard No. 8, response facilities, is addressed in Section 13.3.5.

Standard No. 9

"Adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use."

The subject of Standard No. 9, assessment and monitoring, is addressed in Subsections 13.3.2.3.2, 13.3.5.6, and 13.3.6.2. 55

Standard No. 10

"A range of protective actions have been developed for the plume exposure pathway EPZ for emergency workers and the public. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place, and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed."

The subject of Standard No. 10, protective actions, is addressed in Section 13.3.7.

Standard No. 11

"Means for controlling radiological exposures, in an emergency, are established for emergency workers. The means for controlling radiological exposures shall include exposure guidelines consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guides."

The subject of Standard No. 11, exposure limits, is addressed in Subsection 13.3.7.1.

Standard No. 12

"Arrangements are made for medical services for contaminated injured individuals."

The subject of Standard No. 12, contaminated injuries, is addressed in Section 13.3.8, and Subsections 13.3.5.8, and 13.3.5.9.

Standard No. 13

"General plans for recovery and reentry are developed."

The subject of Standard No. 13, recovery, is addressed in Subsection 13.3.2.2.

Standard No. 14

"Periodic exercises are (will be) conducted to evaluate major portions of emergency response capabilities, periodic drills are (will be) conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are (will be) corrected."

55

The subject of Standard No. 14, exercises, is addressed in Section 13.3.9.

Standard No. 15

"Radiological emergency response training is provided to those who may be called on to assist in an emergency."

The subject of Standard No. 15, training, is addressed in Section 13.3.10.

Standard No. 16

"Responsibilities for plan development and review and for distribution of emergency plans are established and planners are properly trained."

The subject of Standard No. 16, emergency plan development, review and distribution, is addressed in Section 13.3.2.5.

13.3.12.2 Compliance with 10CFR50, Appendix E

In Section II of Appendix E to 10CFR50, Paragraphs A through H list items regarding emergency planning which are to be described in the Preliminary Safety Analysis Report (PSAR). The items of Paragraphs A through H are described in the following manner:

Paragraph A

"Onsite and offsite organizations for coping with emergencies and the means for notification in the event of an emergency of persons assigned to the emergency organizations."

The subject of Paragraph A, onsite and offsite organizations, is described in Section 13.3.2.

Paragraph B

"Contacts and arrangements made and documented with local, State, and Federal governmental agencies with responsibility for coping with emergencies including identification of the principal agencies."

The subject of Paragraph B, government agencies, is described in Subsection 13.3.2.3.

Paragraph C

"Protective measures to be taken within the site boundary and within each EPZ to protect health and safety in the event of an accident; procedures by which these measures are to be carried out (e.g., in the case of an evacuation who authorizes the evacuation how the public is to be notified and instructed how the evacuation is to be carried out); and the expected response of offsite agencies in the event of an emergency." 55

The subject of Paragraph C, protective measures, is described in Section 13.3.7.

Paragraph D

"Features of the facility to be provided for onsite emergency first aid and decontamination and for emergency transportation of onsite individuals to offsite treatment facilities."

The subjects of Paragraph D, first aid, decontamination and transportation of injured parties, are described in Subsections 13.3.5.8, 13.3.5.9, and 13.3.8.2.

Paragraph E

"Provisions to be made for emergency treatment at offsite facilities of individuals injured as a result of licensed activities."

The subject of Paragraph E, offsite treatment, is described in Section 13.3.8.

Paragraph F

"Provisions for a training program for employees of the licensee, including those who are assigned specific authority and responsibility in the event of an emergency and for other persons who are not employees of the licensee but whose assistance may be needed in the event of a radiological emergency."

The subject of Paragraph F, training programs, is described in Section 13.3.10.

Paragraph G

"A preliminary analysis that projects the time and means to be employed in the notification of State and local governments and the public in the event of an emergency. A nuclear power plant applicant shall perform a preliminary analysis of the time required to evacuate various sectors and distances within the plume exposure pathway EPZ for transient and permanent populations, noting major impediments to the evacuation or taking of protective actions."

The subjects of Paragraph G, notification and evacuation, are described in Sections 13.3.4 and 13.3.7.

Paragraph H

"A preliminary analysis reflecting the need to include facilities, systems, and methods for identifying the degree of seriousness and potential scope of radiological consequences of emergency situations within and outside the site boundary, including capabilities for dose projection using real-time meteorological information and for dispatch of radiological monitoring teams within the EPZs; and a preliminary analysis reflecting the role of the onsite technical support center and of the near-site emergency operations facility in assessing information, recommending protective action, and disseminating information to the public." 55

The subjects of Paragraph H, facilities, systems and methods for accident assessment, are described in Sections 13.3.5, 13.3.6, and Subsection 13.3.2.1.

TABLE 13.3-1

ACNGS EMERGENCY RESPONSE ORGANIZATION DRILLS AND EXERCISES

Drill/Exercise	Participants	Frequency
Joint emergency response exercises	ACNGS, local & offsite support groups	Annually (plus or minus 3 months). First exercise about six months prior to issuance of Operating Licen ..
	ACNGS, local, offsite support groups & State	At least once every 3 years
	ACNGS, local, offsite support groups & State & Federal	At least once every 5 years
Communications Drills	ACNGS, State & local	Monthly
	ACNGS, Federal, State and local organizations	Annually
Medical Emergency Drills	ACNGS & offsite support groups	Annually
Radiological Monitoring Drills	ACNGS & State	Annually
Health Physics Drills	ACNGS & State	Semi-annually

55

APPENDIX 13.3A

LETTERS OF AGREEMENT/UNDERSTANDING

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TEXAS 76012

17 OCT 1980

Docket No. 50-466

Houston Lighting & Power Company
Attn: G. W. Oprea, Executive Vice
President
P. O. Box 1700
Houston, Texas 77001

Gentlemen:

This letter is being sent in response to your letter dated September 30, 1980, regarding the participation of the Nuclear Regulatory Commission in the event of an emergency at the Allens Creek Nuclear Generating Station.

The primary role of the NRC during a radiation emergency involving the potential or the unplanned release of radioactivity to the off-site environs is that of monitoring the licensees activities associated with the incident. The NRC will provide technical advice to the licensee if requested or required.

The Federal Notice that you referenced in your letter defines the NRC's responsibility as the lead agency for emergency planning for federal and local governments, which no longer applies. By Executive Order 12127 of March 19/9 the President created the Federal Emergency Management Agency. The Presidents letter of December 7, 1978 gave FEMA the lead agency role for the state and local emergency planning review and approval.

For complete guidance as to the role of the NRC for incident response you should review, Report to Congress: NRC Incident Response Plan NUREG-0728, and Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Nuclear Power Plants NUREG-0654/FEMA REP-1.

If you have any questions or I may be of further assistance please do not hesitate to contact me.

Sincerely,

Karl V. Seyfrit
Director

Department of Energy
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87115

OCT 24

Mr. G. W. Oprea, Executive Vice President
Houston Lighting & Power Company
P. O. Box 1700
Houston, Texas 77001

Dear Mr. Oprea:

In response to your letter of September 30, 1980, assurance is hereby given that the Department of Energy (DOE) will respond to requests for radiological assistance from licensees, federal, state and local agencies, private organizations or individuals involved in or cognizant of an incident believed to involve source, by-product or special nuclear material as defined by the Atomic Energy Act of 1954, as amended, or other ionizing radiation sources. Assistance as indicated would be made available to the Allens Creek Nuclear Generating Station upon request and provided in consonance with response activities conducted by state, local and private industry preparedness personnel.

Unless the DOE or a DOE contractor is responsible for the activity, ionizing radiation source or radioactive material involved in an incident, the DOE radiological assistance will be limited to advice and emergency action essential for the control of the immediate hazards to health and safety. Radiological emergency assistance will be terminated as soon as the emergency situation is under control. Therefore, responsibility for postincident recovery, including further action for the protection of individuals and the public health and safety, should be assumed by the appropriate responsible federal, state or local government, or private authority as soon as the emergency conditions are stabilized.

Requests for DOE emergency radiological assistance may be made on a twenty-four hour basis to the Joint Nuclear Accident Coordinating Center (JNACC), telephone: 505-844-4667.

Sincerely,

Jack R. Roeder, Director
Operational Safety Division

cc: G. P. Dix, Dir., OES/HQ
K. V. Seyfrit, Dir., Region IV NRC
Arlington, TX, w/Oprea/Roeder memo
dtd 9/30/80

Texas Department of Health

Robert Bernstein, M.D., F.A.C.P.
Commissioner

1100 West 49th Street
Austin, Texas 78756
(512) 458-7111

A. M. Donnell, Jr., M.D., M.P.H., F.A.C.P.
Deputy Commissioner

July 1, 1980

Mr. W. F. McGuire, Manager
Environmental Protection Department
Houston Lighting and Power Company
EDC Room C-279
P. O. Box 1700
Houston, Texas 77001

Dear Mr. McGuire:

The Texas Department of Health (TDH) hereby reaffirms its intention to provide radiological emergency response and support for the Allens Creek Nuclear Generating Station.

The Texas Department of Health, Division of Occupational Health and Radiation Control, Radiation Control Branch (RCB) is the governmental agency responsible for responding to radiological emergencies and for the development of final emergency procedures for the State, in conjunction with the Disaster Emergency Services Division (DES) of the Department of Public Safety. The authority for the RCB is derived from the State of Texas Disaster Plan of 1980, Annex L, which was issued by the Disaster Emergency Services Council under the provisions of the Texas Disaster Act of 1975.

Prior to the initial fuel loading of the Allens Creek facility, the RCB will work with Houston Lighting and Power Company, the DES and other state and local agencies to develop final site specific emergency procedures for the plume exposure zone (about 10 miles) and the ingestion pathway zone (about 50 miles).

It is the intention of the RCB that detailed emergency procedures will be developed and implemented for a wide range of emergency conditions classified according to their actual or potential severity. Emergency classifications and protective action criteria consistent with those of Houston Lighting and Power Company and Federal and local agencies will be used. The RCB will participate in drills and exercises required at the Allens Creek facility.

The RCB and DRS are currently reviewing communications systems and methods to determine the most appropriate system for prompt notification to the RCB of any radiological emergency. A system will be operational and tested before the Allens Creek facility becomes operational.

The Texas Department of Health looks forward to working with Houston Lighting and Power Company, other State agencies, and Federal and local agencies toward development of adequate emergency procedures for the Allen Creek Nuclear Generating Station.

Yours truly,

David K. Lacker

David K. Lacker, Director
Division of Occupational Health
and Radiation Control

County of Austin

T. A. MADDOX, SHERIFF
Office Phone No. 865-3112
BELLVILLE, TEXAS 77418

May 9, 1980

Mr. R. M. McCuistion
Vice President - Power Systems Development
Houston Lighting & Power Company
P. O. Box 1700
Houston, Texas 77001

Dear Mr. McCuistion:

This letter confirms discussions I have had with HL&P representatives concerning emergency planning by the Austin County Sheirff's Department in support of the Allens Creek Nuclear Generating Station.

The Sheriff's Department is the primary organization for providing protection for the public in Austin County and will help to coordinate the emergency planning activities of local organizations within the county. We understood that detailed emergency planning is required to a distance of about ten miles from the nuclear plant. This area would encompass portions of Fort Bend, Waller, Wharton and Colorado Counties, as well as Austin County. We have discussed this matter with the Sheriff's Departments of these other counties and stand ready to coordinate emergency planning with them. We understand that the primary State organization for radiological emergency planning is the Texas Department of Health and we look forward to working with them in further development of our emergency plans.

The main center of emergency communications in the county is operated by the Austin County Sheriff's Department. Telephone, radio and teletype communications systems are available to ensure that communications can be established to local agencies, surrounding counties and State emergency organizations. We understand that direct communications will be provided between the Allens Creek station and the Austin County Sheriff's Deparment.

We understand that the Allens Creek Emergency Plan will cover a wide range of emergency conditions classified according to their actual or potential severity. Our offsite emergency plan will relate to the same classifications as contained in the Allens Creek plan. We understand that the Texas Department of Health will also have those same emergency classifications. The emergency actions which we will implement will be commensurate with the emergency classification and will be based on recommendations received from HL&P and/or the Texas Department of Health. The actions for which we will plan range from simple acknowledgment that we have been notified of an unusual event, up to and including evacuation of the public. We will cooperate with HL&P, local orgaizations and surrounding counties in the development of detailed evacuation plans

We presently have the capability to make prompt notification to the population of Austin County in the event of an emergency. We understand that additional notification criteria are being evaluated. We will cooperate with HL&P in specific plans for public notification.

We will participate in the radiological emergency training provided by HL&P as well as emergency drills and exercises that may be required.

This Sheriff's Department stands ready to work with HL&P, the State of Texas and other response agencies in the development and implementation of our emergency plans relative to the Allens Creek facility.

Very truly yours,

T. A. Maddox,
Sheriff

TAM/hlk

STATE OF TEXAS COUNTY OF FORT BEND

ERVIN HURTA
SHERIFF
FORT BEND COUNTY
P.O. BOX 40
RICHMOND, TEXAS 77469

May 22, 1980

Mr. R. M. McCuistion
Vice President-Power Systems Development
Houston Lighting & Power Company
P. O. Box 1700
Houston, Texas 77001

Dear Mr. McCuistion:

This letter confirms discussions this department has had with representatives of Houston Lighting & Power Company regarding emergency planning for the Allens Creek Nuclear Generating Station.

The Sheriff's Department is the principal governmental agency responsible for implementation of protective actions and instructions to the public in the county. We understand that emergency planning will be required for an area about ten miles around the Allens Creek facility. This area encompasses portions of Austin, Waller, Fort Bend, Wharton and Colorado Counties.

We understand that emergency planning will cover a wide range of conditions, classified according to their actual or potential serverity. The actions this department may be called upon to take might range from simple acknowlegment that we have been notified, up to and including evacuation of the public.

The main center for emergency communications will be the Austin County Sheriff's Department. Telephone, radio and teletype communications are available to ensure adequate communications between the Sheriff's Departments and supporting State and local agencies.

This department will participate in the radiological emergency training provided by HL&P as well as periodic emergency drills and exercises that may be required.

This Sheriff's Department stands ready to work with HL&P, the State of Texas and other Sheriff's Departments in the development and implementation of our emergency plans relative to the Allens Creek facility.

Respectfully,

Ervin Hurta, Sheriff
Fort Bend County, Texas

Waller County
Hempstead, Texas 77445

JIMMIE WHITWORTH
SHERIFF

P. O. BOX 452
826-2255
826-2372

May 30, 1980

Mr. R.M. McCuistion
Vice President - Power Systems Development
Houston Lighting & Power Company
P.O. Box 1700
Houston, Texas 77001

Dear Mr. McCuistion:

This letter confirms discussions this department has had with representatives of Houston Lighting & Power Company regarding emergency planning for the Allens Creek Nuclear Generating Station.

The Sheriff's Department is the principal governmental agency responsible for implementation of protective actions and instructions to the public in the county. We understand that emergency planning will be required for an area about ten miles around the Allens Creek facility. This area encompasses portions of Austin, Waller, Fort Bend, Wharton and Colorado Counties.

We understand that emergency planning will cover a wide range of conditions, classified according to their actual or potential severity. The actions this department may be called upon to take might range from simple acknowlegment that we have been notified, up to and including evacuation of the public.

The main center for emergency communications will be the Austin County Sheriff's Department. Telephone, radio and teletype communications are available to ensure adequate communications between the Sheriff's Departments and supporting State and local agencies.

This department will participate in the radiological emergency training provided by HL&P as well as periodic emergency drills and exercises that may be required.

This Sheriff's Department stands ready to work with HL&P, the State of Texas and other Sheriff's Departments in the development and implementation of our emergency plans relative to the Allens Creek facility.

Sincerely,

Jimmie Whitworth

Jimmie Whitworth
Sheriff of Waller County

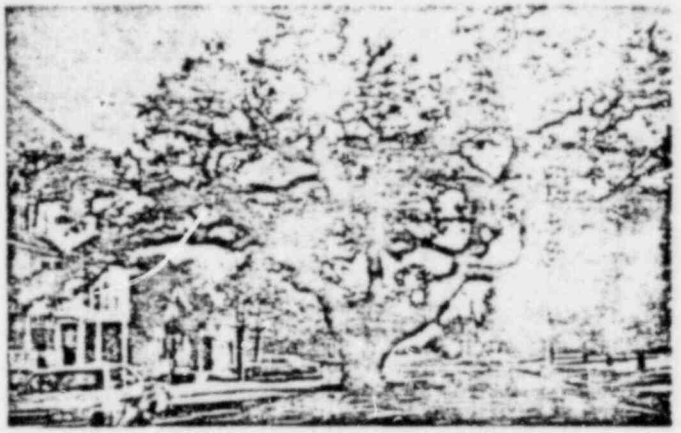
COLORADO COUNTY SHERIFF'S DEPARTMENT

SHERIFF
GEO. "DOC" MUELLER

Office Phone
732-2388

Jail Phone
732-2535

Home Phone



★ ★

First District Court
In Texas
Held Under This
Oak Tree
at Columbus,
Colorado County
In April, 1837

★ ★

COLUMBUS, TEXAS 78934

Mr. R.M. McCuistion
Vice President Power System Development
Houston Lighting & Power Company
P.O. Box 1700
Houston, Texas 77001

June 12, 1980

Dear Mr. McCuistion:

This letter confirms discussions this department has had with representives of Houston Lighting & Power Company regarding emergency planning for the Allens Creek Nuclear Station.

The Sheriff's Department is the principal governmental agency responsible for implementation of protective actions and instructions to the public in the county. We understand that emergency planning will be required for an area about ten miles around the Allens Creek facility. This area encompasses portions of Austin, Waller, Fort Bend, Wharton and Colorado Counties.

We understand that emergency planning will cover a wide range of conditions, classified according to their actual or potential severity. The actions this department may be called upon to take might range from simple acknowlegment that we have been notified, up to and including evacuation of the public.

The main center for emergency communications will be the Austin County Sheriff's Department. Telephone, radio and teletype communications are available to ensure adequate communications between the Sheriff's Departments and supporting State and local agencies.

This department will participate in the radiological emergency training provided by HL&P as well as periodic drills and exercises that may be required.

The Sheriff's Department stands ready to work with HL&P, the State of Texas and other Sheriff's Departments in the development and implementation of our emergency plans relative to the Allens Creek facility.

Geo. "Doc" Mueller, Sheriff
Colorado County

THE COUNTY OF WHARTON

WHARTON, TEXAS 77488

A. W. Sheffield
~~H. G. "Mike" Flournoy~~
SHERIFF

P. O. BOX 726
TELEPHONE 713/532-1550

June 19, 1980

Mr. R. M. McCuistion
Vice President - Power Systems Development
Houston Lighting & Power Company
P. O. Box 1700
Houston, Texas 77001

Dear Mr. McCuistion:

This letter confirms discussions this department has had with representatives of Houston Lighting & Power Company regarding emergency planning for the Allens Creek Nuclear Generating Station.

The Sheriff's Department is the principal governmental agency responsible for implementation of protective actions and instructions to the public in the county. We understand that emergency panning will be required for an area about ten miles around the Allens Creek facility. This area encompasses portions of Austin, Waller, Fort Bend, Wharton and Colorado Counties.

We understand that emergency planning will cover a wide range of conditions, classified according to their actual or potential severity. The actions this department may be called upon to take might range from simple acknowledgment that we have been notified, up to and including evacuation of the public.

The main center for emergency communications will be the Austin County Sheriff's Department. Telephone, radio and teletype communications are available to ensure adequate communications between the Sheriff's Departments and supporting State and local agencies.

This department will participate in the radiological emergency training provided by HL&P as well as periodic emergency drills and exercises that may be required.

This Sheriff's Department stands ready to work with HL&P, the State of Texas and other Sheriff's Departments in the development and implementation of our emergency plans relative to the Allens Creek facility.

Yours truly,

Larry Hensley

Larry Hensley
Captain

CITY OF WALLIS

P.O. DRAWER 190 PHONE 478-6712
WALLIS, TEXAS 77485

July 2, 1980

Mr. G. W. Oprea, Jr.
Executive Vice President
Houston Lighting & Power Company
P. O. Box 1700
Houston, Texas 77001

Dear Mr. Oprea:

This letter confirms discussions with representatives of Houston Lighting and Power Company regarding the Allens Creek Nuclear Generating Station Emergency Plan. The Wallis Fire Department will participate in the development of detailed plans for fire control. We will participate in training provided by HL&P and in drills and exercises as required.

Sincerely,

Michael Kocurek

Michael Kocurek, Chief
Wallis Volunteer Fire Dept.

CITY OF WALLIS

P.O. DRAWER 190 PHONE 478-6712
WALLIS, TEXAS 77485

July 7, 1980

Mr. G. W. Oprea, Jr.
Executive Vice President
Houston Lighting & Power Company
P. O. Box 1700
Houston, Texas 77001

Dear Mr. Oprea:

This letter confirms discussions this department has had with Houston Lighting and Power Company regarding emergency planning for the Company's Allens Creek Nuclear Generating Station.

The Wallis Police Department will cooperate with HL&P, State and local agencies in the future development of detailed emergency plans for the Allens Creek facility. We will participate in the radiological emergency training provided by HL&P as well as periodic emergency drills and exercises as may be required.

Sincerely,

Lee White, Chief
Wallis Police Dept.

CITY OF WALLIS

P.O. DRAWER 190 PHONE 478-6712
WALLIS, TEXAS 77485

July 23, 1980

Mr. G. W. Oprea, Jr.
Executive Vice President
Houston Lighting & Power Company
P.O. Box 1700
Houston, Texas 77001

Dear Mr. Oprea:

This letter confirms discussions with representatives of Houston Lighting & Power Company regarding the Allens Creek Nuclear Generating Station Emergency Plan. The Austin County Ambulance Corps will participate in the development of detailed plans for providing emergency medical transportation. We will participate in training provided by HL&P and in exercises and drills as recuired.

Yours truly,

Carolyn King

Carolyn King,
Area Supervisor
Austin County Ambulance Department

Polly Ryon Memorial Hospital

HOWARD E. PINNELL
ADMINISTRATOR

1701 MAIN
RICHMOND, TEXAS 77469
1-713-342-2811

July 8, 1980

Mr. G. W. Oprea, Jr.
Houston Lighting & Power Company
Executive Vice-President
Box 1700
Houston, Texas 77001

Dear Mr. Oprea:

This letter is in reply to our discussion with your representatives regarding the participation of Polly Ryon Memorial Hospital in the Emergency Plan for the Allens Creek Nuclear Generating Station.

This proposed plan has been discussed with our staff. The staff supports participation in a program to develope plans to meet Houston Lighting & Power needs. Polly Ryon Memorial Hospital will contribute to the medical care portion of the plan and provide emergency services and participate in cooperative training programs and emergency drills as necessary to fulfill regulatory requirements.

The management, medical staff and support personnel are looking forward to working with Houston Lighting & Power in this endeavor.

Sincerely,

H. E. Pinnell
Administrator

/mm

APPENDIX 13.3B
EVACUATION TIME ESTIMATES

EVACUATION TIME ESTIMATES FOR AREAS NEAR THE ALLENS CREEK PROJECT

HMM Document No. 80-056

December 23, 1980

Prepared for:

HOUSTON LIGHTING & POWER COMPANY
Houston, Texas 77001

Prepared by:

HMM ASSOCIATES, INC.
255 Bear Hill Road
Waltham, Massachusetts 02154

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

1. INTRODUCTION

In a letter dated December 26, 1979, the Nuclear Regulatory Commission (NRC) issued a request for information regarding estimates of evacuation times for various areas around nuclear power plants. The NRC request was sent to all applicants for construction permits and licensees for plants under construction. Requirements for similar information are included in the NRC Final Regulations on Emergency Planning (Federal Register, 8/19/80) and NUREG-0654. The Final Regulations require that a CP applicant shall ...

> "perform a preliminary analysis of the time required to evacuate various sectors and distances within the Plume Exposure Pathway EPZ for transient and permanent populations, noting major impediments to the evacuation or taking of protective actions."

The submission of evacuation data is being requested to provide useful evacuation planning data to local officials. The NRC also seeks sufficient information to ensure the compatibility of proposed emergency plans with facility design features, site layout and site location, taking into account considerations such as population, access routes, land use and jurisdictional boundaries. One of the purposes of this report is to satisfy the Final Rule and NRC requests for information.

The NRC request relates primarily to the actual evacuation time for both "normal" and "adverse" weather conditions. In addition, NRC has requested ancillary information on four topics.

1) Total time to evacuate special facilities, such as hospitals.

2) Time required to notify the population at risk.

3) Time required for confirmation that evacuation has been completed.

4) Identification of alternative protective actions, such as sheltering, which may be implemented where "special evacuation problems" are identified.

As a response to this request, Houston Lighting & Power Company sponsored a study to calculate evacuation times associated with several evacuation scenarios. These calculations were undertaken by HMM Associates, Inc., of Waltham, Massachusetts. These analyses were conducted using available population data and a computer-based venicle traffic simulation model (see description of the NETSIM model in Appendix C). The ancillary evacuation data were obtained from Allens Creek Project licensing documents and from interviews with local law enforcement officials. These included the Sheriffs of Austin County, Waller County, Colorado County, Fort Bend County, and Wharton County. The County Sheriff offices are the primary local agencies responsible for emergency response.

This report has been compiled to document the responses to the NRC requests. In subsequent sections, the report describes:

- Population and Automobile Data Used for Evacuation Time Estimates (Section 2);
- The Evacuation Network (Section 3);
- Evacuation Model Areas, Cases and Scenarios (Section 4);
- Estimates of Evacuation Times (Section 5);
- Ancillary Evacuation Data (Section 6); and
- Conclusions (Section 7).

Appendix B includes an explanation of the terminology and definitions used in this report.

2. POPULATION AND AUTOMOBILE DATA USED FOR EVACUATION TIME ESTIMATES

In order to estimate the evacuation times, several sets of population estimate data were required. The first set of population data identified was the 1990 permanent population within the 10-mile plume exposure emergency planning zone (EPZ). This included residents and non-essential workers at the ACNGS site. The second set was the peak 1990 population, defined as the total of permanent population, seasonal population, certain workers, public school students, and daily transients (recreational visitors). The third set of population data was the permanent population for the year 2020.

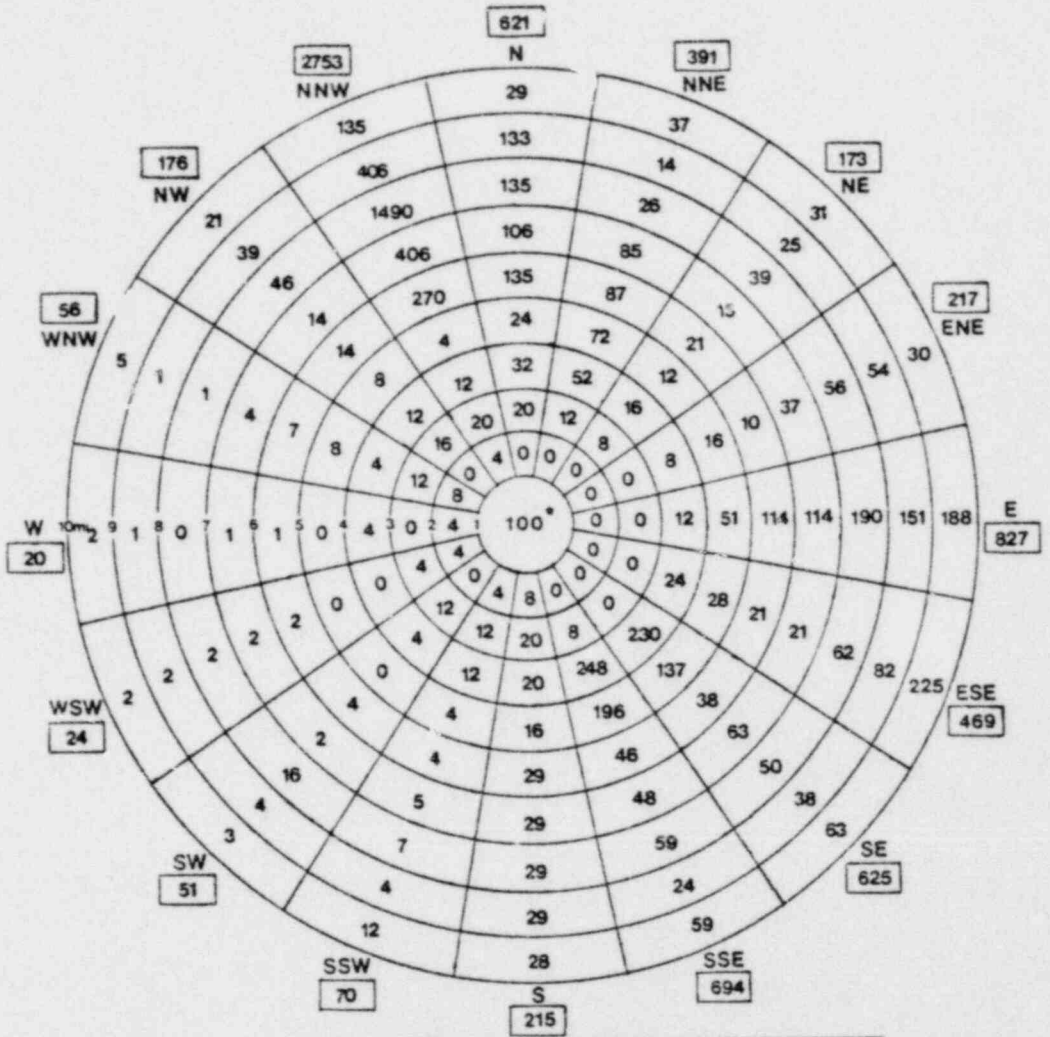
2.1 Sources of Data

The data used for the various 1990 and 2020 population estimates come from HL&P's most recent population estimates. A description of the data used in the preparation of this report is presented in Appendix A.

2.2 Data Derived for Use in Computer Model Analyses

Three population cases were identified. Two 10-mile radius population distributions were derived from the best available 1990 population data. These were delineated for the 1990 permanent population and the 1990 peak population. The third population distribution was the 2020 permanent population. The process used to derive these populations is described in Appendix A.

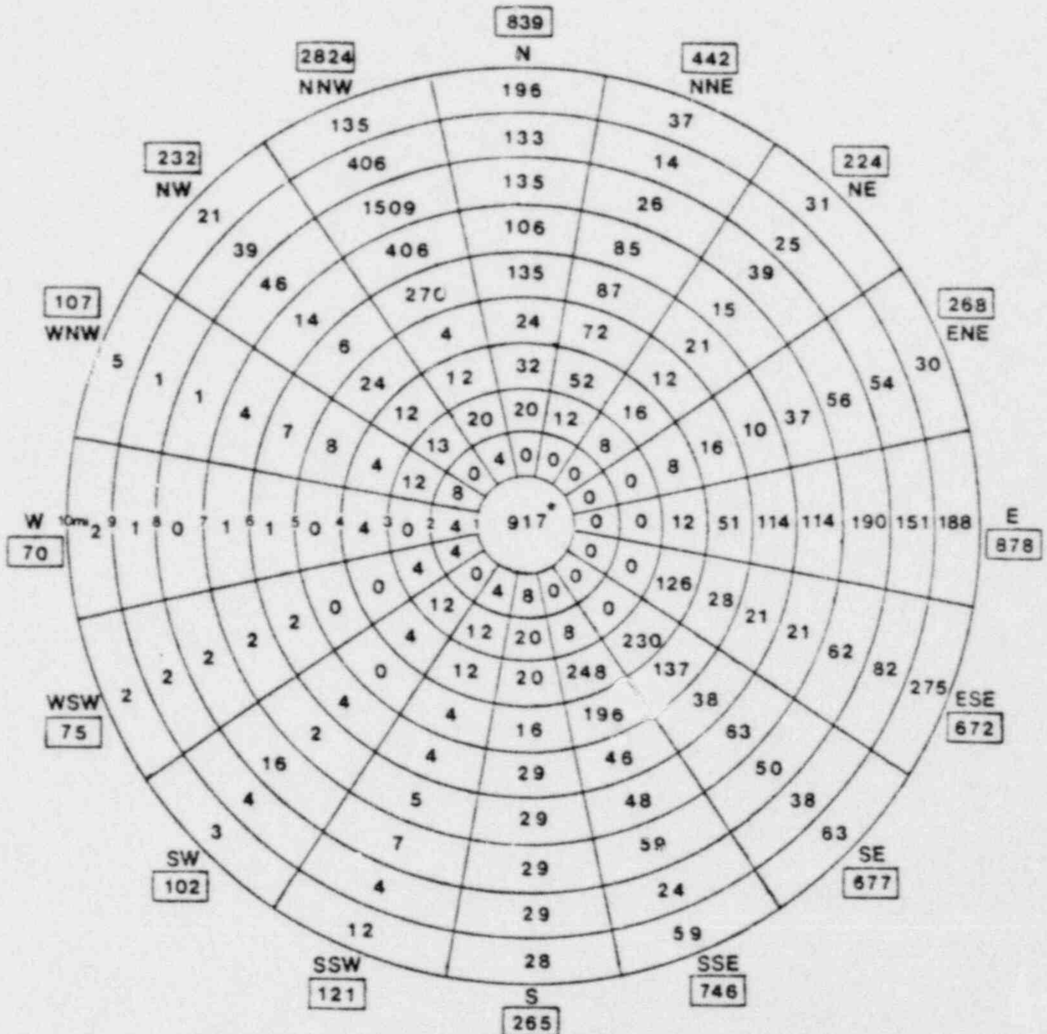
It is assumed that evacuation of the area would be accomplished by automobile. In order to estimate evacuation times, the three sets of population data were converted to corresponding numbers of automobiles. It was assumed that permanent residents would evacuate with 2.5 people per automobile. Workers were assumed to occupy one person per automobile. These are conservative assumptions. Other population groups included in the peak population were handled on a case-by-case basis. The resultant roses displaying the numbers of automobiles to be evacuated from the EPZ are shown in Figures 2-1, 2-2, and 2-3 for the 1990 permanent, 1990 peak and 2020 permanent populations, respectively.



AUTOMOBILE TOTALS			
RING, MILE	RING AUTOS	RING TOTALS	CUM. AUTOS
0 - 1	100	0 - 1	100
1 - 2	32	0 - 2	132
2 - 3	144	0 - 3	276
3 - 4	690	0 - 4	966
4 - 5	576	0 - 5	1542
5 - 6	803	0 - 6	2345
6 - 7	952	0 - 7	3297
7 - 8	2208	0 - 8	5505
8 - 9	1007	0 - 9	6512
9 - 10	870	0 - 10	7382

FIGURE 2-1 - NUMBER OF AUTOS FOR 1990 PERMANENT POPULATION

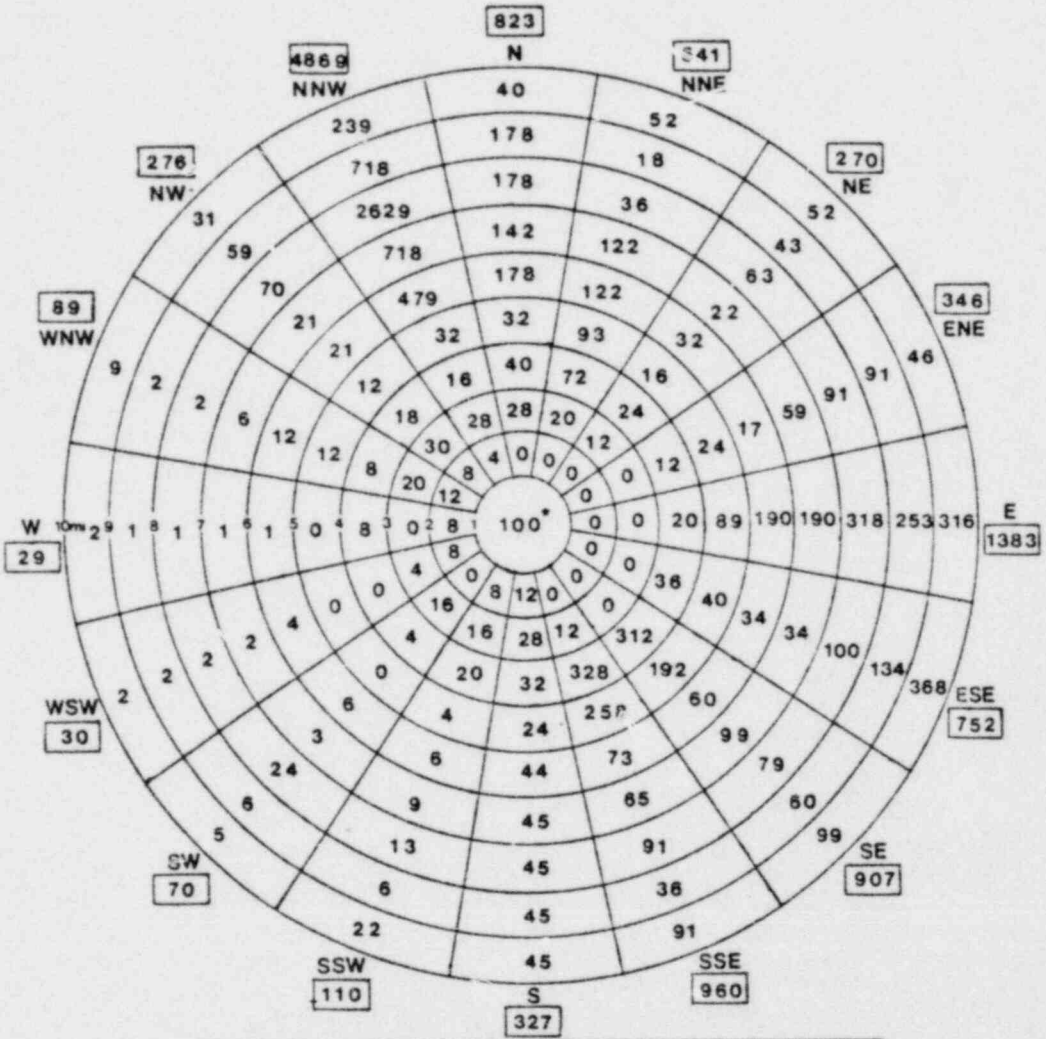
*Automobiles for 100 non-essential plant workers at Allens Creek site



AUTOMOBILE		TOTALS	
RING, MILE	RING AUTOS	RING TOTALS	CUM. AUTOS
0 - 1	917	0 - 1	917
1 - 2	32	0 - 2	949
2 - 3	141	0 - 3	1090
3 - 4	792	0 - 4	1882
4 - 5	592	0 - 5	2474
5 - 6	795	0 - 6	3269
6 - 7	952	0 - 7	4221
7 - 8	2227	0 - 8	6448
8 - 9	1007	0 - 9	7455
9 - 10	1087	0 - 10	8542

FIGURE 2-2 - NUMBER OF AUTOS FOR 1990 PEAK POPULATION

*Includes automobiles for 100 non-essential plant workers, 400 refueling workers and approximately 1,700 park visitors at Allens Creek site.



AUTOMOBILE TOTALS			
RING, MILE	RING AUTOS	RING TOTALS	CUM. AUTOS
0 - 1	100	0 - 1	100
1 - 2	60	0 - 2	160
2 - 3	214	0 - 3	374
3 - 4	950	0 - 4	1324
4 - 5	828	0 - 5	2152
5 - 6	1279	0 - 6	3431
6 - 7	1538	0 - 7	4969
7 - 8	3742	0 - 8	8711
8 - 9	1652	0 - 9	10363
9 - 10	1419	0 - 10	11782

FIGURE 2-3 - NUMBER OF AUTOS FOR 2020 PERMANENT POPULATION

*Automobiles for 100 non-essential plant workers at Allens Creek site.

3. EVACUATION NETWORK

3.1 Study Area

One vital element in assessing the compatibility of proposed plans with facility design features, site layout and site location is consideration of access routes and jurisdictional boundaries. An evaluation was made of the road system likely to be used by departing persons during an evacuation. Key roadways within a radius of 10 miles from the Allens Creek Project were examined. The 10-mile study area was selected to reflect the suggested size of the NRC plume exposure emergency planning zone (EPZ). The 10-mile EPZ used as the study area is shown in Figure 3-1. The area includes portions of five counties. The closest concentration of population is Wallis, Texas. It is located four miles southeast of the plant. The Town of Sealy, Texas is located approximately eight miles north of the plant. The 10-mile EPZ comports with the NRC's emergency planning regulations which generally require protection from exposure to a radioactive plume released during a hypothetical accident out to a distance of about 10 miles. There are no characteristics in the vicinity of ACNGS which would call for expanding or contracting the size of the plume exposure EPZ.

Six sources of information were used in compiling descriptions of the evacuation network: 1) county road maps compiled by the State of Texas, 2) USGS Quadrangle maps, 3) Preliminary Safety Analysis Report (PSAR) and Environmental Report (ER) for Allens Creek, 4) discussions with local law enforcement officials, 5) Flood Prone Area maps developed by the National Flood Insurance Program, and 6) data from a 10-mile area field survey conducted by HMM in February 1980. These sources of information provided data suitable for calculating times for evacuation of areas within the 10-mile EPZ through use of a computer model for simulation of various vehicle evacuation scenarios.

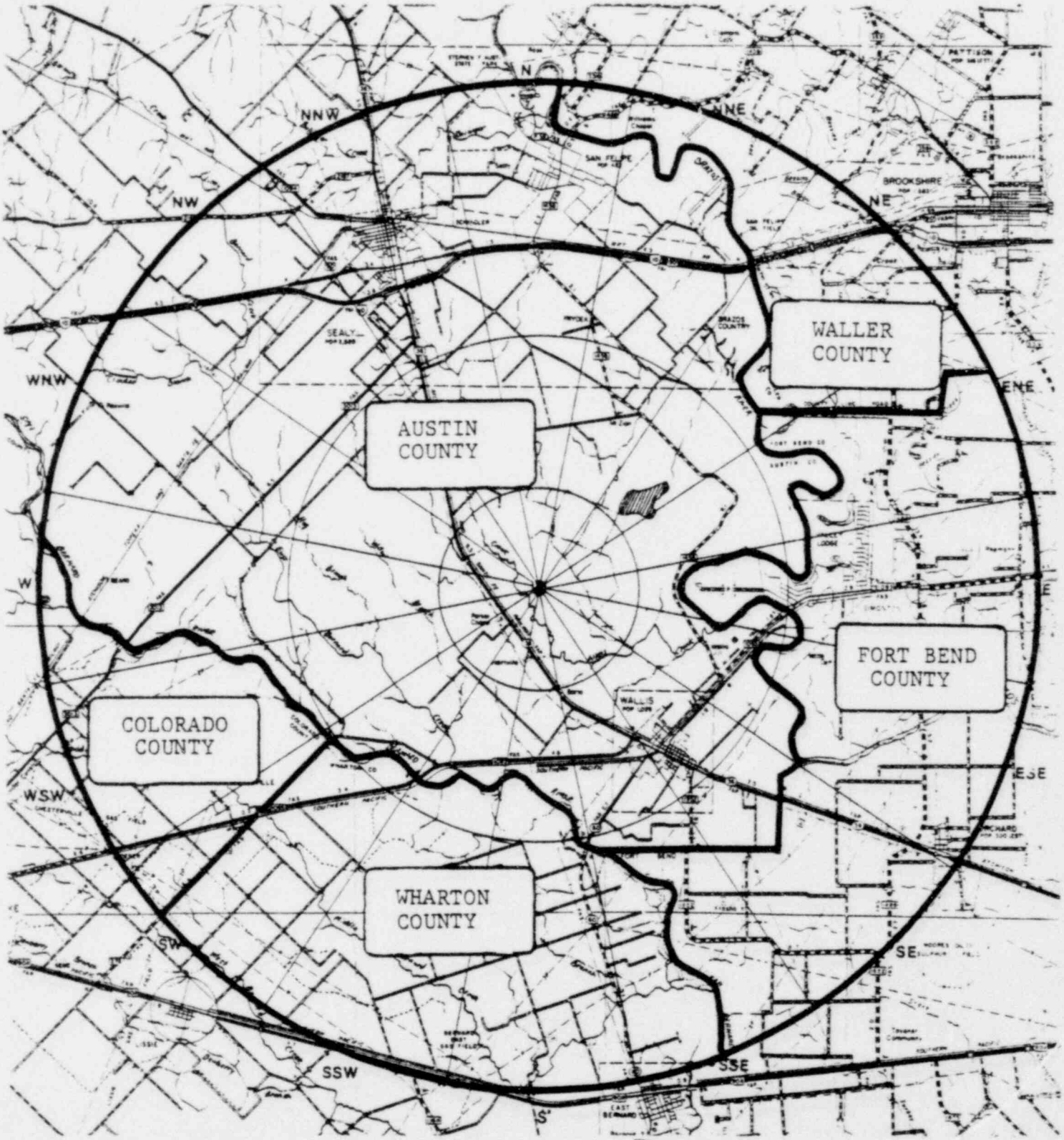


FIGURE 3-1 - 10-MILE RADIUS STUDY AREA

For all time estimates, HMM used the road network as it exists in 1980. This was done because the exact conformation of the road network in future years (1990 and 2020) is unknown at this time. This results in a conservative assumption, since it is probable that occasional road network improvements will be made during the next 10 to 40 years.

3.2 Network Definition for Use in the Computer Model

The system of access routes considered in the evacuation modeling consists of major streets and intersections within the 10-mile EPZ. The major streets included roadways of the following classifications.

1) Arterial Streets are characterized by continuity of travel. They connect business, population, or major recreation areas. They are characterized by traffic controls and geometric designs which enhance traffic flow and safety. In the vicinity of Allens Creek, these are generally heavy duty two lane roads capable of carrying significant traffic at high speed.

2) Connector Streets are links between business or residential areas (served by local roads) and arterial streets.

Most vehicles enter the evacuation network via the smaller local residential and business roadways. Because these local roads are "upstream" of the major streets which make up the evacuation network, the movement of traffic on these smaller roads was not evaluated as part of the computer model simulation. The methodology used for movement of autos onto the network is discussed in Section 4.4.

In addition to the major roadways, the evacuation network included the intersections of major streets. The intersections are particularly important, since the ability of intersections to handle traffic can be the major capacity constraint during an evacuation.

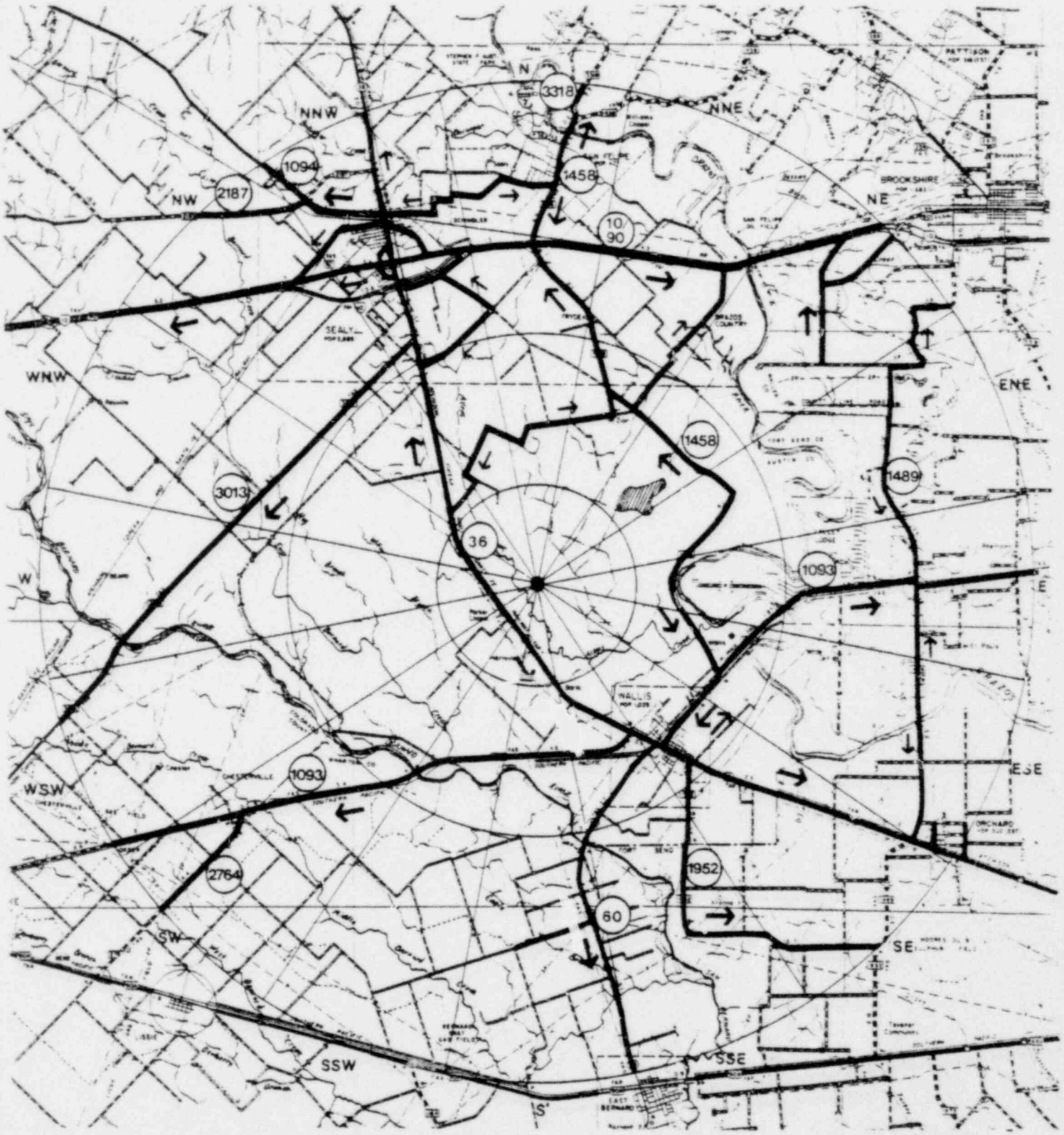


FIGURE 2.2 - NETWORK OF MAJOR STREETS AND INTERSECTIONS

The network of major streets and intersections considered in the evacuation analysis is shown in Figure 3-2. Figure 3-2 also indicates traffic flow likely to be used during evacuations. Major roads which would service the Allens Creek EPZ during an evacuation would include: Route 36, which lies in an approximate north to southeast direction, connecting the ACNGS site to Sealy and Wallis; Interstate Highway 10 leading east and west from Sealy; Route 1093 radiating east and west from Wallis; and Routes 36 and 60 heading southeast and south from Wallis. Table 3-1 is a list identifying the access routes in the network.

For the purposes of calculating evacuation times, this evacuation network was computer coded into a system of "nodes" and "links". The nodes correspond to network intersections, and the links correspond to the individual roadway segments between the nodes. Figure 3-3 is a diagram of the types of nodes and links discussed in the following sections.

3.3 Internal Links and Nodes

A total of 99 internal links, representing actual road segments, are included in the network. A total of 75 internal nodes, representing actual and representative intersections within the model, were included in the network. Representative nodes were required in the evacuation simulation in two instances: where a number of local roads join the model's network, and in cases where it was deemed desirable to measure traffic flow past a certain point. The internal nodes and links used in the Allens Creek road network are shown in Figure 3-4a.

3.4 Entry and Exit Nodes and Links

Entry links and nodes were the mechanisms used in the computer model to move automobiles onto the network for evacuation. For modeling purposes, the estimated number of automobiles (identified in Section 2.2) were assumed to enter the network at entry nodes. Entry nodes were used as surrogates for all the parking lots, driveways, smaller streets, etc., from which the evacuating automobiles originate.

TABLE 3-1

MAJOR ROADS WITHIN 10 MILES OF THE ALLENS CREEK PROJECT

Rt. 36
Rt. 60
FM 1093
FM 2764
FM 1952
FM 1489
FM 1458
FM 3013
FM 2187
FM 1094
FM 3318
Road from Bernard Prairie School to Rt. 60
Interstate 10/90 and Frontage Road
Peschel Lane in Sealy
Main Street, Sealy
Rt. 36 by-pass, Sealy
Road from Rt. 90 west of Rt. 36 to Main Street, Sealy
Road from intersection of Rt. 36 and FM 1094 in Sealy to FM 1458 in San Felipe
Ward Bend Road, Sealy
Stockold Road, Sealy
Mixville Road, Sealy
Chew Road, Frydex
Peak Ridge Road, Brookshire
Donigan Road, Brookshire

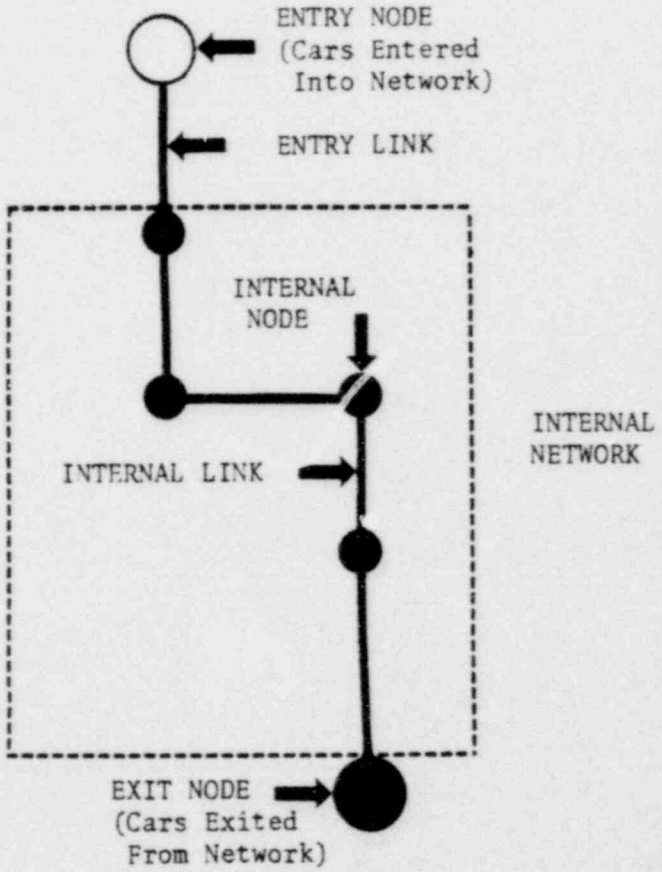


FIGURE 3-3 - SCHEMATIC DIAGRAM OF LINKS AND NODES

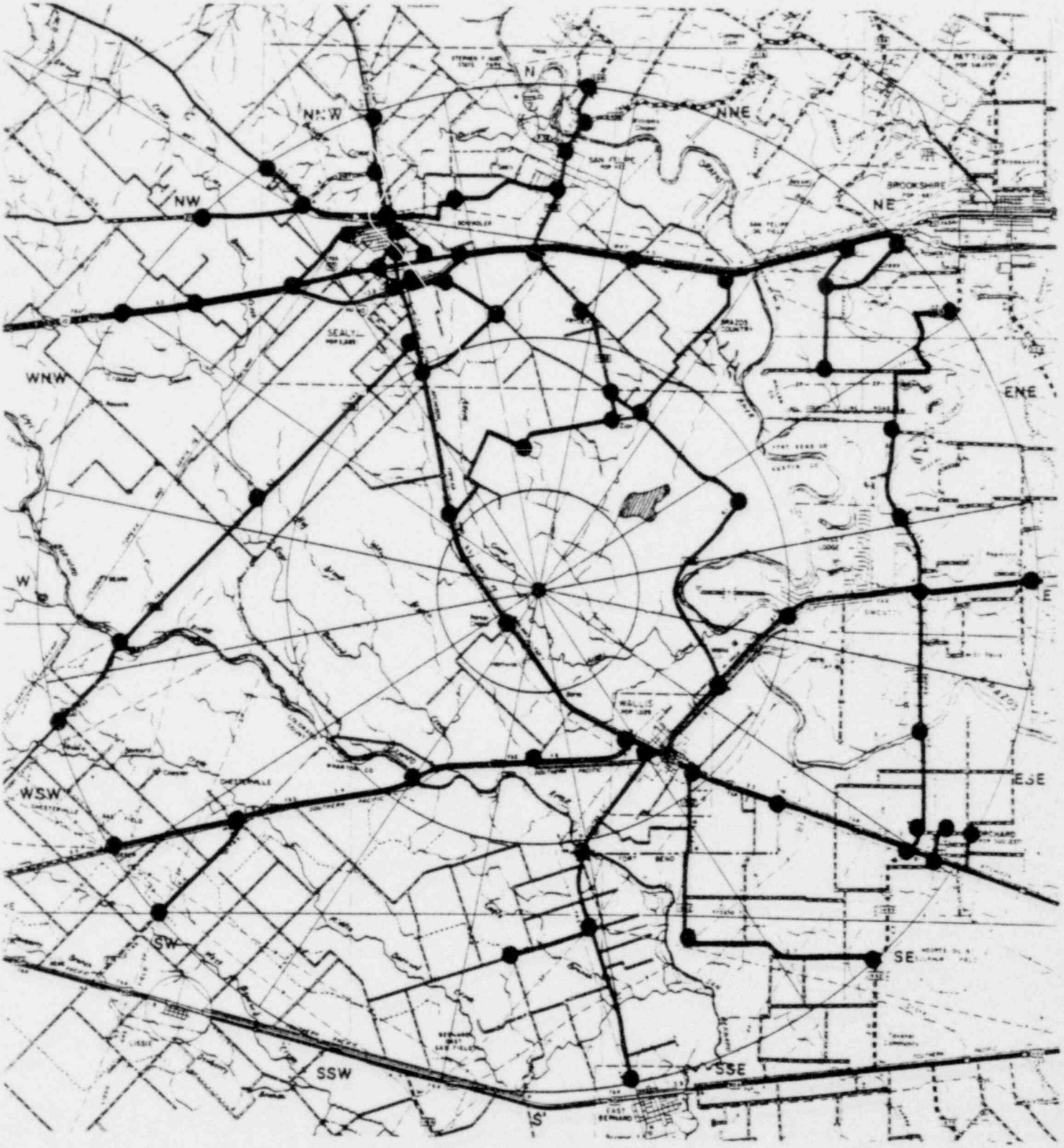


FIGURE 3-4a - INTERNAL LINKS AND NODES FOR THE FULL 10-MILE RADIUS EVACUATION

For the Allens Creek network, the estimated numbers of cars, based on the permanent or peak populations (as per Section 2.2) were assigned to one of 35 entry nodes. From the entry nodes, the cars were simulated to travel along the 35 entry links where they entered the internal network, on a stochastic basis, at appropriate internal nodes. The vehicles were advanced through subsequent internal nodes on the basis of predetermined turning movements. The travel speed of vehicles was determined by the simulation model according to the amount of traffic carried by links and nodes. Maximum speed of vehicles was controlled by operators of the model. Once carried through the internal network by the simulation process, the vehicles were simulated to leave the internal network at the exit nodes. Exit nodes were designated nodes lying outside the area being evacuated. For example, for the full 10-mile radius evacuation, exit nodes were placed on major streets beyond the radius of the 10-mile study area and by the entrances to Interstate Route 10. For the full 10-mile radius evacuation, the internal links and nodes and the entry and exit nodes are shown in Figure 3-4a and 3-4b. The time required to evacuate a given area was the time required for all traffic to pass by the exit nodes designated for that area.

3.5 Initialization Process

For purposes of conservatism, a vehicle loading initialization process was employed. This involved placing a certain amount of background traffic on the road network prior to the start of the evacuation process. This group of automobiles was distinct from the automobiles identified in Section 2.2 (residents, students, workers, etc.). Thus, the evacuation time estimates ultimately developed were based on evacuation of both background traffic and the subject population groups for the years 1990 and 2020. Initialization involved approximately 700 automobiles for scenarios involving the permanent population and 1400 automobiles for scenarios involving the peak population.

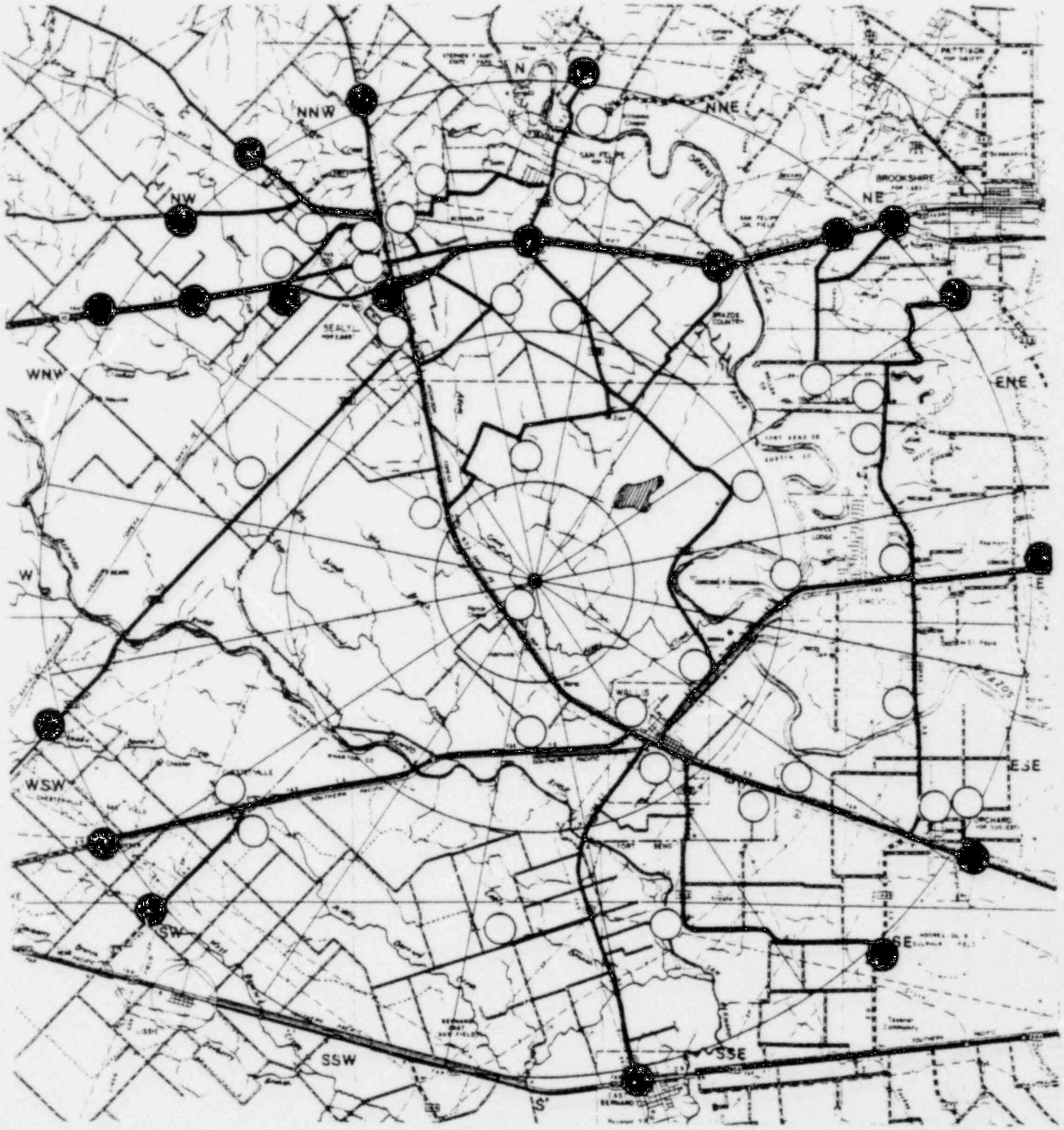


FIGURE 3-4b - ENTRY NODES AND EXIT NODES FOR THE FULL 10-MILE RADIUS EVACUATION

Legend: Entry Node.. ○

Exit Node ●

4. EVACUATION MODEL AREAS, CASES AND SCENARIOS

The NRC letter of December 26, 1979 indicates a need for evacuation time estimates for several scenarios. The following excerpt from the letter outlines the data requirements of NRC:

> The areas for which evacuation estimates are required must encompass the entire area within a circle of about 10 miles radius, and have outer boundaries corresponding to the plume exposure EPZ. These areas are as follows:
>
> | Distance | Area |
> |---|---|
> | 2 miles | two 180° sectors |
> | 5 miles | four 90° sectors |
> | about 10 miles | four 90° sectors |
>
> Estimates for the outer sectors should assume that the inner adjacent sectors are being evacuated simultaneously. To the extent practical, the sector boundaries should not divide densely populated areas...
>
> Two estimates are requested in each of the areas defined in item 1 for a general evacuation of the population (not including special facilities). A best estimate is required and an adverse weather estimate is required for movement of the population.

The Final Rule on emergency planning includes more general language, but it appears to require approximately the same thing.

To respond to the NRC requests, HMM defined a series of areas, cases and scenarios. Areas were defined as geographic areas. Cases were assumed combinations of weather and population conditions. Time estimates were developed for scenarios, and each scenario was made up of one case and one or more areas.

4.1 Areas

Eleven geographic areas were identified for the evacuation time analysis. These were identified on the basis of meteorological and jurisdictional considerations. On the basis

of meteorological considerations, four quadrants of approximately 90 degrees centered at the site were identified. On the basis of jurisdictional and geographical considerations, conspicuous natural and man-made boundaries were chosen for these quadrants which could be readily identified by residents and government officials. The principal boundaries identified were county boundaries and Rt. 36. Three radial lines connecting the plant and three tri-county intersections were also used. The outer boundaries of the eleven areas are primarily defined by circles having radii of 2-miles, 5-miles and 10-miles. None of the eleven areas overlap. See Figure 4-1.

Area 1 includes all land within 2 miles of the plant plus all area included in the lake and the two parks. This area corresponds approximately to the 2-mile radius area of interest to the NRC. This area was not divided into two sectors of 180^{0} each, because it consists largely of site and park property.

Areas 2, 3, 4 and 5 correspond approximately to 90^{0} quadrants located from 2 to 5 miles from the plant.

Area 2 lies approximately southwest of the plant between the 2-mile and 5-mile circles. Specifically, it is bounded by: the 2-mile circle on the northeast; on the northwest by a radial between the plant and the intersection point of Austin, Colorado and Wharton Counties; on the southwest by the 5-mile circle; and by a radial line between the plant and boundaries of Austin, Fort Bend and Wharton Counties. Area 2 might be evacuated in the event of a northeast wind.

Area 3 lies southeast of the plant. It is bounded by: the 2-mile circle and the site on the west; on the southwest by the radial from the plant to the intersection point of Austin, Fort Bend and Wharton Counties; the 5-mile circle on the southeast; and the radial from the plant to the intersection point of Austin, Fort Bend, and Waller Counties. Area 3 might be evacuated in the event of a northwest wind.

Area 4 lies northeast of the site. It is bounded by: the 2-mile circle on the southwest; on the southeast by the radial from the plant to the intersection point of Austin, Fort Bend,

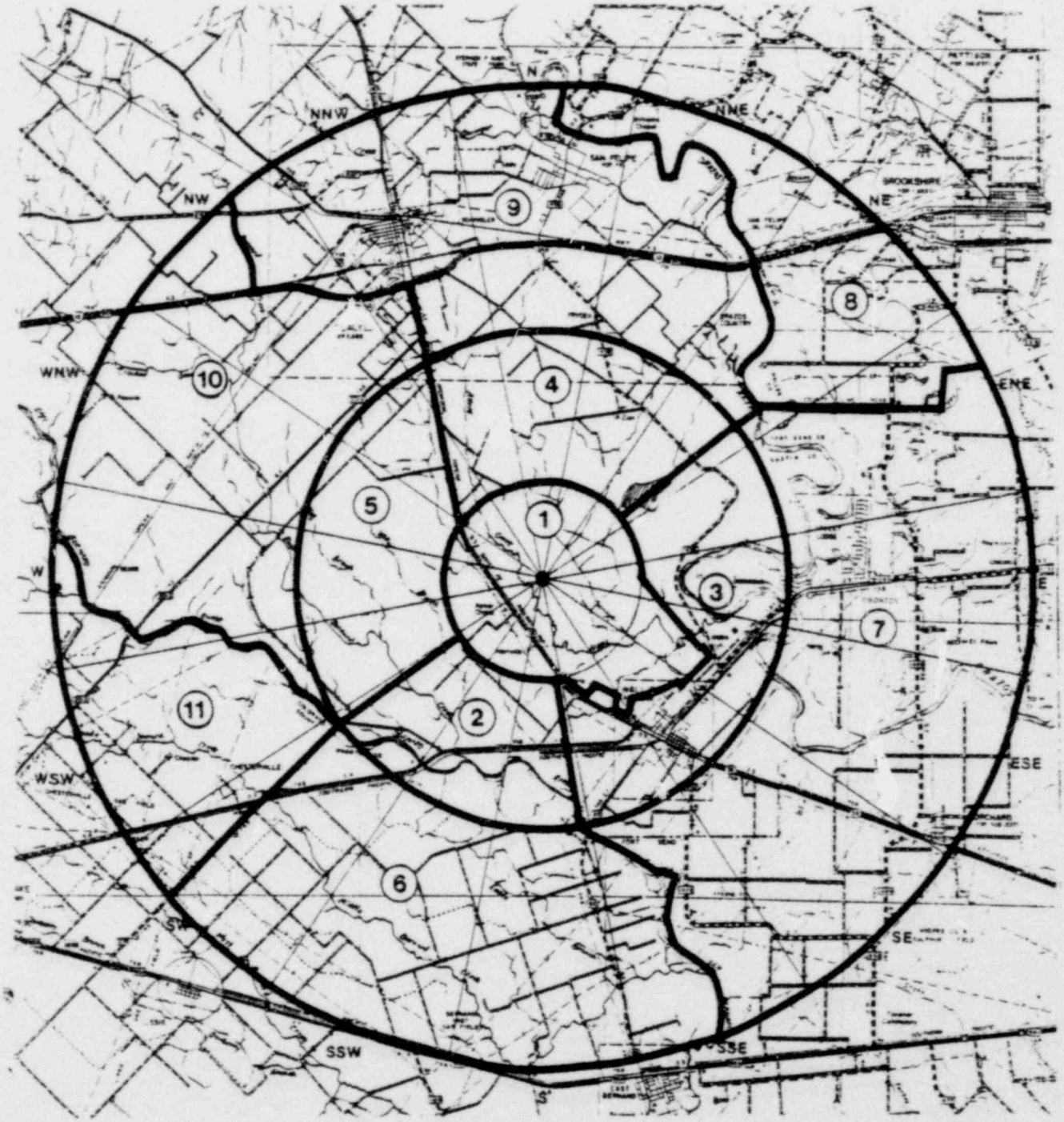


FIGURE 4-1 - AREAS 1 THROUGH 11

and Waller Counties; the 5-mile circle on the northeast; and Rt. 36 on the west. Area 4 might be evacuated in the event of a southwest wind.

Area 5 lies northwest of the plant. Area 5 is bounded by: the 2-mile circle on the east; Rt. 36 on the northeast; the 5-mile circle on the west; and on the southeast by a radial from the plant to intersection of Austin, Colorado and Wharton Counties. Area 5 might be evacuated in the event of a southeast wind.

Area 6 lies southwest of the plant. It is bounded: on the northeast by the 5-mile circle; on the northwest by the Colorado-Wharton County line; on the southwest by the 10-mile circle; and on the east by the Wharton-Fort Bend County line. Area 6 might be evacuated in the event of a north wind. Area 6 is made up exclusively of portions of Wharton County.

Area 7 lies southeast of the plant. It is bounded by: the 5-mile circle on the west; by the Wharton-Fort Bend County line of the southwest; by the 10-mile circle on the southeast; by the Fort Bend-Waller County line on the north; and on the northwest by a line between the plant and the intersection point of Waller, Austin and Fort Bend Counties. Area 7 might be evacuated in the event of a northwest wind.

Area 8 lies northeast of the site. It includes all portions of Waller County within 10 miles of the plant. It might be evacuated in the event of a southwest wind.

Area 9 lies north of the site. It contains those portions of Austin County lying north of the site. It is bounded: on the southeast by the 5-mile circle; on the east by the radial between the plant and the intersection point of Austin, Fort Bend and Waller Counties; on the northeast by the Austin-Waller County line; on the northwest by the 10-mile circle; and on the west by Route 36, Interstate 10, and Little Bernard Creek. Area 9 might be evacuated in the event of a south wind.

Area 10 lies northwest of the site. It is bounded by: the 5-mile circle and Route 36 on the east; Interstate 10 and Little Bernard Creek on the north; the 10-mile circle on the west; and the Austin-Colorado County line on the south. Area 10 might be evacuated in the event of a southeast wind.

Area 11 lies west of the site. It includes all portions of Colorado County within 10 miles of the plant. It might be evacuated in the event of an east wind.

4.2 Cases

Cases were defined according to population and weather conditions. Four base cases were analyzed. In order to identify a range of times for evacuation, estimates were developed for a "best estimate" case as well as several conservative cases.

Case A involved evacuation of the 1990 permanent population via the 1980 road network during good weather. This was intended to correspond to the NRC request for a "best estimate". Since population roses developed in the most recent HL&P population estimates locate persons in their residences, the evacuating population was assumed to originate from residences. Since most people spend more time at home than any other specific place, it is reasonable to evaluate at least one case in which an evacuation is initiated while people are at home, with all schools and workplaces closed. The permanent population was also assumed to include 100 non-essential workers at the Allens Creek site, which will operate 24 hours per day. Good weather was defined to be clear weather, day or night, with no fog, precipitation, or other weather conditions to limit vehicle speed or visibility. Target speeds used were posted speed limits, with occasional variations depending on road design or capacity.

Case B was intended to be a very conservative estimate, as compared to the Case A best estimate. Case B was based on evacuation of 1990 peak population via the 1980 road network during adverse weather. The peak population for Case B was defined to include the total of the following:

- o permanent population included in Case A (i.e., assume all residents are at home);
- o school population (i.e., assume all schools are full);
- o seasonal population (i.e., assume all seasonal resort homes are occupied);
- o recreational population (i.e, assume the typical peak number of recreational visitors is in the EPZ); and
- o certain occupational groups (i.e., assume that all teachers are at school, and that 400 extra workers are at Allens Creek for a refueling).

Note that the peak population above is overly conservative. For example, it has been assumed that all residents, some of whom are students and workers, are in their homes. Meanwhile, it has also been assumed that all students are at school and certain workers are at work. Obviously, they cannot be in two places at the same time. This is double counting, and it generally leads to overly conservative results (i.e., overly long time estimates). Adverse weather was defined as bad weather, not worst possible weather. Specifically, adverse weather was defined as a severe storm or fog, summer or winter, which would substantially reduce visibility and driving

speeds. Travel speeds for adverse weather were targeted at approximately one-half of posted speed limits, with occasional variations depending on the road design and capacity. Adverse weather conditions could occur during a time of peak population.

Case C is similar to Case A. Case C involved evacuation of the year 2020 permanent population during good weather via the 1980 road network. This is a conservative case. It assumes that 40 years of population growth will occur with no accompanying expansion of the capacity of the road system. In fact, it is unlikely that the road system would not be upgraded during forty years of population growth. Examination of Case C is useful as a test of the sensitivity of evacuation times to increases in population.

Case D is more conservative than Case C. It involved using the 1980 road system to evacuate the year 2020 permanent population during adverse weather. Cases C and D should provide some indication of the sensitivity of evacuation times to adverse weather. Case C and Case D did not attempt to evaluate evacuation of the peak 2020 population. It was felt that development of a year 2020 peak population estimate analogous to the 2020 permanent population would not be meaningful at this time.

4.3 Scenarios

A scenario was defined as the evacuation of a specified population, during specified weather conditions, from a specified area or group of areas. Thus, scenarios include one case and one or more areas. Most scenarios involve more than one area because inner adjacent areas are also included in estimates. Evacuation time estimates have been developed for 48 scenarios. Each of the areas either individually or in combinations were evaluated according to Cases A, B, C, and D. In Table 4-1, Roman numerals have been used to denote the

twelve area combinations examined. Figures 4-I through 4-XII indicate the twelve geographic areas for which scenarios were developed.

TABLE 4-1

SCENARIOS WITH GEOGRAPHIC AREAS

Scenario			Corresponding
	Areas	Cases	Wind Direction
I	1	A,B,C,D	360° 2-mile
II	1,2	A,B,C,D	NE
III	1,3	A,B,C,D	W,NW
IV	1,4	A,B,C,D	S,SW
V	1,5	A,B,C,D	E,SE
VI	1,2,3,4,5	A,B,C,D	360° 5-mile
VII	1,4,9	A,B,C,D	SE
VIII	1,5,10,11	A,B,C,D	E
IX	1,2,6	A,B,C,D	N
X	1,3,7	A,B,C,D	W,NW
XI	1,4,8,9	A,B,C,D	S,SW
XII	1,2,3,4,5,6,7,8,9,10,11	A,B,C,D	360° 10-mile

Thus, Scenario IA corresponds to evacuation of the permanent 1990 population of Area 1 during good weather. Scenario VIIIB corresponds to evacuation of the peak 1990 population of the combination of Areas 1, 5, 10, and 11 during adverse weather.

4.4 Vehicle Loading

As discussed in Section 3.5, it is unlikely that the roads would be empty when an evacuation is declared. Thus, prior to initiation of the evacuation scenarios, an initialization process was conducted. This involved placing a certain amount of background traffic on the roads prior to the notice to evacuate. The evacuation times ultimately identified correspond to the evacuation of this background traffic as well as evacuation of the subject populations.

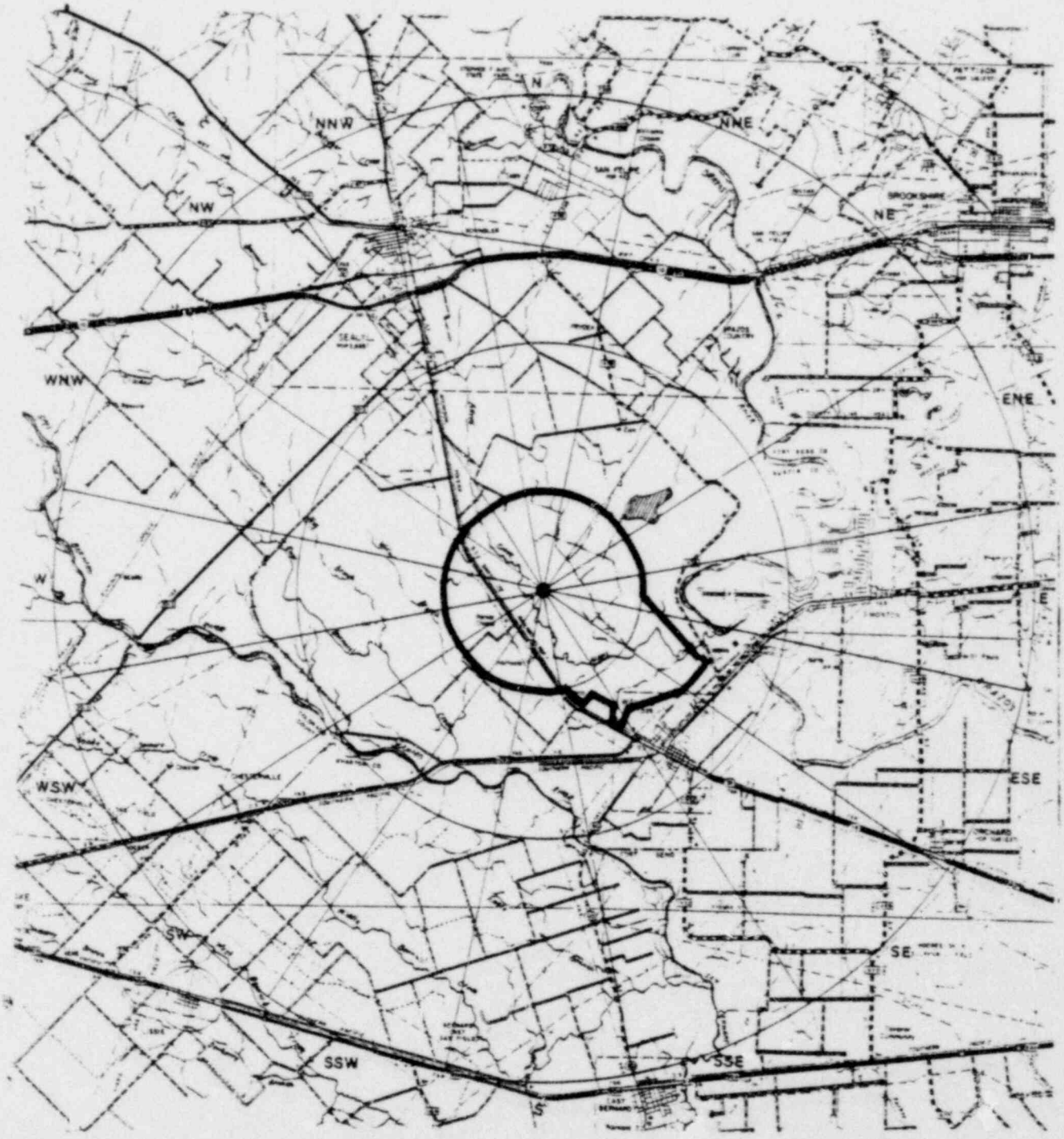


FIGURE 4-I - SCENARIO I
Area 1

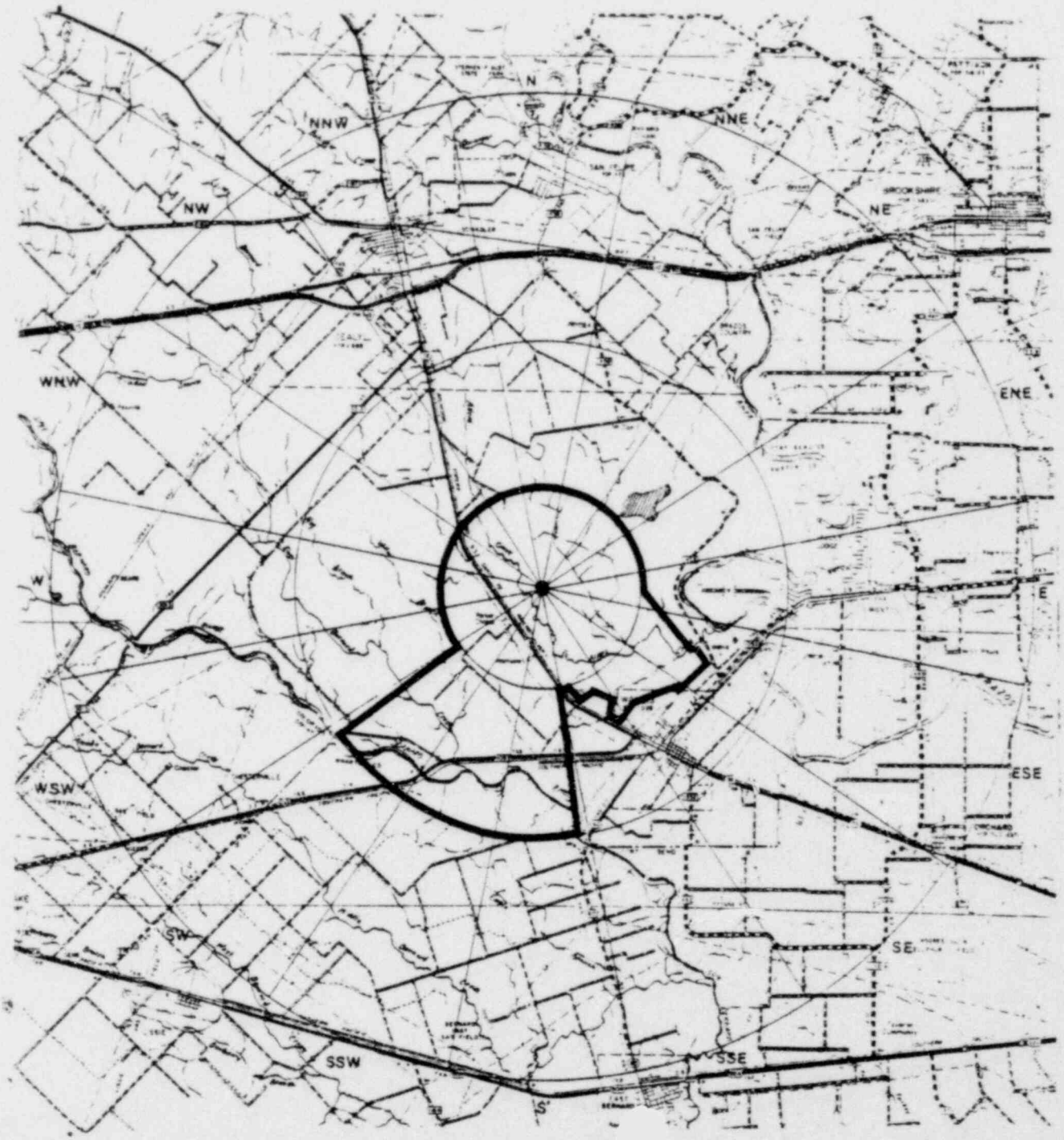


FIGURE 4-II - SCENARIO II

Areas 1 and 2

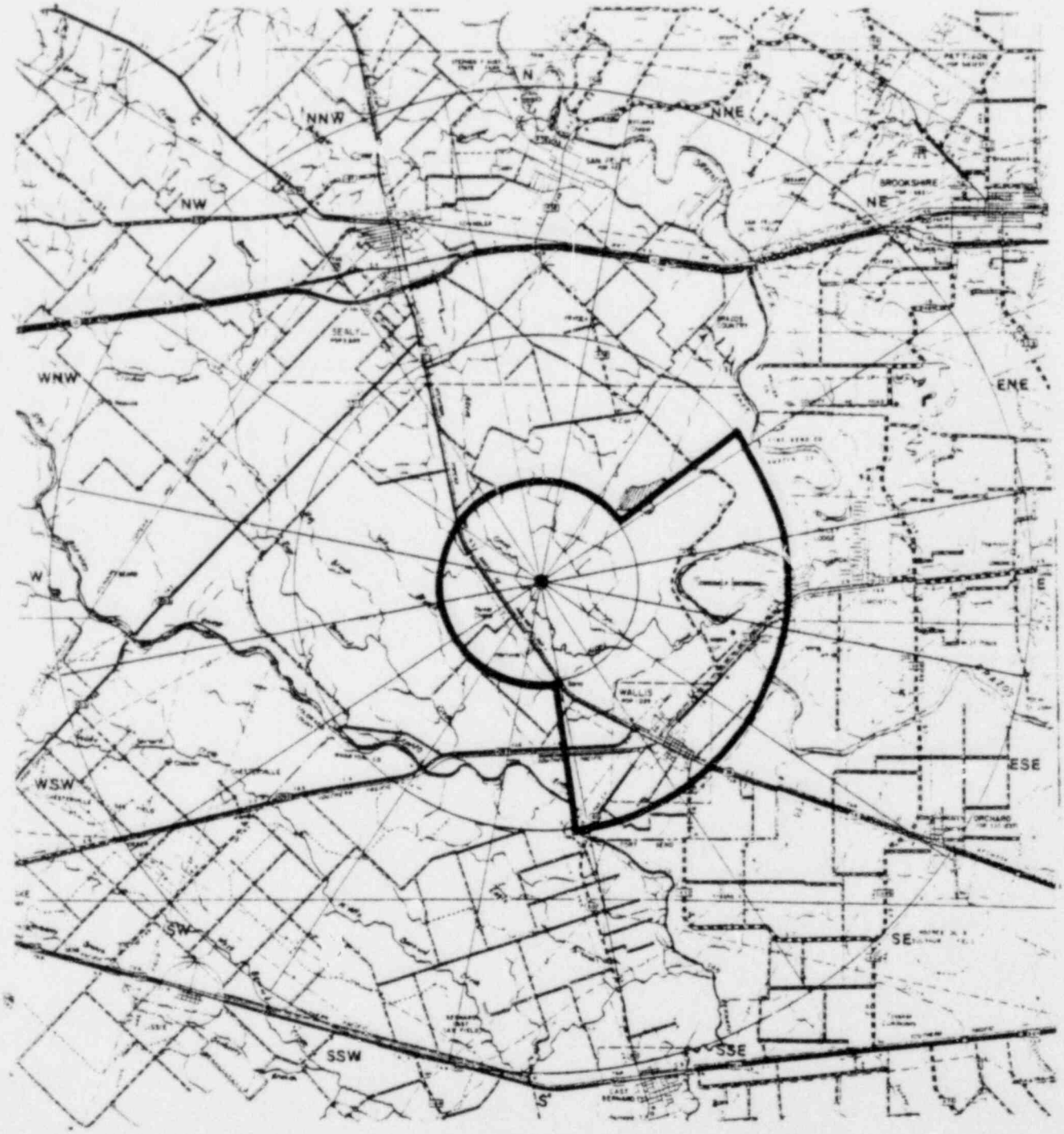


FIGURE 4-III - SCENARIO III
Areas 1 and 3

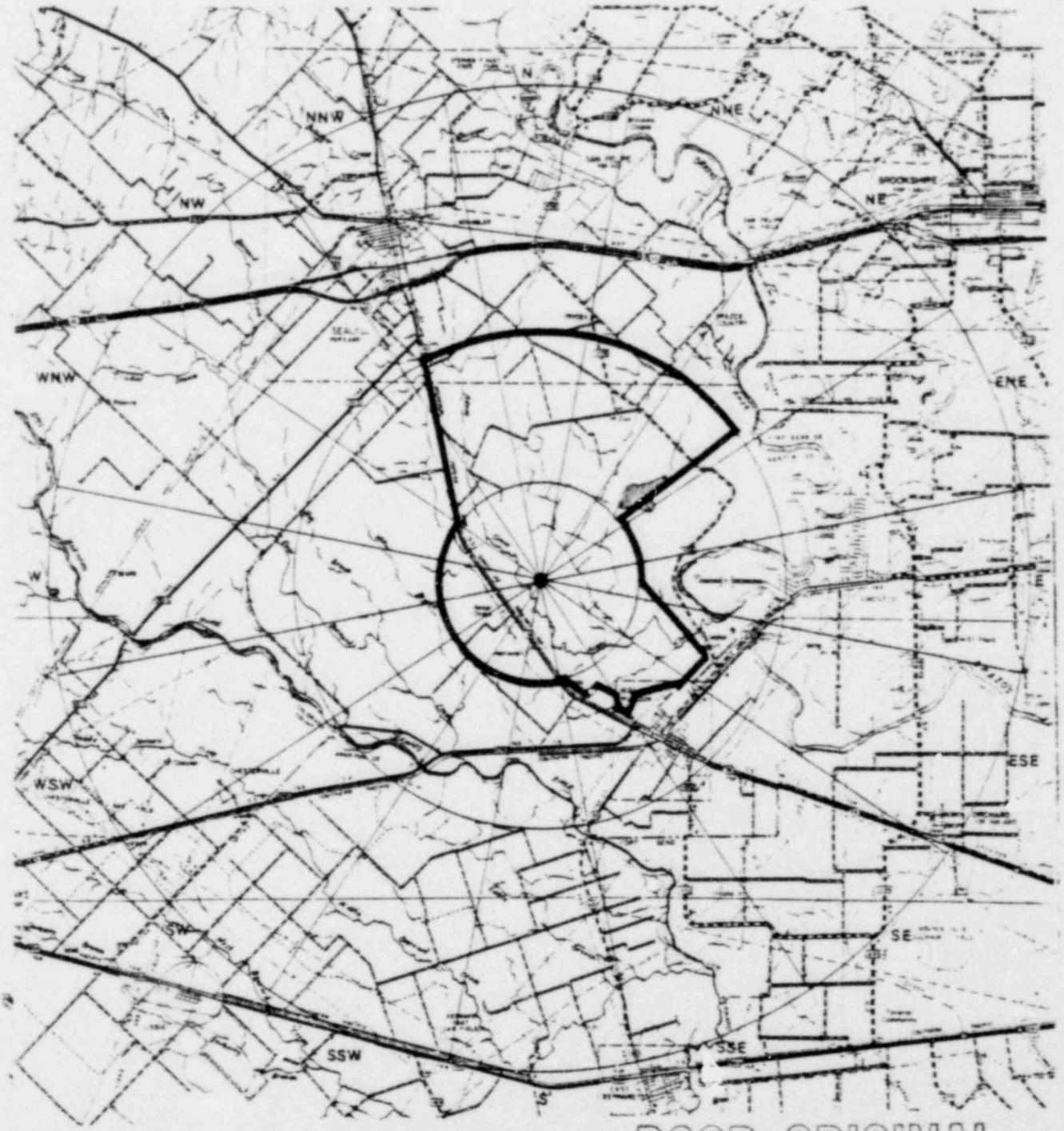


FIGURE 4-IV - SCENARIO IV
Areas 1 and 4

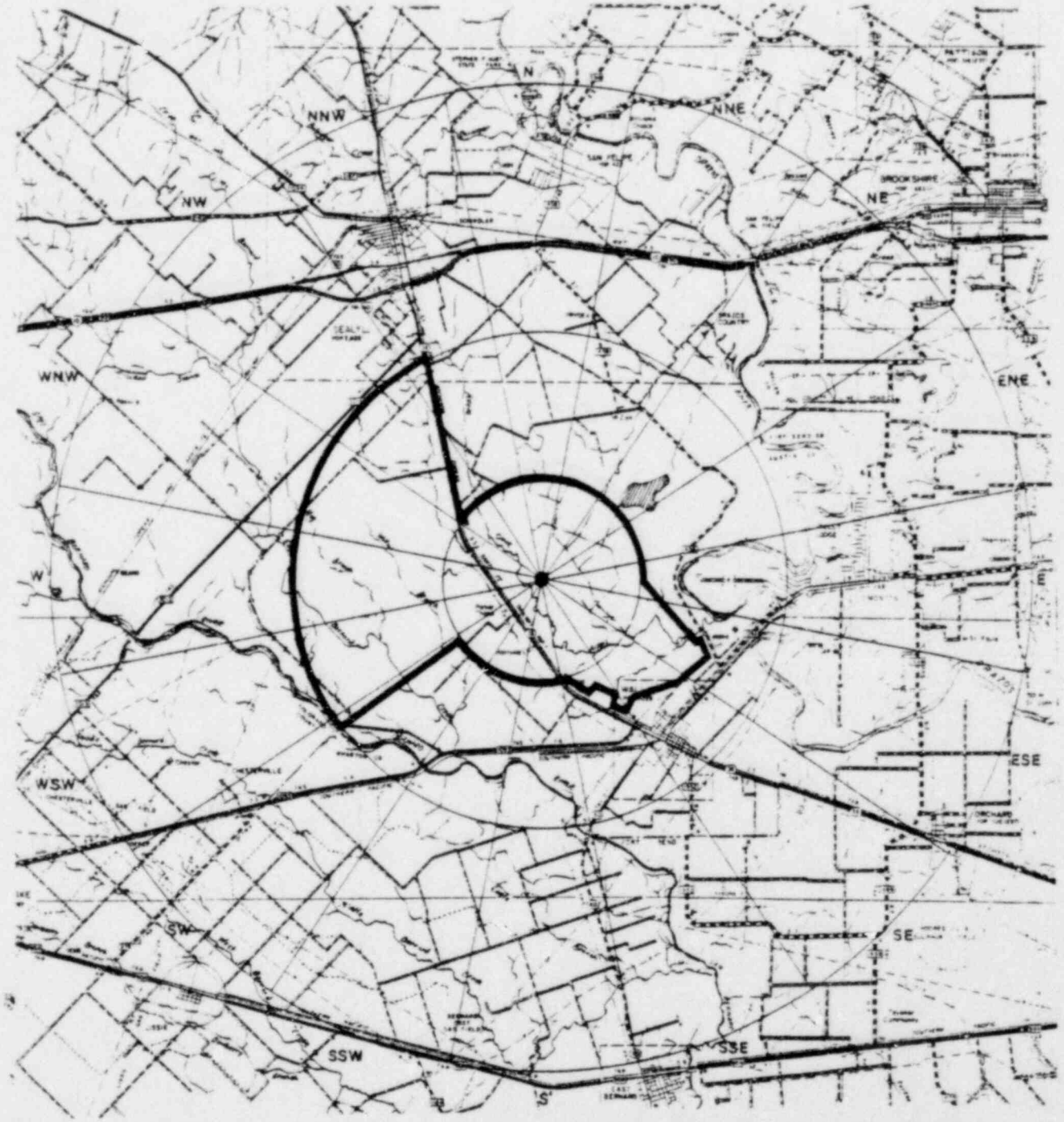


FIGURE 4-V - SCENARIO V
Areas 1 and 5

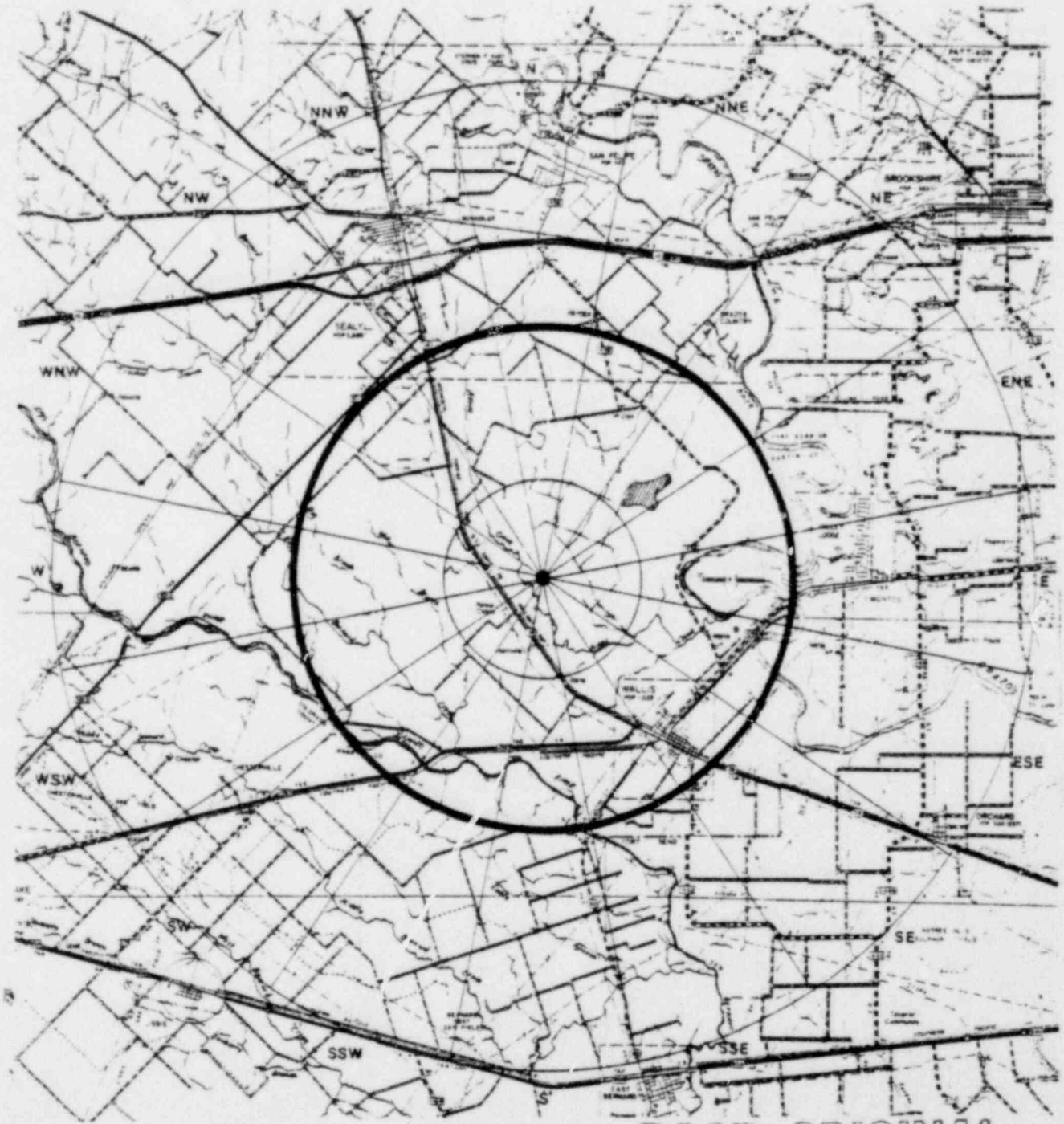


FIGURE 4-VI - SCENARIO VI
Areas 1 through 5

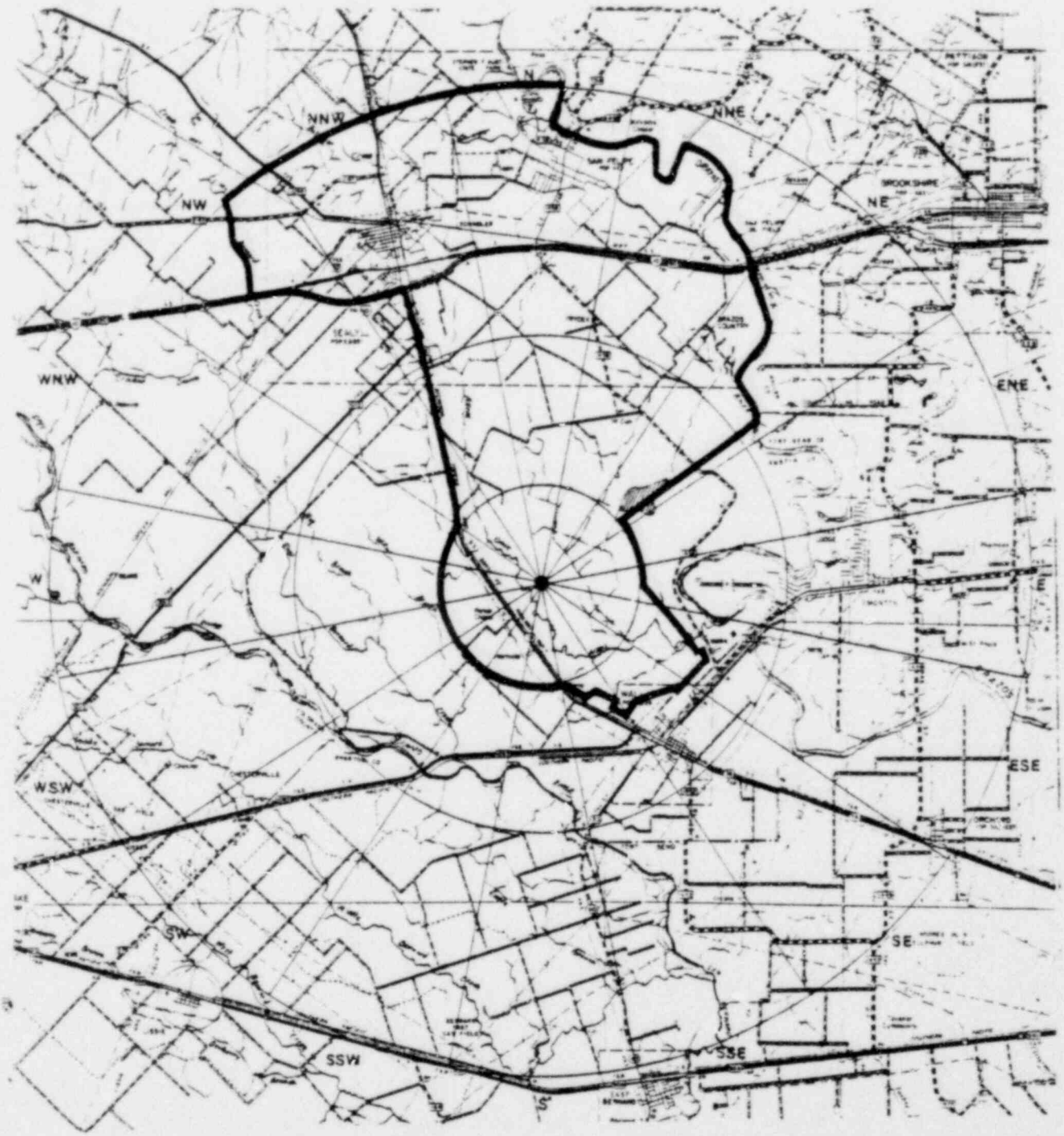


FIGURE 4-VII - SCENARIO VII

Areas 1, 4, and 9

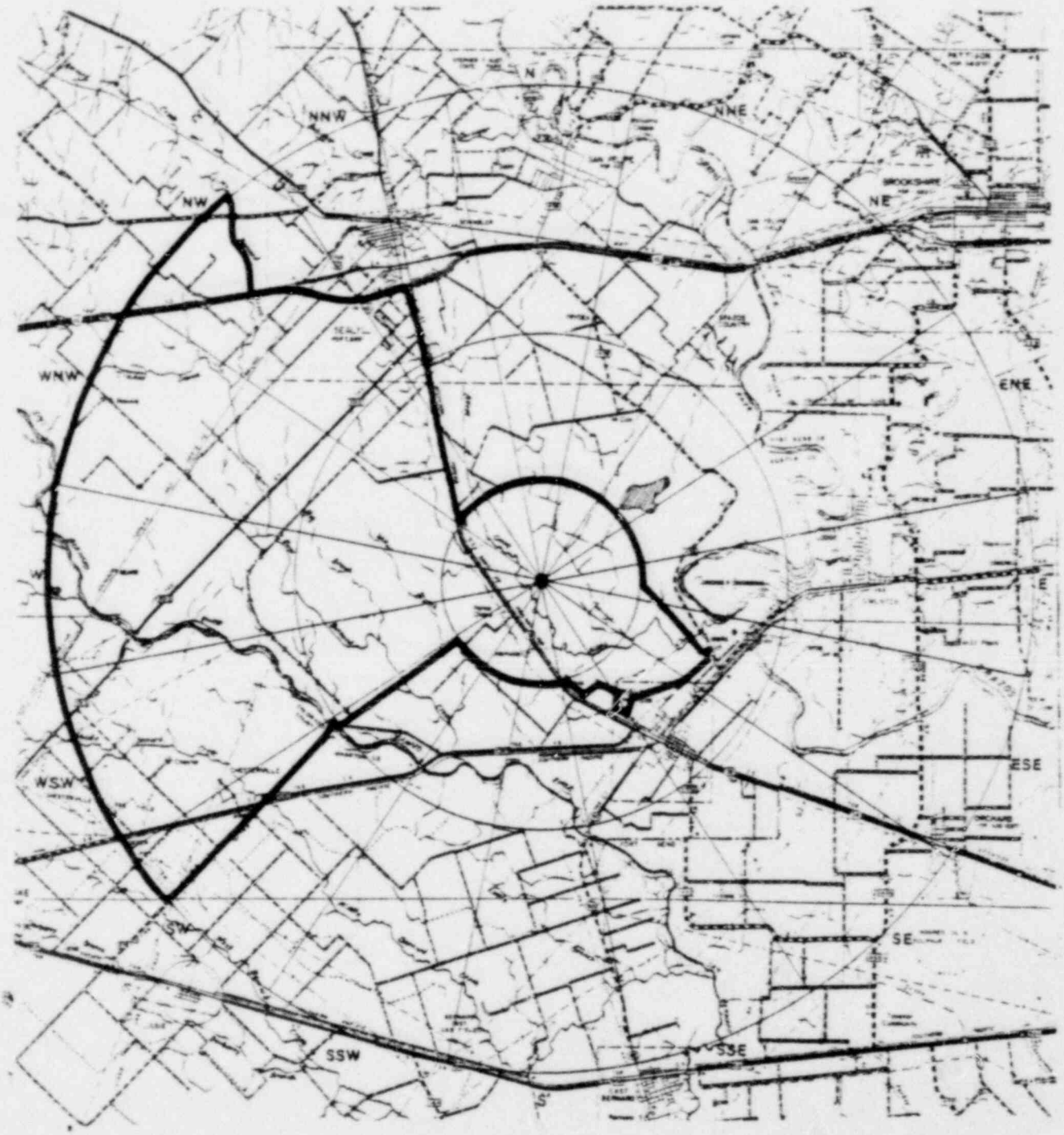


FIGURE 4-VIII - SCENARIO VIII
Areas 1, 5, 10, and 11

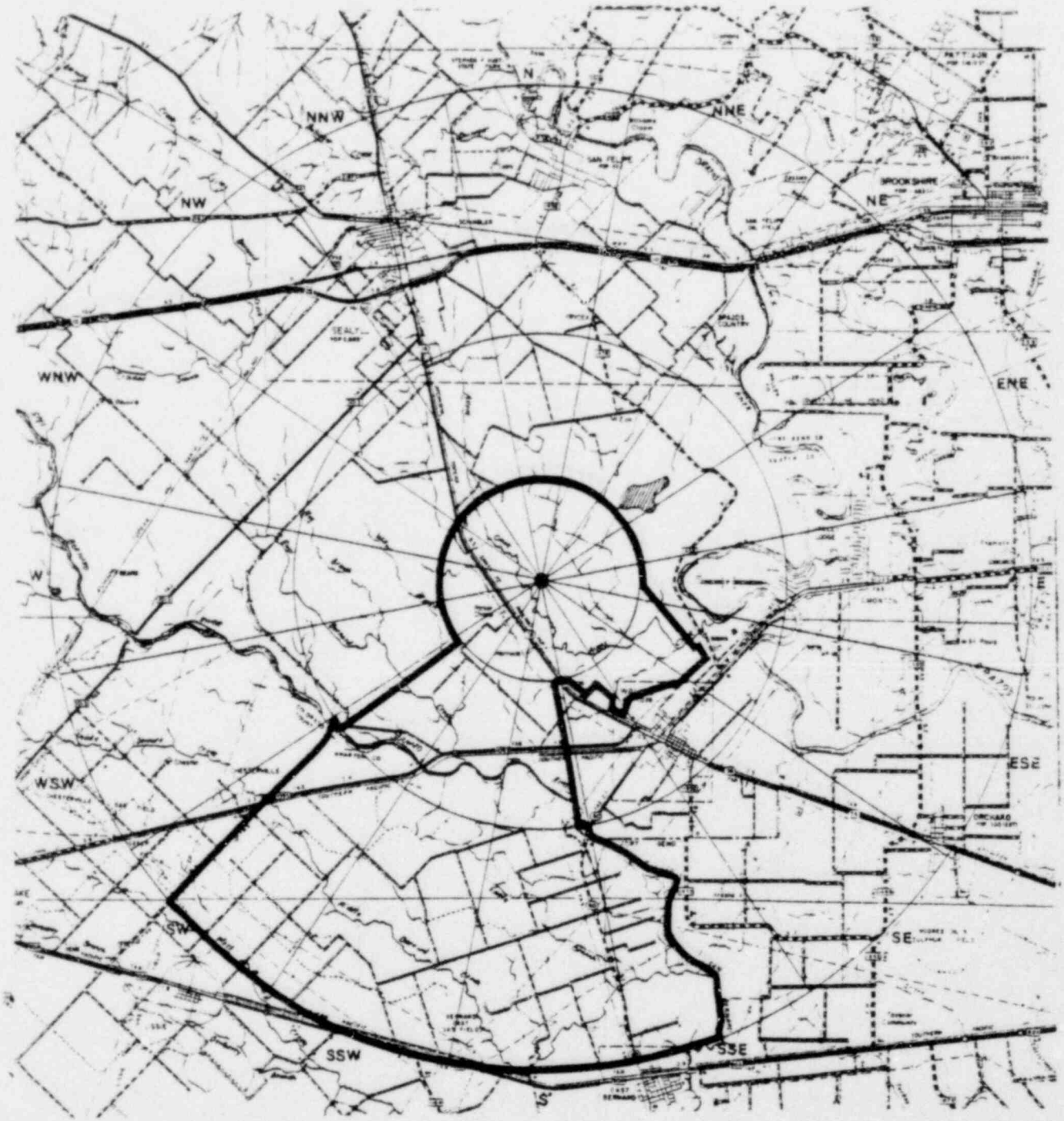


FIGURE 4-IX - SCENARIO IX
Areas 1, 2, and 6

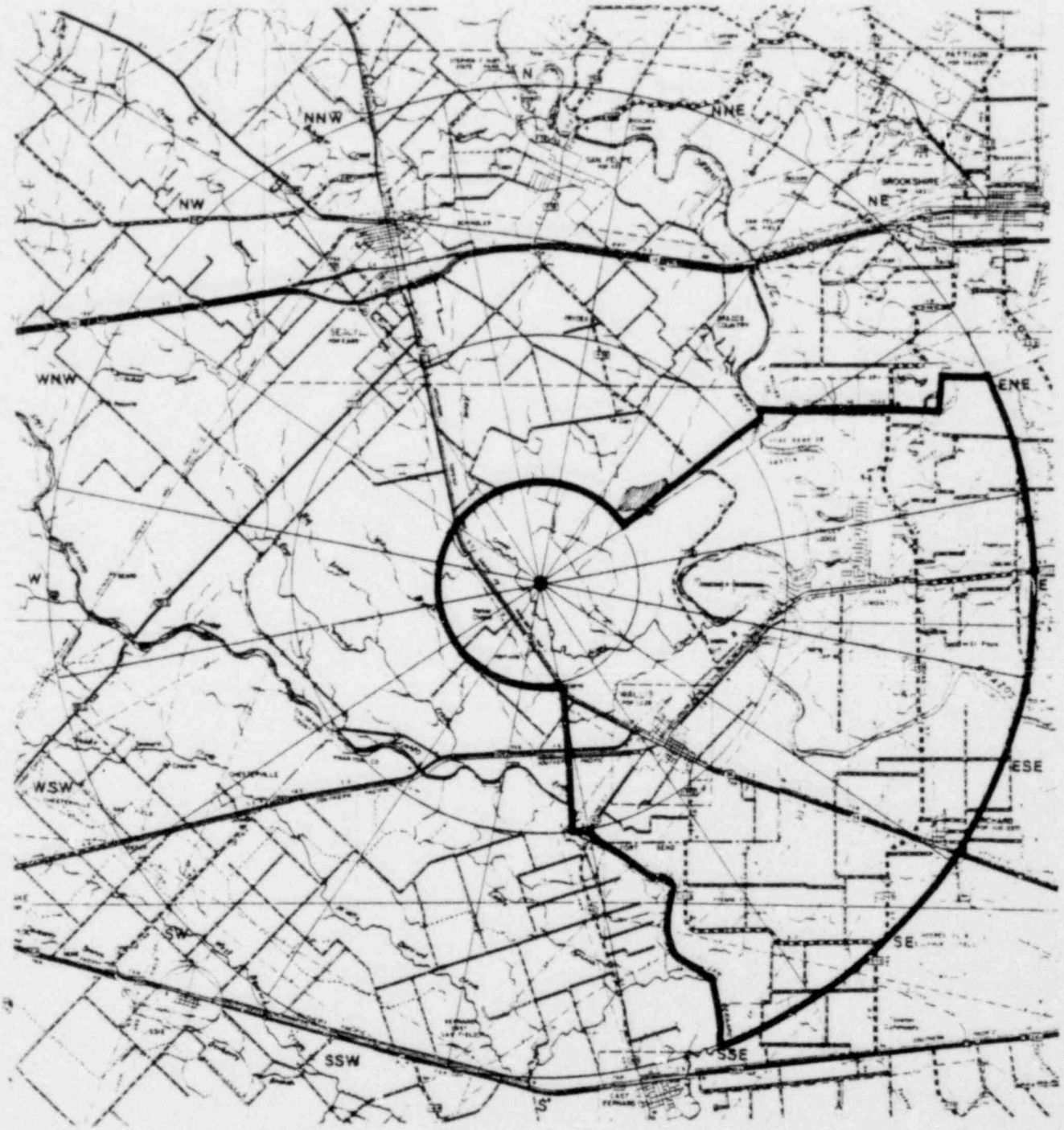


FIGURE 4-X - SCENARIO X
Areas 1, 3, and 7

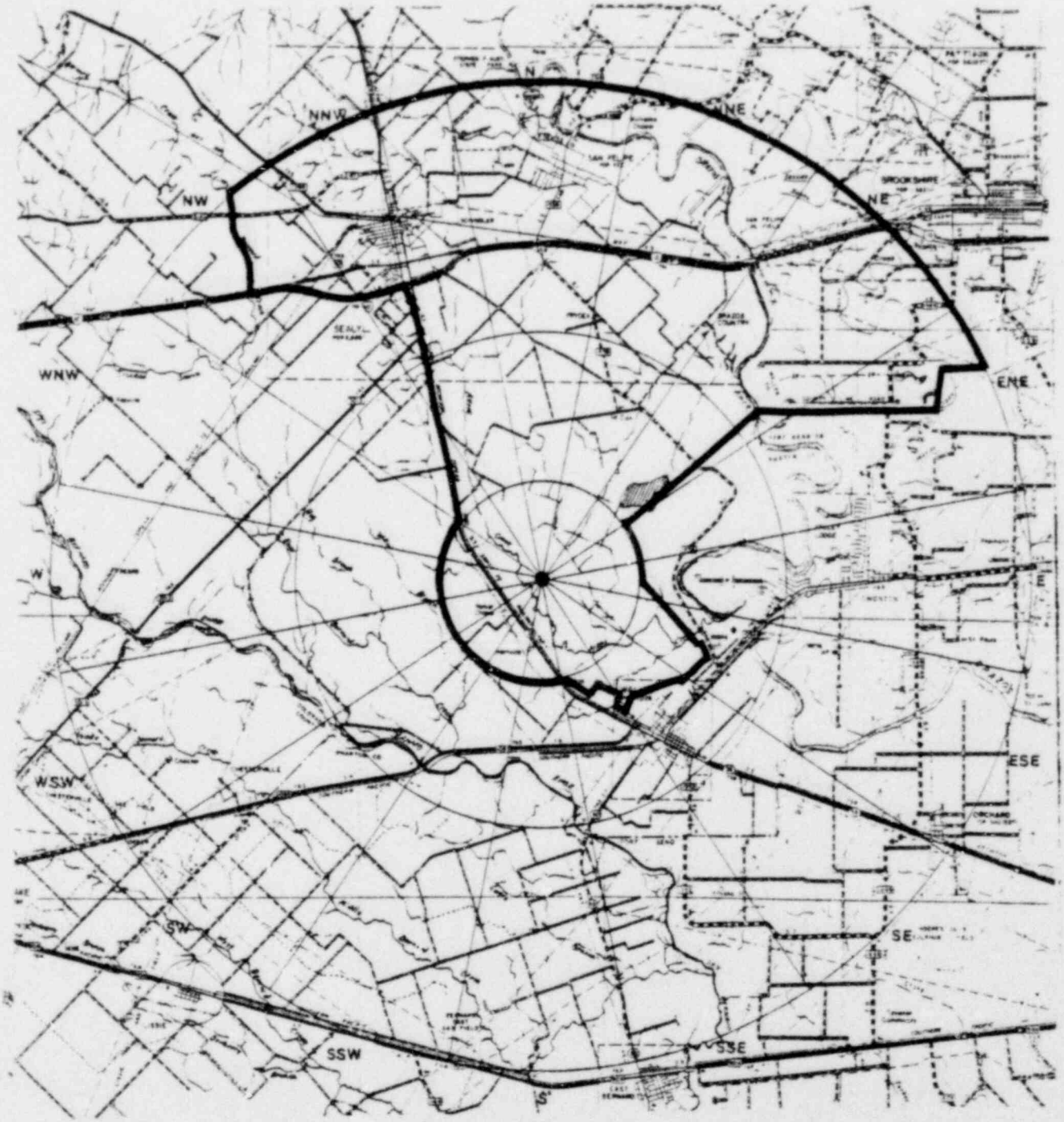


FIGURE 4-XI - SCENARIO XI
Areas 1, 4, 8, and 9

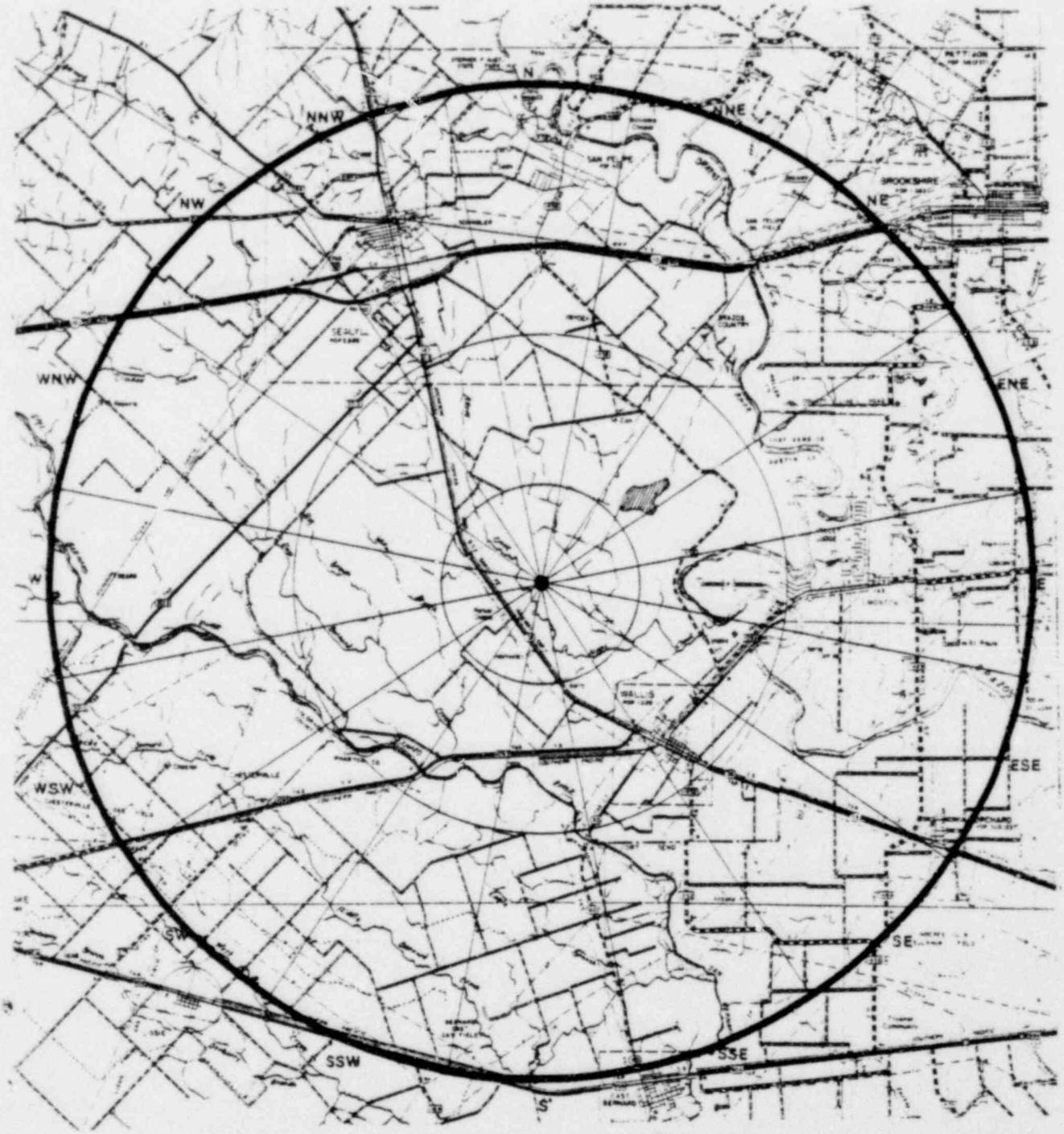


FIGURE 4-XII - SCENARIO XII
Areas 1 through 11

Vehicle estimates for each of the eleven geographic areas were included in the simulation model. This was accomplished by assigning automobiles, shown in Figures 2-1, 2-2, and 2-3, on a sector-by-sector basis, to designated entry nodes. In general, vehicles originating in a sector were assigned to one or more of the entry nodes closest by road to that particular sector. Loading of the network with vehicles was initiated simultaneously at each entry node within the model area to be evacuated. This means that each car to be evacuated was put into a queue, or line, at the appropriate entry node.

5. ESTIMATES OF EVACUATION TIMES

The results of the evacuation time calculations by HMM are summarized in Table 5-1. The table outlines the applicable evacuation times for each of the scenarios suggested by NRC, as well as several other scenarios of interest. These estimates represent the elapsed time from notification of the public to the time when all autos have left the area. As such, they represent maximum values of evacuation time for each scenario. Use of different population and weather conditions is intended to provide a range of values for evacuation times, with Cases A and B intended to bracket the range for 1990 scenarios. Thus, the maximum time for an evacuation during average conditions of population and weather would fall between the estimates for Case A and Case B.

Four scenarios were examined for Area 1. It was determined that Area 1, the 2-mile radius area, could be evacuated in 15 minutes during good weather (Scenario IA). This time estimate included evacuation of 100 non-essential plant workers and any residents within two miles. For Scenario IB, the peak population, adverse weather case, evacuation time was estimated to be 70 minutes. With the exception of the 102 automobiles assigned to the small recreation area in Scenario IB, all ACNGS and park traffic was assumed to leave the site using only one exit, the proposed bridge over Route 36. Time estimates for Scenarios IA, IB, IC, and ID are shown in Table 5-1.

For the 5-mile radius area, Scenarios II through VI are relevant. As indicated in Table 4-1, estimates were made for each of the four 2-5 mile areas plus the inner adjacent 2-mile area. Evacuation time estimates were also made for the entire 5 mile area (Scenarios VI A, B, C, and D). Thus, in connection with the 5-mile radius, a total of 20 evacuation scenarios were examined. The shortest evacuation time, 30 minutes, was associated with Scenarios IIA, IVA and VA. The longest evacuation time for the 5-mile area was associated with the 2020 permanent population during adverse weather (Scenario VID).

TABLE 5-1

EVACUATION TIME ESTIMATES BY HMM ASSOCIATES
(Minutes)

Scenario	Area(s)	A	B	C	D
I	1	15	70	15	20
II	1,2	30	75	35	40
III	1,3	60	75	75	80
IV	1,4	30	75	50	55
V	1,5	30	75	50	55
VI	1,2,3,4,5	65	80	80	85
VII	1,4,9	75	90	125	130
VIII	1,5,10,11	40	100	55	65
IX	1,2,6	70	85	95	100
X	1,3,7	85	90	115	120
XI	1,4,8,9	75	90	125	130
XII	1 through 11	90	105	130	135

Case A - 1990 Permanent Population - Best Estimate (Good weather)

Case B - 1990 Peak Population - Adverse Weather

Case C - 2020 Permanent Population - Best Estimate (Good weather)

Case D - 2020 Permanent Population - Adverse Weather

In connection with the 10-mile radius, 24 evacuation scenarios were examined. As indicated in Table 4-1, these include Scenarios VII, VIII, IX, X, XI, and XII with Cases A, B, C, and D. The shortest evacuation time, 40 minutes, was associated with Scenario VIIIA. The longest evacuation time for the 10-mile area was associated with Scenario XIID.

It should be noted that during most of the year, the size of the population at risk is closer to the permanent population than the peak population condition. Also, adverse weather occurs only a minority of the time. It can, therefore, be inferred that the most probable maximum evacuation times for 1990 will be closer to those for Case A than Case B.

The calculations have intentionally incorporated many conservative assumptions which tend to increase estimates of evacuation times. A few examples are as follows:

1) Double counting of some population groups, as discussed in Section 4.2, leads to conservative estimates for Case B.

2) The initialization process places approximately 700 cars on the road prior to the beginning of evacuation for Cases A, C and D. Approximately 1400 cars are involved in initialization for Case B. This assumption is probably conservative, especially for periods late at night when background traffic would be minimal.

3) It is assumed that all stop signs, traffic lights and traffic control measures would be obeyed. It is assumed that local officials do nothing to expedite traffic movement.

4) The evacuation analysis considered only one exit from the ACNGS site and park areas, the proposed bridge over Route 36. Had grade level emergency and service road exits also been used, evacuation times would have been significantly reduced for Case B.

6. ANCILLARY EVACUATION DATA

In response to the NRC request, several ancillary evacuation topics have been discussed with the Sheriff of Austin County. The following subsections document the conclusions of those discussions.

6.1 Special Facilities

There are a total of eight facilities which qualify as "special facilities" for evacuation purposes. Detailed plans for evacuation of these facilities will be included in the FSAR. Estimates of evacuation times would require the use of such plans. The analysis by HMM assumed that all persons from special facilities would be evacuated simultaneously with the general population. As of now, the following information has been developed and used in the HMM analysis.

1) Allens Creek site recreation areas, located along State Highway 36 and FM 1458 between two to four miles from the site in a southeasterly direction, have provision for 2,100 visitors (ref. ACNGS-ER Supplement and subsequent information from HL&P). For purposes of the evacuation analysis, it was assumed that one car for each of the 519 parking spaces at the two recreation areas would be involved in the evacuation.

2) Wallis School in Wallis (SE 4 miles) has 255 students (ref. ACNGS-ER Supplement and subsequent information from HL&P) and an estimated 13 teachers. Evacuation would require nine bus trips*

* In operating the simulation model, the highway network was assumed to be loaded with the equivalent of the specified number of buses. Furthermore, the network was loaded with one automobile for each teacher.

for students. It is assumed that teachers would evacuate by bus or in their own cars. Buses were assumed to hold no more than 30 students.

3) Orchard School in Orchard (ESE 9.5 miles) has 376 students and an estimated 19 teachers (ref. ACNGS-ER Supplement and subsequent information from HL&P). Evacuation would require 13 bus trips for students. It is assumed that teachers would evacuate by bus or in their own cars.

4) Brazos High School in Wallis (SE 6 miles) has 315 students with an estimated 16 teachers (ref. ACNGS-ER Supplement and subsequent information from HL&P). Evacuation would require 11 bus trips for students. It is assumed that teachers would evacuate by bus or in their own cars.

5) Sealy School in Sealy (NNW 7 miles) has 1,572 students and an estimated 70 teachers (ref. information from HL&P). Evacuation would require 53 bus trips for students. It is assumed that teachers would evacuate by bus or in their own cars.

6) Sealy Medical Center in Sealy (NNW 7 miles) has an average of 15 patients and an estimated staff of 15 (ref. ACNGS-ER Supplement, Table S2.1-1). For purposes of the evacuation analysis, it was assumed that an average of three persons would occupy each car, and evacuation would require ten vehicles.

7) Azalea Manor in Sealy (NNW 7 miles) has an average of 88 nursing home patients and an estimated 88 staff (ref. ACNGS-ER Supplement, Table S2.1-1). For purposes of the evacuation analysis, it was assumed that an average of three persons would occupy each car, and evacuation would require 59 automobiles.

8) Stephen F. Austin Park in San Felipe (N 9-10 miles) has 420 average daily visitors (ref. ACNGS-ER Supplement). For purposes of the HMM analysis, it was assumed that evacuation would require 140 cars.

With respect to special facilities, no major impediments to the evacuation or taking of protective actions was identified by HMM during the study.

6.2 Notification and Confirmation Times

Notification of the population to take some emergency action is an important element of emergency plans. In a real emergency, notification would take many forms. For example, radio, television, cable TV, telephone and word of mouth would all play a part in spreading the alert. However, for purposes of planning for nuclear emergencies, it is necessary to identify a primary method of notification. This must be some method of notification which is under government control and which is specifically intended to reach virtually every member of the population at risk. It must be available 24 hours per day.

Effective methods to rapidly notify the public within this area in the event of an emergency have long been established. The final ACNGS Emergency Plan will describe the specific methods which will be utilized to ensure that the capability exists to notify the public in the 10-mile EPZ within 15 minutes of notification to off-site authorities. If necessary, additional notification systems will be installed.

Another important element of emergency planning is confirmation. This is a process by which officials confirm that all people have evacuated the area. Several methods are possible. At this time, it is assumed that the confirmation process would be accomplished by law enforcement vehicles traveling house-to-house. Confirmation times are included in Table 6-1. These estimates were developed on the basis of

discussions with the Sheriff of Austin County. These estimates have also been reviewed by the Sheriffs of Waller, Fort Bend, Colorado, and Wharton Counties. Estimates are included for good weather and adverse weather.

TABLE 6-1

ESTIMATED TIMES FOR CONFIRMATION(1)

Times Estimated in Hours

Scenario	Confirmation by Vehicle	
	Best Estimate(2)	Adverse weather
I	1	2
II	1	2
III	1	2
IV	1	2
V	1	2
VI	1	2
VII	1	2
VIII	1	2
IX	1	2
X	1	2
XI	1	2
XII	1	2

(1) This information was developed after conversations with the Sheriffs of Austin, Fort Bend, Waller, Wharton, and Colorado Counties.

(2) During the daytime, it would take only 30 minutes to gather 50 manned law enforcement vehicles at a central location. At night, this would take one hour. During good weather, confirmation by 50 cars could be accomplished in 30 minutes. During adverse weather, this would take one hour.

It should be noted that in a real evacuation, the total time for notification, evacuation and confirmation steps is not equal to the sum of the estimates for each of the three steps. This is because the processes of notification, evacuation, and confirmation would overlap significantly. In many cases, evacuation of the population would begin before notification was complete. Confirmation would also begin before the evacuation was completed. Therefore, the total time to carry out the process of notifying the population, implementing an evacuation, and confirming the evacuation would be less than the total of the times estimated for each step alone.

6.3 Special Evacuation Problems

Past evacuations during emergencies were discussed with the Sheriff of Austin County. He indicated that no insurmountable problems have been encountered. Sealy was once placed on alert during an accidental gas line shut-off. Notification took only 20 minutes. Police and fire personnel were used. Officials from other counties commented that there would be no special evacuation problems in their areas.

7. SUMMARY AND CONCLUSIONS

Pursuant to NRC's Final Rule on Emergency Planning, and in response to a request contained in a 12/26/80 letter from NRC, an analysis of evacuation times was conducted for the 10-mile radius Emergency Planning Zone around Allens Creek Nuclear Generating Station. Input information was derived from ACNGS licensing documents, from field inspections, from local officials and from other sources. A computer model method was used to simulate several evacuation scenarios. For each scenario an estimate of time to conduct evacuation was developed. The analysis included evacuation of population in various sectors at various distances within the plume exposure Emergency Planning Zone. The analysis included evacuation of permanent and transient populations. Various weather conditions were considered. The analysis considered site layout and location with respect to access routes, surrounding population distributions, land use and local jurisdictional boundaries. Throughout the analysis, efforts were made to identify major impediments to evacuation or taking of protective action.

A total of forty eight time estimates were developed in consideration of various weather conditions, population groupings and geographical areas. These estimates are shown in Table 5-1. The range of values corresponds to a range of assumptions regarding population and weather. For the site and all areas within 2 miles of the plant, evacuation of the 1990 permanent population during good weather would be completed within 15 minutes, while evacuation of the peak population during adverse weather would be completed within 70 minutes. For the 5-mile radius portion of the EPZ, evacuation of the permanent population during good weather would be completed within 65 minutes, while evacuation of the peak population during adverse weather would be completed within 80 minutes. For the 10-mile radius EPZ, evacuation of the permanent population during good weather would be competed within

90 minutes, while evacuation of the peak population during adverse weather would be completed within 105 minutes.

No major impediments to evacuation or taking of protective action were identified. Nothing was identified which would indicate that evacuation is incompatible with site layout and site location with respect to such considerations as access routes, surrounding population distributions, land use and local jurisdictional boundaries for the plume exposure EPZ.

APPENDIX A
POPULATION AND AUTOMOBILE DATA USED FOR CLEAR TIME ESTIMATES

APPENDIX A

POPULATION AND AUTOMOBILE DATA USED FOR CLEAR TIME ESTIMATES

The number and location of 1990 permanent, 1990 peak, and 2020 permanent population data for the area within a 10-mile radius of Allens Creek Nuclear Generating Station were obtained from HL&P's most recent population estimates. Additional information was obtained from HL&P. Permanent population estimates for 1990 and 2020 were further disaggregated for sectors between five and ten miles. Also included in evacuation of the permanent population were 100 non-essential plant workers at ACNGS. Peak population estimates for 1990 include the permanent population, 400 refueling workers at the plant, a full compliment of recreational visitors at parks adjacent to the site, recreational visitors at other parks within ten miles of ACNGS, students and faculties at schools, seasonal residents and persons at medical facilities. Special facilities are discussed in Section 6.1.

The associated number of automobiles for 1990 permanent, 1990 peak and 2020 permanent populations are shown in Figures 2-1, 2-2, and 2-3. Average vehicle occupancy rates used for the study included: 2.5 persons per car for permanent population, 1.0 persons per car for workers, 3.0 persons per car for general recreational population, and approximately 4.0 persons per car for the parks adjacent to the site. Buses were estimated to carry 30 school children.

APPENDIX B

TERMINOLOGY AND DEFINITIONS

APPENDIX B

TERMINOLOGY AND DEFINITIONS

The following terms and definitions have been used in conducting the study and developing this report.

Adverse Weather

Bad weather, such as a severe thunderstorm or fog, which limits visibility and lowers driving speeds. This definition does not include extreme weather such as hurricanes.

ACNGS, Allens Creek Nuclear Generating Station

In this report this term is used to delineate three things: the project, the site, and the plant itself.

Area

A delineated geographic zone, lying within ten miles of the site, for which evacuation times are of interest. Ten areas were defined during this study.

Best Estimate

Clear weather, day or night, with no weather-related reduction in visibility or driving speeds. This is the converse of the adverse weather estimate.

Case

A situation which, for purposes of this study, is defined by a population level and weather condition. Four cases were examined during this study.

Clear Time

The time required to evacuate or clear the population from a designated area or group of areas during a specified weather condition.

EPZ, Emergency Planning Zone

A zone defined pursuant to federal guidance for purposes of emergency planning in the vicinity of nuclear facilities. The plume exposure EPZ has a radius of 10 miles. Planning within this area will be directed to reducing direct exposure to radiation released from the plant during an accident. The scope of this report is limited to the 10-mile radius plume exposure EPZ. The ingestion exposure EPZ has a radius of 50 miles. Planning within this area will be directed primarily to eliminating or reducing exposure to radiation caused by ingestion of food contaminated by radioactive material.

ER, Environmental Report

The Construction Permit Stage Environmental Report and its Supplement for the Allens Creek Project. This is part of the application for a construction permit.

Evacuation Time

The time required to evacuate or clear the population from a designated area or group of areas during a specified weather condition.

Exclusion Area

As defined in federal regulations, this is an area surrounding the reactor, in which the reactor licensee has the

authority to determine all activities including exclusion or removal of personnel and property from the area. This area may be traversed by a highway, railroad, or waterway, provided these are not so close to the facility as to interfere with normal operations of the facility and provided appropriate and effective arrangements are made to control traffic on the highway, railroad, or waterway, in case of emergency, to protect the public health and safety. Residence within the exclusion area shall normally be prohibited. In any event, residents shall be subject to ready removal in case of necessity. Activities unrelated to operation of the reactor may be permitted in an exclusion area under appropriate limitations, provided that no significant hazards to the public health and safety will result.

Link

Sections of the network along which vehicles pass. Generally, these are roadways lying between intersections.

LPZ, Low Population Zone

As defined in federal regulations, this is the area immediately surrounding the exclusion area which contains residents, the total number and density of which are such that there is a reasonable probability that appropriate protective measures could be taken on their behalf in the event of a serious accident. Federal guides do not specify a permissible population density or total population within this zone because the situation may vary from case to case. Whether a specific number of people can, for example, be evacuated from a specific area, or instructed to take shelter, on a timely basis will depend on many factors such as location, number and size of

highways, scope and extent of advance planning, and actual distribution of residents within the area. (In this study, twelve scenarios were used to define population subject to evacuation. The 10-mile radius, not the LPZ, was the principal criterion in identifying the emergency planning zone.)

Meteorology

Study of the atmosphere, including winds, weather, etc. The science of meteorology is used to predict the behavior of airborne radioactive material released from the plant in an accident.

Model

A mathematical method which enables imitation or simulation of the behavior of some real thing. During this study, a model was used to predict the flow of vehicle traffic which would occur during an evacuation. Since this model was used in combination with a computer, it is referred to as a computer model. The name of the model used during this study is NETSIM.

NETSIM

The computer model used during the study. The name is derived from its ability to simulate movement of vehicles on a network of streets and highways.

Network

The group of arterial and connector roads which, through the computer simulation process, were used to model evacuation of automobiles from the areas of interest.

Node

A point on the network through which vehicles pass. Nodes are connected by links. Entry nodes are points at which vehicles enter the network. Actual nodes, in most cases, are intersections of roads, where vehicles may slow down, stop or turn. Exit nodes are points at which vehicles leave the network.

Plume

An elongated and usually open and mobile column of smoke or gases. In emergency planning, the plume of concern is the cloud of radioactive gases which might be released during an accident at the plant. The purpose of planning within the 10-mile EPZ is to eliminate or reduce radiation dose caused by the gases making up this plume.

PSAR, Preliminary Safety Analysis Report

The Preliminary Safety Analysis Report for the Allens Creek project. This is part of the application for a construction permit.

Quadrant

A geographic area, usually defined as one fourth (90^{o}) of a circle (360^{o}). Quadrants are sometimes referred to as sectors. For purposes of this study, each quadrant is made up of one or more areas.

Real Time

The actual time in which an event takes place, with the reporting on, or recording of, the event practically simultaneous with its occurrence. NETSIM is a real time computer program.

Rose

A set of concentric circles with lines radiating from the center. Roses are used to display information in geographical relation to some central point. Population roses indicate the distance and direction of people in regard to a central point, the plant. Automobile roses indicate the number of vehicles and point of origin of vehicles in regard to the distance and direction from the plant.

Scenario

For purposes of this study, a scenario is defined as the evacuation of a specified population, during specified weather conditions, from a specified area or group of areas. Time estimates have been developed for 48 scenarios during this study.

Sector

An angular portion of a circle. For purposes of displaying population and meteorological information, circular areas around nuclear facilities are divided into roses having 16 sectors of $22\text{-}1/2^{o}$ each.

Simulation

Examination of a problem by means of a device which performs imitative representations. In this study, a computer model has been used to simulate evacuation scenarios and thereby provide time estimates.

Site Boundary

The property line surrounding Allens Creek Nuclear Generating Station.

Stochastic

Involving chance or probability. The NETSIM model is considered a stochastic model because it employs the laws of probability in conducting steps such as turning of a vehicle into a moving line of traffic.

Target Speed

The speed which would be used by an average vehicle under designated weather conditions on an uncrowded road. For purposes of this study, this is the maximum speed allowed on a given road during the computer simulation.

Ten Mile Area

The 10-mile radius plume exposure EPZ.

Zone

A physical space within certain boundaries. The plume exposure Emergency Planning Zone is that area lying within ten miles of the plant.

APPENDIX C
THE NETSIM MODEL

The NETSIM Model

NETSIM is a traffic network simulation model. It was originally designed for the traffic engineer to evaluate alternative network control and traffic management strategies for improving urban traffic flow. NETSIM was developed for the Federal Highway Administration (FHWA) by the consulting firms of Peat, Marwick & Mitchell and General Applied Science Laboratory (GASL).

NETSIM has been validated through an extensive program of field testing and with field data collected in the Washington, DC area. Further validation was obtained by test programs in San Jose, California, as well as in New Jersey.

The model uses microscopic inspection. This means that NETSIM uses a detailed representation of the road network, following individual vehicles, and updating their status and position in short-term intervals.

The road network representation includes: the link geometry (i.e., right-turn, thru, left-turn or diagonal), link length, number of moving lanes, grade, intersection signalization, and entry and exit points. The model emits vehicles onto the network at entry points and follows each vehicle individually as it travels along the network until it reaches an exit node. At this point, the vehicle is taken off the network and statistics updated.

The NETSIM model follows vehicles by computing the location and status of each vehicle every second. NETSIM simulates vehicle behavior by calculating speed and status using car following, queueing behavior, lane change, vehicle headways, and acceptable lag for lane changes. These distributions were empirically derived by the validation studies.

To keep track of network performance, the model updates statistics on the full network and on each link at the end of each time step (one second). NETSIM calculates cumulative statistics for the entire network and for each link at the end

of each subinterval, and whenever requested. It also keeps a running total of instantaneous link-performance statistics which can be reported at any time during the simulation.

The NETSIM model requires very detailed and extensive data inputs. There are two basic types of inputs: network data (or exogenous) and embedded data. The network data is mandatory and includes line geometry, intersection signalization, link turning movements, link operation, entry link volume, and the time of simulation. Link geometry inputs include: link length, type of turn and receiving node, and grade of the link. Link operation inputs include: number of moving lanes, target speed, headway, and lane channelization. Link turning movements include: percent of vehicles turning to each destination.

The intersection signalization inputs are the types of control which include sign, fixed time signal, or actuated signal. The entry link volume inputs include the flow rate and percent trucks. The length of subintervals and the total simulation can be selected.

The embedded data inputs include the calibration data which are embedded in the model algorithms. These data inputs are optional and the model uses default values if they are not specified. These inputs can change the distribution for acceptable gap for turning vehicles, vehicle speed, headways, and amber phase response. The acceptable lag for lane change and mean effective vehicle lengths can also be changed with embedded inputs.

The NETSIM model reports on system performance by displaying cumulative and instantaneous statistics for both the full network and individual links. The cumulative statistics include: occupancy, number of vehicles discharged, queue length, delay time, average speed and signal code. The time is also reported for any statistical output. These statistics provide the information needed to determine when the network is cleared and the effectiveness of the traffic control strategies.