APPENDIX 3

MEANS FOR PROVIDING PROMPT ALERTING AND NOTIFICATION OF RESPONSE ORGANIZATIONS AND THE POPULATION

NRC and FEMA recognize that the responsibility for activating the prompt notification system called for in this section is properly the responsibility of State and local governments. NRC and FEMA also recognize that the responsibility for demonstrating that such a system is in place rests with the facility licensee.

The initial notification when appropriate, of the affected population within the plume exposure pathway Emergency Planning Zone (EPZ) must be completed in a manner consistent with assuring the public health and safety. The design objective for the system shall be to meet the acceptance criteria of section B of this Appendix. This design objective does not, however, constitute a guarantee that early notification can be provided for everyone with 100% assurance or that the system when tested under actual field conditions will meet the design objective in all cases.

The plan shall include:

- The specific organizations or individuals, by title, who will be responsible for notifying response organizations and the affected population and the specific decision chains for rapid implementation of alerting and notification decisions;

- A capability for 24-hour per day alerting and notification;

- o Provision for the use of public communications media or other methods for issuing emergency instructions to members of the public, and

- o A description of the information that would be communicated to the public under given circumstances, for continuing instructions on emergency actions to follow, and updating of information.

A. Concept of Operations

Commercial broadcast messages are the primary means for advising the general public of the conditions of any nuclear accident. The primary means for alerting the public to an impending notification by public authorities may be any combination of fixed, mobile or electronic tone generators which will convey the alerting signal with sufficient timeliness and intensity to permit completion of notification by broadcast media in a timely manner. Since the timeliness of notification is a function of the accident severity, to be effective, appropriate systems, such as EBS and NOAA weather radio, should be placed on alert prior to the physical need for a public broadcast. The second or "Alert" category of events in Appendix 1 would ordinarily trigger the placing of broadcast media on alert, pending further instructions from State and local officials.

It is desirable for the public notification system to have a phasing capability. The arrangements for phasing are a function of the case-by-case population distribution or topography around each nuclear power station, and the details of each site-specific preparedness plan of State and local government.

B. Criteria for Acceptance

1. Within the plume exposure EPZ the system shall provide an alerting signal and notification by commercial broadcast (e.g., EBS) plus special systems such as NOAA radio. A system which expects the recipient to turn on a radio receiver without being alerted by an acoustic alerting signal or some other manner is not acceptable.

2. The minimum acceptable design objectives for coverage by the system are:

   a) Capability for providing both an alert signal and an informational or instructional message to the population on an area wide basis throughout the 10 mile EPZ, within 15 minutes.

   b) The initial notification system will assure direct coverage of essentially 100% of the population within 5 miles of the site.

   c) Special arrangements will be made to assure 100% coverage within 45 minutes of the population who may not have received the initial notification within the entire plume exposure EPZ.

The basis for any special requirements exceptions (e.g., for extended water areas with transient boats or remote hiking trails) must be documented. Assurance of continued notification capability may be verified on a statistical basis. Every year, or in conjunction with an exercise of the facility, FEMA, in cooperation with the utility operator, and/or the State and local governments will take a statistical sample of the residents of all areas within about ten miles to assess the public's ability to hear

the alerting signal and their awareness of the meaning of the prompt notification message as well as the availability of information on what to do in an emergency. The system plan must include a provision for corrective measures to provide reasonable assurance that coverage approaching the design objectives is maintained. The systems shall be operable no later than July 1, 1981. The lack of a specific design objective for a specified percent of the population between 5 and 10 miles which must receive the prompt signal within 15 minutes is to allow flexibility in system design. Designers should do scoping studies at different percent coverages to allow determination of whether an effective increase in capability per unit of cost can be achieved while still meeting the objective of item 2.a. above.

3. Public Notifications

A prompt notification scheme shall include the capability of local and State agencies to provide information promptly over radio and TV at the time of activation of the alerting signal. The Emergency Plans shall include evidence of such capability via agreements, arrangements or citation of applicable laws which provide for designated agencies to air messages on TV and radio in emergencies. Initial notifications of the public might include instructions to stay inside, close windows and doors, and listen to radio and TV for further instructions.

C. Physical Implementation

1. Communications Supporting Alerting and Notification Systems

Policy Objective

Federal, State and local government and utility authorities must develop and maintain plans, systems, procedures and relationships that

are effective in mobilizing responsible authorities and operating elements in alerting and notifying the general public and in assuring appropriate and effective responses by the public.

Incident Alert Notification

The triggering of processes to mobilize forces and warn the public is dependent upon the communication between the nuclear power facility and government authorities (Federal, State and Local). The communications net must feature the following capacity:

a. Coverage: 24 hour coverage at the facility and at the primary points to receive and act upon notification.

b. Points to be Linked: Appendix 1 describes the conditions for assured dissemination of alert and warning information by the nuclear power plant to appropriate local and State warning points at all times and under all conditions. The system should include identical communications capabilities at primary and alternate operating locations.

c. Net Control: To assure effective utilization, net discipline and availability, one location should be assigned responsibility for net control and an alternate designated. The primary and alternate location should be a State or local civil government activity. It should issue and update procedures on testing, net access, and discipline and maintenance and repair.

d. System Availability and Reliability: All stations/points on the network and the communications linkage must provide a capability for immediate dissemination, receipt and acknowledgment of

alert and warning messages on a 24-hour basis. The system should be able to function notwithstanding adverse environmental conditions, such as floods and power outages. It should not be subject to pre-emption for lower priority purposes nor to failure due to traffic (subscriber) overloading. To the extent a single system does not meet these performance standards, alternate means must be in place which have dissimilar vulnerability characteristics.

e. Information Sensitivity: The system design should take into consideration that alert and warning information is highly sensitive and if monitored or intercepted by unauthorized personnel, is subject to misinterpretation and can lead to undesirable and counterproductive reactions. Therefore it is desirable not to cite specific radio frequencies in public planning documents.

f. System Features. Dissemination should be rapid and reliable and provide acknowledgment and verification of message content. It is desirable for voice traffic to be supported by hard copy verification.

g. Multipurpose Use: Whatever system is designed and installed to meet all of the above capabilities for accident alerting may be used for communication in support of other response functions. However, systems designed for other purposes should not be adapted to incident alert notification unless (a) all of the criteria are met and (b) such adaptation does not compromise their primary purpose. Exception may be justified when a system designed for other purposes is adapted to incident alert notification to serve as a back-up to the primary system.

2. Notification of Response Organizations

a. Assigned Responsibility: Plans should clearly designate the responsibility and means of notifying response organizations by either the nuclear power plant or by the State or local warning points designated to receive initial alert notification.

b. Dissemination Time: Warning points cannot be encumbered by sequential call down processes nor can response organizations accept the time lost by such processes. This second level notification by warning points should be a one call process to all assigned organizations to be notified. Acknowledgement and message verification is essential. Message content must be clear, and brief. A preferred procedure is to communicate a posture code which calls for various predetermined responses for each organization based on its mission.

c. Capability of Organizations to be Notified: Organizations with immediate response functions must also have a 24-hour capability of receiving and acting upon a notification.

d. Internal Alerting: Each organization with response functions must develop reliable procedures for internal alerting and mobilization of forces. The system should account for the non-emergency nature of some organizations and the routine posture of key staff elements.

3. Sirens

Wherever proposed as part of a system, subject to later testing by statistical sampling, the design concept and expected performance

must be documented as part of plans submitted by licensees, States and local governments. The designs of such systems must take into account the demography and topography of the areas being considered.

Some institutional alerting mechanisms are already in place (e.g., in schools, factories, hospitals, shopping centers, jails, and centralized offices). Siren systems should complement rather than substitute for these already in place.

The basic criterion needed for the design of a siren system is the acceptable dissonant sound level as described in "Outdoor Warning Systems Guide," Report No. 4100, by Bolt, Beranek and Newman, Inc., June 1979 (FEMA publication number CPG-1-17).

As an acceptable criteria at most locations 10db above average daytime ambient background should be a target level for the design of an adequate siren system. In cases involving industrial operations, a special survey to determine design sound level targets or an inside system may be needed to provide an audible 10db dissonant differential. Sirens on vehicles may be used to supplement fixed alert systems outside the inner five mile radius of the plume exposure EPZ.

Siren systems should be designed considering the demography and topography of an area, and taking into account other alert or notification systems in place or planned. The maxium sound levels received by any member of the public should be lower than 123db, the level which may cause discomfort to individuals.

a. The 10db dissonant differential is a conservative use of the 9db differential which is discussed in FEMA document CPG-1-17. Research has shown that a person is capable of being alerted by such a differential above or below the background ambient in the case of a predominately narrow band 300 to 800 Hz emitted by large sirens. The achievement of a positive differential of 10db has been a basic objective (although not always attained) of a wide range civil defense system.

b. In considering siren applications for nuclear power stations, the actual population density must be considered. The average population density around such stations is well below 2000 persons/ per square mile. Therefore, any use of population based criteria such as Figure 1 of CPG-1-17 is improper because the actual population density is predominately low.

c. The 10db differential above daytime ambient is meant to provide a distinguishable signal inside of average residential construction under average conditions. Where special individual cases require a higher alerting signal, it should be provided by other means than a generally distributed acoustic signal.

d. In keeping with the policy that sirens may only be a portion of a complete public notification system, NRC and FEMA believe that organizations proposing their use retain the responsibility for cost/benefit decisions which might involve the use alternative methods in thinly populated areas where such methods are cost effective while meeting the notification criteria for the Plume Exposure EPZ. Where sirens are proposed, the design may be based either on handbook values for background, or alternatively on field surveys.

e. For Organizations Proposing Systems Without Field Surveys

It may be very difficult, expensive, and time consuming to determine the average-day-time ambient for an EPZ. Sound level change with season, location, weather, traffic, ground cover, etc. If in combination with the uncertainties in siren performance, it is doubtful whether the predictability of detection would be increased above what could be obtained using existing date to develop standards, 50db(a) is a conservative estimate of the average day time ambient in areas with population below 2000 person/per square mile. For organizations proposing systems without field surveys, the following requirements apply:

That Figure 1 of CPG-1-17, "Outdoor Warning Systems Guide" published by FEMA, be used as the design criterion for siren systems in areas with population densities above 2000 persons/mi^2.

For areas with population densities below 2000 persons/mi^2 the siren system must be designed to produce a minimum of 60db(c). An attenuation factor of 10db loss per distance doubled should be used to determine siren range in the absence of special geographical features. Those organizations applying the criteria should document the basis for their selection of appropriate values to include:

* population densities, location of major transportaiton routes and heavy industry

* attenuation factors with distance

* siren output db(c) at 100 feet vs. assumed range and acoustic frequency spect a.

* maps showing siren location, size of coverage and any features that could affect siren performance (e.g., hills)

* mounting heights of sirens

* special weather conditions such as expected heavy snow which might modify the design assumptions

f. For Organizations Proposing Systems With Field Surveys

Instead of a 50db(a) estimate of average daytime background for areas with relatively low population (less than 2000 persons/per square mile), the average daytime (7 am to 10 pm) background may be measured.

The 10 db above average daytime ambient background may then be applied against these measurements.

Background db should be determined in a band about the siren signal frequency. Inclusion of background noise energy from outside this band could be misleading.

Figure 1 of CPG-1-17, "Outdoor Warning System Guide," should be used as the design criterion for siren systems in areas with population densities above 2000 persons/mi^2.

Organizations choosing to measure background ambients should document the basis for their selection to include:

* The basic requirements described in paragraph e concerning population densities, attenuation factors, siren output and spectra, and maps with terrain features

* Values of measured average daytime ambient background used as a basis for siren selection, to include survey location, how locations were selected, frequency range measured and measurement time span

* How seasonal changes were taken into account

g. General Considerations

NRC's licensees are urged to cooperate with State and local governments in the use of cost effective combinations of systems, including those already in place, as a means of satisfying this objective.

The siren signal shall be a 3 to 5 minute steady signal as described in Paragraph IV E of CPG-1-17 and capable of repetition.

h. Siren Testing Guidance

(1) Types of tests and suggested frequency are:

* Silent Test	every two weeks - log entry
* Growl Test (or equipment)	quarterly and when preventive maintenance is performed
* Complete Cycle Test	at least annually, and as required for formal exercises

(2) Oversight

* FEMA will receive an annual statement from the cognizant State or local authority that silent and growl tests have been performed. This may in turn be based on utility certification if the utility has directed responsibility for maintenance.

* FEMA will observe or receive a statement of the annual statistical sample of population in the EPZ hearing a test based on a field test or in conjunction with an exercise. FEMA will approve corrective measures necessary to provide assurance that siren systems are meeting the objectives for alerting the population (where they are the specific means for such alerting) approved jointly by NRC and FEMA.

4. Other Systems

a. The Emergency Broadcast System (EBS)

The Emergency Broadcast System (EBS) exists to furnish an expedited means of furnishing real time communications to the public in the event of war, threat of war, or grave national, or regional or local crisis.

To activate the EBS at the State level, a request may be directed to an Originating Primary Relay Station (usually an FM station located near the State capital) by the Governor, his desingated representative, the National Weather Service, the State Civil Preparedness or Emergency Services Office, or other designated State authority.

At the local level, a request for activation may be directed to the Common Program Control Station (CPCS-1), by designated officials of local government or the National Weather Service.

In either case, communications facilities developed for use in contacting and providing emergency program material may include any of the following: telephone, remote pickup units, NOAA Weather Wire Service or NOAA Weather Radio, police and fire communications, amateur and citizens band radio. Station management at the Originating Primary Relay Station and/or the Common Program Control Station authenticates the validity of all requests to activate the system. Other broadcast stations may activate the EBS on an individual basis as needed. This is important since station management is responsible for all program material broadcast to the public.

The Originating Primary Relay Station at the State level, or the Common Program Control Station at the local level, will take the following steps to activate the EBS:

1. Take action to broadcast emergency programming which may include recording the emergency message for use later.

2. Broadcast an initial statement.

3. Transmit the two-tone Attention Signal.

4. Broadcast the emergency announcement.

All other participating stations, alerted via their off-the-air monitoring of the two-tone signal, repeat the above procedures.

The State and local EBS is available for public officials who have specifically been designated "activating officials." These designees are responsible to the community for determining the appropriateness of activating the EBS for disseminating emergency public information. In this regard, the activating official could determine that an early alert to the broadcasters was advisable, because of certain actual or contemplated adverse conditions at a nuclear power plant. Such a decision could be implemented by the activating official notifying the broadcasters by available communications. The bottom line of the early alert would be to notify stations that are off the air, that there may be a need for activation, which in turn would cause the stations to notify appropriate personnel to stand by.

Alerting and notification systems around nuclear facilities must be integrated with the State and local EBS Operational Area Plan. Operational Area EBS plans involve agreements with the Common Program Control Stations (CPCS-1) and local emergency preparedness organizations while the State EBS plan is coordinated with the State emergency communications chairman. It may be necessary for utility organizations to sign agreements with CPCS-1 stations in order to cover a fast breaking general emergency described in Appendix 1. However, actual public notices would only take place upon authorization of governmental authorities.

b. National Oceanic and Atmospheric Administration (NOAA) Weather of Emergency Alert

Receivers compatible with Weather or Emergency Alert transmitters can be obtained commercially. Where transmitters or repeaters are not available, such could be provided independently, or perhaps by negotiation with the National Oceanic and Atmospheric (NOAA) or the Federal Communications Commission (FCC). Receivers and servicing thereof could be offered as a service.

c. Telephone Automatic Dialers

Systems are available whereby pre-selected telephone numbers could be dialed automatically, and a recorded announcement played when a telephone is answered. After a fixed number of rings, the next number is dialed automatically; the unanswered numbers are redialed at the end of the quene. This system could be most cost-effective and secure for warning to principal response officials, school systems, selected industrial complexes, downstream water works or isolated farms.

d. Aircraft with Loudspeakers

Hiking trails and hunting areas are illustrative of areas where it may not be feasible to provide a prompt notification by any other means except by aircraft equipped with powerful sound systems or by dropping prepared leaflets. Such would not work in bad weather, of course, but such areas are less likely to be used in bad weather. These areas should be reached on a best effort basis.

APPENDIX 4

EVACUATION TIME ESTIMATES WITHIN THE PLUME EXPOSURE PATHWAY EMERGENCY PLANNING ZONE

The following is an example of what shall be included in an evacuation times assessment study and how it might be presented. The example includes a complete outline of material to be covered, but only a few typical tables and explanations are provided. The requirements are intended to be illustrative of necessary considerations and provide for consistency in reporting. Because the evacuation time estimates will be used by those emergency response personnel charged with recommending and deciding on protective actions during an emergency the evacuation time estimates should be updated as local conditions change (e.g., change in type or effectiveness of public notification system).

I. INTRODUCTION

This section of the report should make the reader aware of the general location of the nuclear power plant and plume exposure pathway emergency planning zone, and generally discuss how the analysis was done.

A. Site Location and Emergency Planning Zone

A vicinity map showing the plant location shall be provided along with a detailed map of the plume exposure pathway emergency planning zone (EPZ). The map shall be legible and identify transportation networks, topographical features and political boundaries. (See planning element J.10.a.)

B. General Assumptions

All assumptions used in the analysis shall be provided. The assumptions shall include such things as automobile occupancy factors, method of determining roadway capacities, and method of estimating populations.

C. Methodology

A description of the method of analyzing the evacuation times shall be provided. If computer models are used, a general description of the algorithm shall be provided along with a source for obtaining further information or documentation.

II. DEMAND ESTIMATION

The objective of this section is to provide an estimate of the number of people to be evacuated. Three potential population segments shall be considered: permanent residents, transients, and persons in special facilities. Permanent residents includes all people having a residence in the area, but not in institutions. Transients shall include tourists, employees not residing in the area, or other groups that may visit the area. Special facility residents include those confined to institutions such as hospitals and nursing homes. The school population shall be evaluated in the special facility segment. Care should be taken to avoid double counting.

A. Permanent Residents

The number of permanent residents shall be estimated using the U. S. Census data or other reliable data, adjusted as necessary, for growth. (See planning element J.10.b.). This population data shall then be translated into two subgroups: 1) those using autos and those

without autos. The number of vehicles used by permanent residents is estimated using an appropriate auto occupancy factor. A range of two to three persons per vehicle would probably be reasonable in most cases.

An alternative approach is to calculate the number of vehicles based on the number of households that own vehicles assuming one vehicle per household is used in evacuation. Regardless of the approach used, special attention must be given to those households not having automobiles. The public transport-dependent population must, therefore, be considered as a special case.

B. Transient Populations

Estimates of transient populations shall be developed using local data such as peak tourist volumes and employment data for large factories. Automobile occupancy factors would vary for different transient groups. Tourists might have automobile occupancy factors in the range of three to four while a factory would probably have a factor of less than 1.5 persons per vehicle. This population segment along with the permanent population subgroup using automobiles constitute the general population group for which an evacuation time estimate shall be made.

C. Special Facility Population

An estimate for this special population group shall usually be done on an institution-by-institution basis. The means of transportation are also highly individualized and shall be described. Schools shall be included in this segment.

D. Emergency Planning Zone and Sub-areas

The sub-areas for which evacuation time estimates are required must encompass the entire area within the plume exposure EPZ. Additionally, evacuation time estimates are also required for simultaneous evacuation of the entire plume exposure pathway. The areas to be considered are as follows:

Radius	Area
about 2 miles	four 90° sectors
about 5 miles	four 90° sectors
about 10 miles (EPZ)	four 90° sectors
about 10 miles (EPZ)	entire EPZ

When making estimates for the outer sectors, assume that the inner adjacent sectors are being evacuated simultaneously. The boundaries of the sub-areas shall be based upon the same factors as the EPZ, namely demography, topography, land characteristics, access routes, and local jurisdictions. To the extent practical, the sector boundaries shall not divide densely populated areas. Where meteorological conditions such as dominant wind directions, warrant special consideration, an additional sub-area may need to be defined and a separate estimate made for this case. The EPZ and its sub-areas shall be identified by mapping on United States Geological Survey (USGS) 7-1/2-minute series quadrant maps when available. Special facilities shall also be noted on these maps, to the extent that their locations can be geographically specified.

Populations shall be provided by evacuation areas as specified in planning element J.10.b. For the purpose of determining evacuation times it may also be useful to summarize population data by sector and distance from the plant. Figure 1 is an example of such a summary. Separate totals shall be provided for the three population segments. Figure 2 shows the population totals translated into the number of vehicles estimated to be used in evacuation.

III. TRAFFIC CAPACITY

This section of the report shall show the facilities to be used in evacuation. It shall include their location, types, and capacities. A complete review shall be made of the road network. Analyses shall be made of travel times and potential locations for serious congestion in potential corridors. (The analyses may be simplified in extreme rural areas.) The entire road network shall be used but local routes shall be carefully selected and analyzed to minimize their impact on the major routes should queuing or cross traffic conflicts occur. Care shall be taken to avoid depending only on high-capacity interstate and similar type routes because of limitations of on-ramp capacities. Alternatively, special traffic management plans may be developed to effectively utilize available capacity. Evacuation shall be based on general radial dispersion.

A. Evacuation Roadway Network

A map showing only those roads used as primary evacuation routes shall be provided. Figure 3 is an example. The map need not show local access streets necessary to get to the evacuation routes. Each segment of the network shall be numbered in some manner for reference.

The sector and quadrant boundaries shall also be indicated. (See planning elements J.10.a and b.).

B. Roadway Segment Characteristics

A table such as example Table 1 shall be provided indicating all the evacuation route segments and their characteristics, including capacity. The characteristics of a segment shall be given for the narrowest section or bottleneck if the roadway is not uniform in the number of lanes throughout the segment.

IV. ANALYSIS OF EVACUATION TIMES

As indicated previously, evacuation time is composed of several components. Each of these components shall be estimated in order to determine the total evacuation time.

A. Reporting Format

Table 2 shows the desired format for presenting the data and results for each type of evacuation. Each of the evacuation time components is presented along with the total evacuation time. Two conditions -- normal and adverse -- are considered in the analyses. Adverse conditions would depend on the characteristics of a specific site and could include flooding, snow, ice, fog or rain. The adverse weather frequency used in this analysis shall be identified and shall be severe enough to define the sensitivity of the analysis to the selected events. These conditions will affect both travel times and capacity. More than one adverse condition may need to be considered. That is, a northern site with a high summer tourist

population should consider rain, flooding, or fog as the adverse condition as well as snow with winter population estimates.

The text accompanying the table shall clearly indicate the critical assumptions which underlie the time estimates; e.g., day versus night, workday versus weekend, peak transient versus off-peak transient, and evacuation on adjacent sectors versus nonevacuation. The relative significance of alternative assumptions shall be addressed, especially with regard to time dependent traffic loading of the segments of the evacuation roadway network.

Some modification of the reporting format may be appropriate, depending on local circumstances.

B. Methodology

The method for computing total evacuation time shall be specified. Two approaches are acceptable. The simplest approach is to assume that events are sequential. That is to say, for example, that no one begins to move until all persons are warned and prepared to leave before anyone starts moving. The time is estimated by simply adding the maximum time for each component. This approach tends to over-estimate the evacuation time.

The second approach, which is more complex and will be discussed further, is to combine the distribution functions for the various evacuation time components. This second approach may result in reduced time estimates due to more realistic assumptions. The added complexity of analysis, therefore, may be warranted at sites

with long evacuation times. When distribution functions are used, estimates are made of the likelihood that each stage in an evacuation sequence will be accomplished within a given period of time. These conditional probabilities depend upon completion of the preceding stage. For example, formulation of family units or other evacuation groups does not commence until notification is received. Some of these distribution functions must be based on the judgment of the estimators. Computation of the joint distribution functions of evacuation times are made. Typically, the joint distribution assumes the form of an S-shape curve as shown in Figure 4. The evacuation time function is fairly smooth for large homogeneous population segments such as the general public. Special facilities, such as hospitals and industrial centers, produce less smooth functions, or discontinuous ones. The assessment of evacuation time may be easily updated should further analyses be conducted, assumptions changed, or new plans developed.

When distributions are used, distribution functions for notification of the various categories of the evacuee population shall be developed. The distribution functions for the action stages after notification predict what fraction of the population will complete a particular action within a given span of time. There are separate distributions for auto-owning households, school population, and transit dependent populations. These distribution functions can be constructed in a variety of ways, depending greatly on the kinds of data available for the actual site being studied. The previously developed conditional

distributions are combined to develop the time distributions for the various population segments departing their home or other facility from which they are being evacuated. For example, for the auto-owning population segment, these vehicles are then loaded onto the roadway network in order to compute travel times and delays.

Regardless of the means by which the time and amount of traffic to be loaded on the network is determined (i.e., sequentially or using distribution functions), it is necessary to calculate the on-road travel and delay times. In this step, traffic from each sector is assigned to available evacuation routes, and, if assigned volumes exceed capacity, delay times must be calculated using a queuing analyses. Traffic queue (backup) locations and estimated delay times should be indicated on the area map.

An estimate of the time required to evacuate that segment of the non-car-owning population dependent upon public transport shall be made, in a similar manner to that used for the auto-owning population. This estimate shall include consideration of any special services which might be initiated to serve this population subgroup. Such services might include fixed-route departures from designated assembly points.

Estimates for special facilities shall be made with consideration for the means of mobilization of equipment and manpower to aid in evacuation, and the needs for designated employees or staff to delay

their evacuation in order to shut down industrial facilities. Each special facility shall be treated on an individual basis. Weather conditions and time of day conditions shall be considered. Consideration shall be given to the impact of peak populations including behavioral aspects.

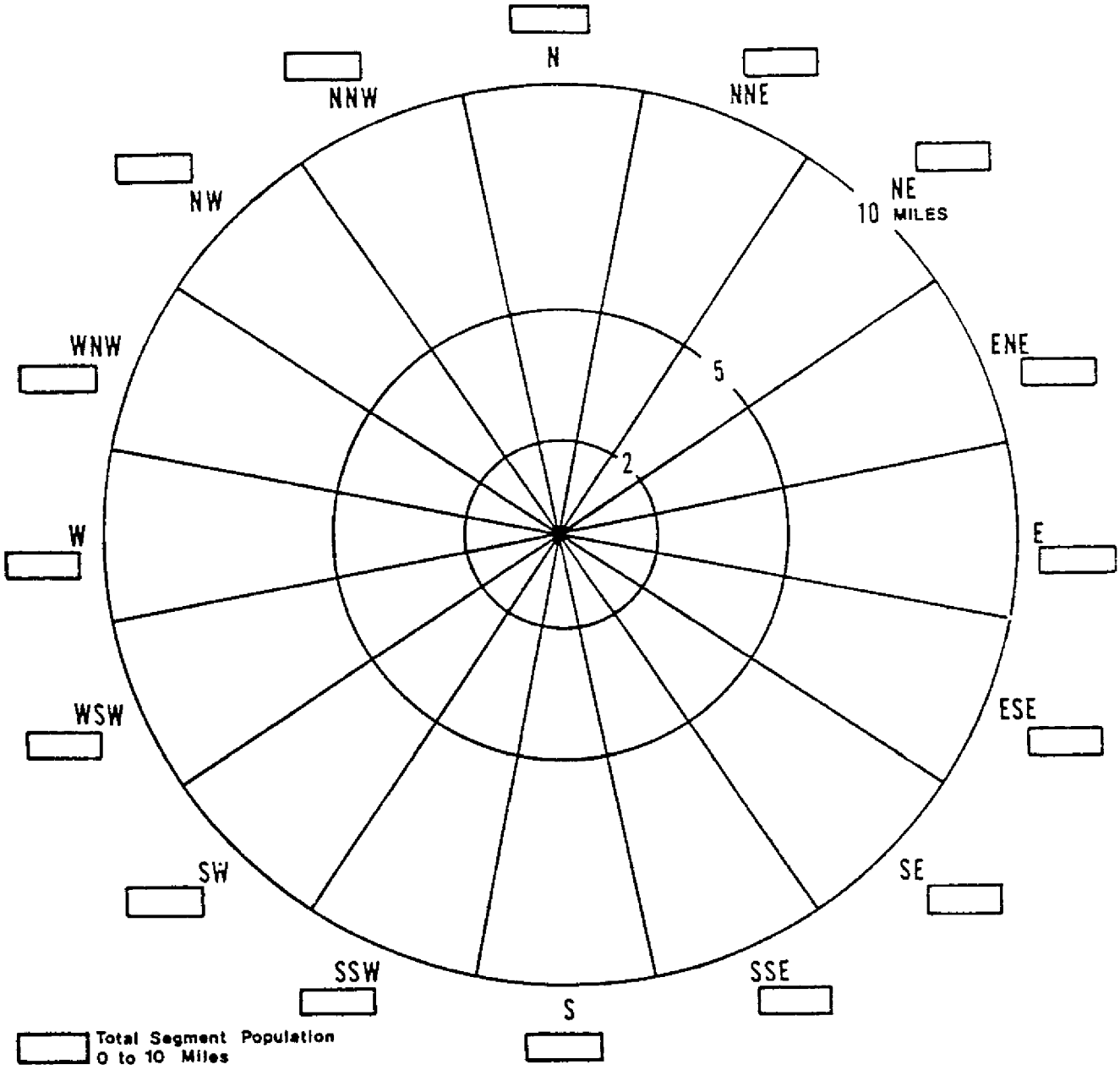
All of the results shall be reported in the format previously indicated. This format summarizes the maximum time for each component and for each sector. The components may or may not be directly additive based on the methodology used and stated in the report. Where distribution functions are used the percentage of the population as a function of time should be reported (See Figure 4 for an example format).

V. OTHER REQUIREMENTS

The time required for confirmation of evacuation shall be estimated. Candidate methods include visual confirmation by aircraft or ground vehicles and telephone confirmation.

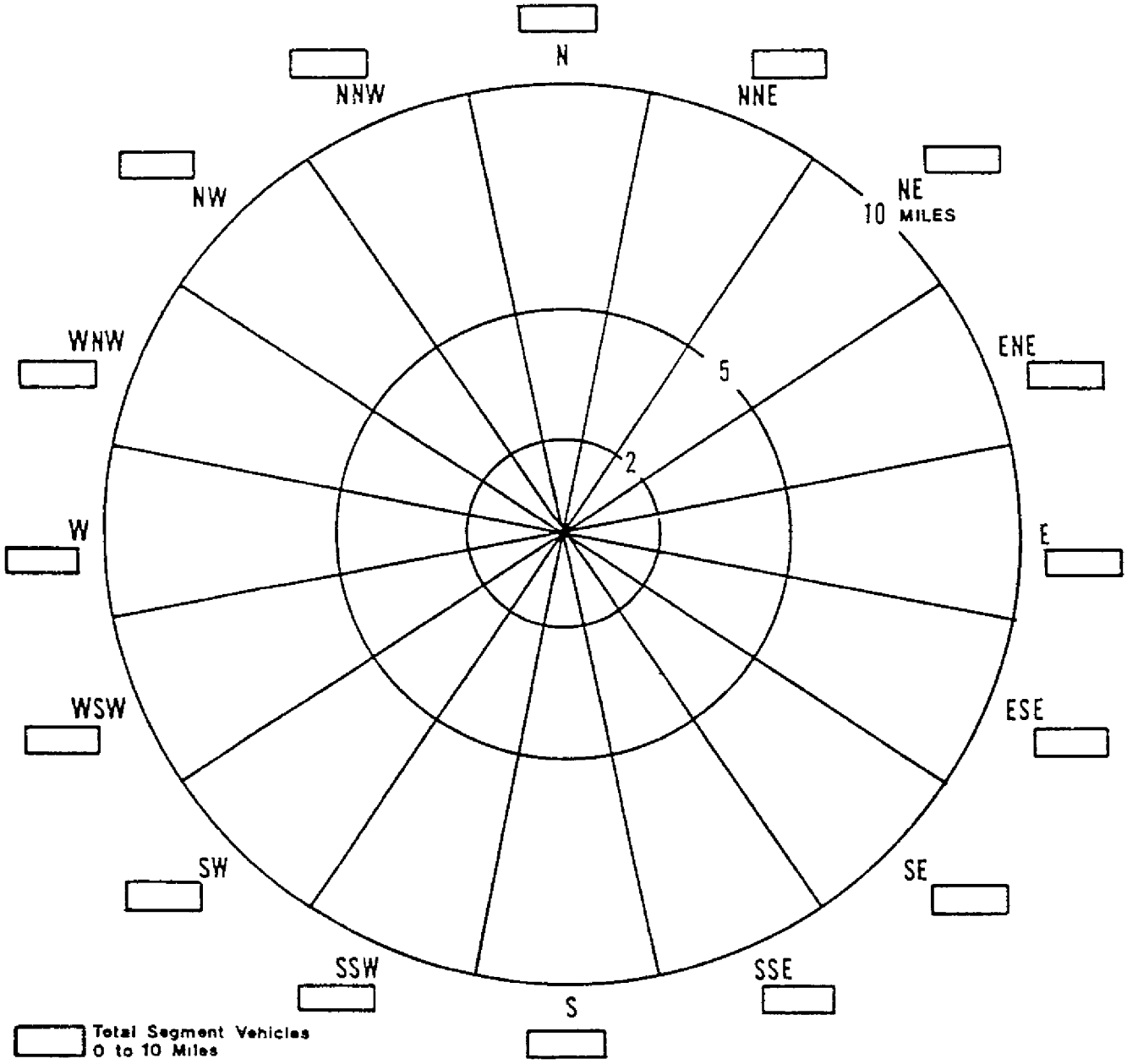
Specific recommendations for actions that could be taken to significantly improve evacuation time shall be given. Where significant costs may be involved, preliminary estimates of the cost of implementing these recommendations shall be given.

A review of the draft submittal by the principal organizations (State and local) involved in emergency response for the site shall be solicited and comments resulting from such review included with the submittal.



POPULATION TOTALS			
RING, MILES	RING POPULATION	TOTAL MILES	CUMULATIVE POPULATION
0 - 2		0 - 2	
2 - 5		0 - 5	
5 - 10		0 - 10	

Figure 1: Example of Format for Presentating Population Data By Sector



VEHICLES TOTALS			
RING MILES	RING VEHICLES	TOTAL MILES	CUMULATIVE VEHICLES
0 - 2		0 - 2	
2 - 5		0 - 5	
5 - 10		0 - 10	

Figure 2: Example of Format for Presenting Vehicle Data By Sector

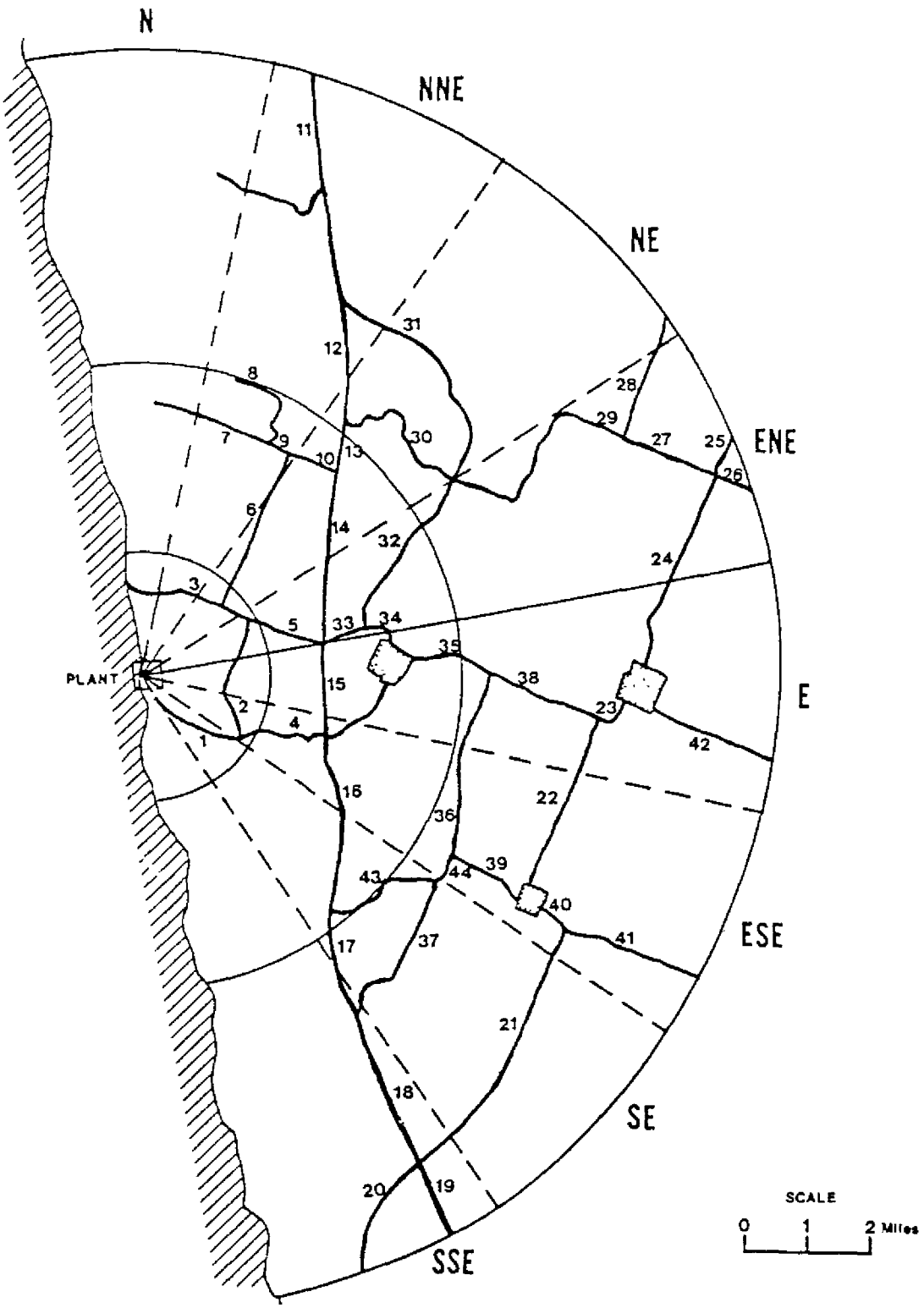


Figure 3: Example of Evacuation Roadway Network

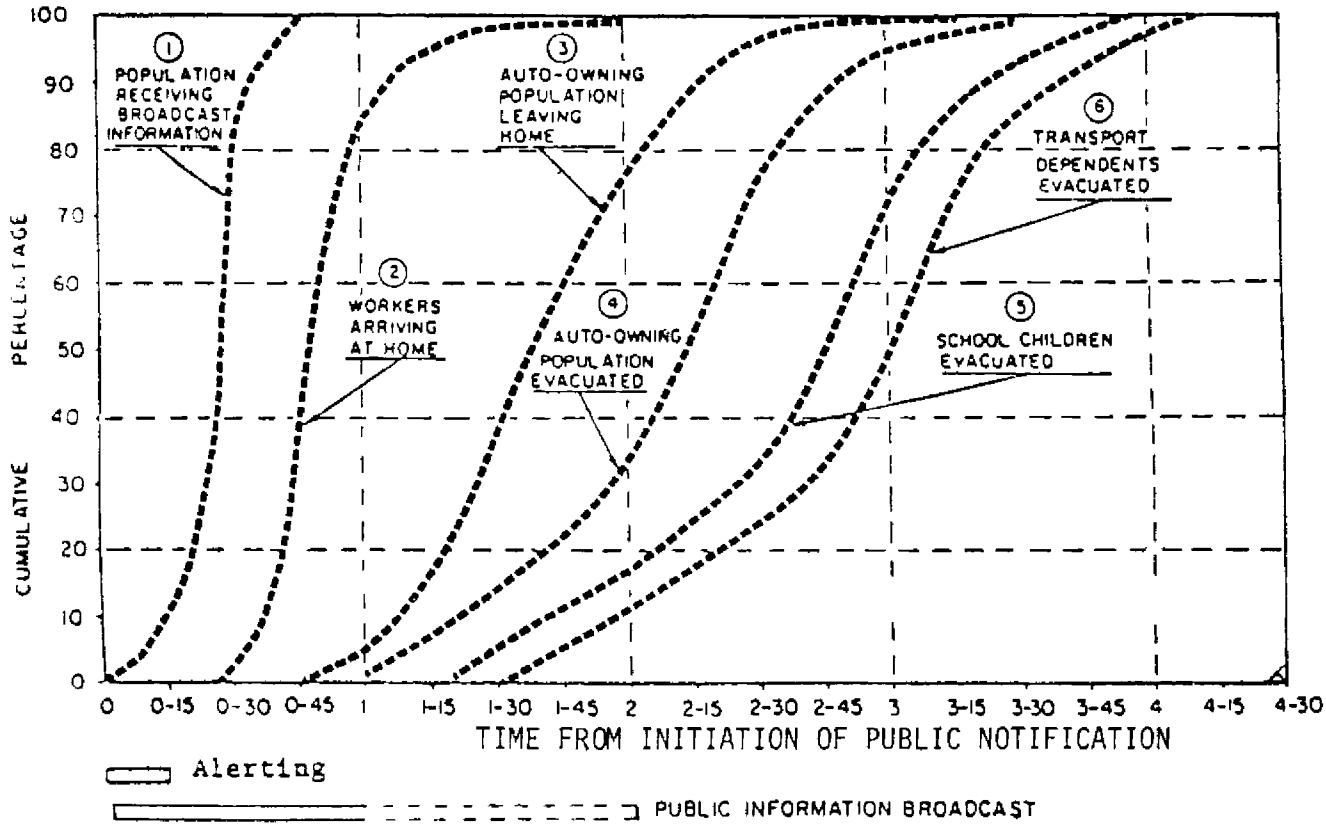


Figure 4: Example of Additional Reporting Format for Time Estimates of Population Evacuation When Probability Distributions Are Used

Note: These curves are suggestive of a hypothetical 10-mile radius EPZ. Similar curves can be developed for sub-areas of the entire EPZ. The horizontal displacement of these curves along the time axis as well as the slope of the curves will vary depending upon the characteristics of the EPZ or sub-areas of the EPZ.

Table 1: Example of Roadway Characteristics

Segment	Number[1] of Lanes	Type[2]	Capacity[3]	Comments[4]

NOTES:

[1]Total number of through lanes in both directions. If roadway cross section is not uniform, use section with least number of lanes

[2]F = Freeways and Expressways
U = Urban Streets
R = Rural Highways

[3]If known

[4]Indicate any special conditions that may affect roadway capacity.

WITHIN TEN MILES	WITHIN FIVE MILES	WITHIN TWO MILES	AREAS
			Permanent Population
			Permanent Pop. Vehicles
			Transient Population
			Transient Pop. Vehicles
			Evacuation Capacity Per Hour
			Notification Time
			Preparation Time
			Permanent Pop. Response Normal Conditions
			Permanent Pop. Response Adverse Contitions
			Transient Pop. Response Normal Conditions
			Transient Pop. Response Adverse Conditions
			General Pop. Evac. Time Normal Conditions
			General Pop. Evac. Time Adverse Conditions
			Confirmation Time
			Special Pop. Evac. Time Normal Conditions
			Special Pop. Evac. Time Adverse Conditions

Table 2: Example of Summary of Results of Evacuation Times Analysis

GLOSSARY

Three major "organizations" are identified by the three columns headed "Licensee", "State", and "Local" in Part II of this document. "Organizations" are also indicated in the document generally with a modifying word preceeding the term "organization", e.g.: -

Principal (organizations):
Federal, State, Local agencies or departments or executive offices and nuclear utilities (licensees) having major or lead roles in emergency planning and preparedness.

Sub - (organizations):
Any organization such as agencies, departments, offices or local jurisdictions having a supportive role to the principal or lead organization(s) in emergency planning and preparedness.

Federal (organizations):
Agencies, departments or their components, of the U. S. Federal government, having a role in emergency planning and preparedness.

State (organization):
The State government agency or office having the principal or lead role in emergency planning and preparedness. There may be more than one State involved, resulting in application of the evaluation criteria separately to more than one State. To the extent possible, however, one State should be designated lead.

Local (organization):

The local government agency or office having the principal or lead role in emergency planning and preparedness. Generally this will be the County government. Other local government entities (e.g., towns, cities, municipalities, etc.), are considered to be sub-organizations with supportive roles to the principal or lead local government organization responsible for emergency planning and preparedness. In some cases there will be more than one lead organization at the local level, but designation of one lead local organization is preferable.

Private Sector (organizations):

Industry, volunteer, quasi-governmental etc. having a role in emergency planning and preparedness.

It is not possible to totally specify each class or type of organization that may be involved in the total emergency planning and preparedness scheme. Nor is it possible to define the particular roles, function and responsibilities of "principal organizations" and "sub-organizations". This is a matter that is best defined by the various parties involved in developing plans and preparedness for each nuclear site. Where the guidance in this document indicates a function that must be performed, emergency planners at all levels, must decide and agree among themselves, which organization is to perform such function. As a minimum, one lead agency at the State level and one lead local government agency having 24 hour manning is required.

Onsite Technical Support Center (TSC) and Licensees Near-Site Emergency Operations Facility (EOF)

For description and functional criteria for the TSC and EOF, see "Functional Criteria for Emergency Response Facilities" (NUREG-0696), U. S. Nuclear Regulatory Commission.

Consequences	The results or effects (especially projected doses or dose rates) of a release of radioactive material to the environment.
Core Melt Accident	A postulated reactor accident in which the fuel melts because of overheating.
Emergency Planning Zone (EPZ)	A generic area defined about a nuclear facility to facilitate offsite emergency planning and develop a significant response base. It is defined for the plume and ingestion exposure pathways. During an emergency response best efforts are made making use of plan action criteria without regard to whether particular areas are inside or outside EPZs.
Ingestion Exposure Pathway	The principal exposure from this pathway would be from ingestion of contaminated water or foods such as milk or fresh vegetables. The duration of principal exposures could range in length from hours to months.

Planning Basis	Guidance in terms of (1) Size of Planning Area (Distance); (2) Time Dependence of Release; and (3) Radiological Characteristics of Releases.
Planning Standard	The standard that must be met for onsite and offsite emergency plans and preparedness. (Ref: 10 CFR 50 section 50.47 Emergency Plans, 45 FR No. 162 pp 55409; and proposed 44 CFR 350 section 350.5 Criteria for Review and Approval of State and Local Radiological Emergency Plans and Preparedness, 45 FR No. 123 pp 42344).
Plume Exposure Pathway	The principal exposure sources from this pathway are: (a) whole body external exposure to gamma radiation from the plume and from deposited materials and (b) inhalation exposure from the passing radioactive plume. The duration of principal potential exposures could range in length from hours to days.
Projected Dose	An estimate of the radiation dose which affected individuals could potentially receive if protective actions are not taken.

Protective Action	An action taken to avoid or reduce a projected dose. (Sometimes referred to as protective measure).
Protective Action Guide	Projected absorbed dose to individuals in the general population which warrants protective action.

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The purpose of this guidance and upgraded acceptance criteria document is to provide a basis for NRC licensees, State and local governments to develop radiological emergency plans and improve emergency preparedness. The guidance is the product of the joint FEMA/NRC Steering Committee established to coordinate the agencies' work in emergency preparedness associated with nuclear power plants. This document is consistent with NRC and FEMA regulations and supersedes other previous guidance and criteria published by FEMA and NRC on this subject. It will be used by reviewers in determining the adequacy of State, local and nuclear power plant licensee emergency plans and preparedness.

17. KEY WORDS AND DOCUMENT ANALYSIS

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