U.S. NUCLEAR REGULATORY COMMISSION

November 1975

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 1.101

EMERGENCY PLANNING FOR NUCLEAR POWER PLANTS

A. INTRODUCTION

Section 50.34, "Contents of Applications; Technical Information," of 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that each application for a license to operate a facility include in a Final Safety Analysis Report (FSAR), along with other information, the applicant's plans for coping with emergencies, including the items specified in Appendix E, "Emergency Plans for Production and Utilization Facilities," to 10 CFR Part 50. Appendix E refers to a document entitled "Guide to the Preparation of Emergency Plans for Production and Utilization Facilities,"[1] which was developed to help applicants establish adequate plans for coping with emergencies. This regulatory guide provides more complete guidance in developing emergency plans for nuclear power plants. It describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to adequate content of emergency plans for nuclear power plants, primarily in the FSAR stage.

B. DISCUSSION

The Commission's interest in emergency planning is focused primarily on situations that may cause or may threaten to cause radiological hazards affecting the health and safety of workers or the public or resulting in damage to property. Emergency plans should be directed toward mitigating the consequences of emergencies and should provide reasonable assurance that appropriate measures can and will be taken to protect health and safety and prevent damage to property in the event of an emergency. Although it is not practicable to develop a completely detailed plan encompassing every conceivable type of emergency situation, advance planning can create a high order of preparedness and ensure an orderly and timely decision-making process at times of stress, as well as the availability of necessary equipment, supplies, and services.

An important element of emergency planning for nuclear power plants is the recognition of a need to prepare to cope with a very broad spectrum of potential consequences. Federal, State, and local agencies, as well as the licensee, have responsible roles to play in both the planning and the implementation of emergency preparedness procedures. Federal interagency responsibilities for nuclear incident planning were set forth by the Office of Emergency Preparedness in a FEDERAL REGISTER notice (38 FR 2356) published January 24, 1973. To a large extent, these responsibilities are directed toward a coordination of efforts to provide assistance to State and local governments in their planning. This policy is based on the recognition that State and local governments have the necessary authority to implement emergency measures in their jurisdictions. Although Federal agencies can and will respond to emergencies arising from nuclear power plant activities if necessary, such response should be regarded primarily as supportive of, and not as a substitute for, responsible action by licensees and State and local governments.

In the preparation of an emergency plan for a specific nuclear power plant, the applicant should be guided by the following criteria to clarify the scope, content, and purpose of the document that describes the plan.

1. Although considered a part of the Final Safety Analysis Report, the plan should be prepared as a separate document.

2. The plan should be an expression of the overall "concept of operation" that describes the essential

[1] Copies may be obtained by request to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Office of Nuclear Reactor Regulation.

USNRC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public methods acceptable to the NRC staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants. Regulatory Guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. However, comments on this guide, if received within about two months after its issuance, will be particularly useful in evaluating the need for an early revision.

Comments should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Section.

The guides are issued in the following ten broad divisions:

1. Power Reactors
2. Research and Test Reactors
3. Fuels and Materials Facilities
4. Environmental and Siting
5. Materials and Plant Protection
6. Products
7. Transportation
8. Occupational Health
9. Antitrust Review
10. General

Copies of published guides may be obtained by written request indicating the divisions desired to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Office of Standards Development.

elements of advance planning that have been considered and the provisions that have been made to cope with emergency situations. The plan should incorporate information about the emergency response roles of supporting organizations and agencies. That information should be sufficient to enable a determination of the interface and coordination required among the supporting groups and between them and the licensee.

3. Details that can reasonably be expected to change from time to time, e.g., names and telephone numbers, specific items of equipment and supplies, inventory lists, and step-by-step procedures or checklists that may be altered as a result of experience or test exercises, should not be incorporated into the plan.

4. The plan should not, by itself, be considered a primary working document to be used during an emergency. Detailed procedures that will ensure timely and effective implementation of various aspects of the emergency plan should be prepared. These procedures, however, should not be incorporated into the document.

C. REGULATORY POSITION

1. Each applicant's emergency plan should include provisions for coping with emergencies, both within the boundary of the plant site and in the environs of the site. Responsibility for planning and implementing all emergency measures within the site boundaries rests with the licensee. Planning and implementation of measures to cope with plant-related emergencies outside the site boundary should be a coordinated effort involving the licensee and local, county, State, and Federal agencies having emergency responsibilities. The emergency plan should describe this coordination, that is, the arrangements and agreements between the licensee and these supporting agencies.

2. The scope and content of a nuclear power plant emergency plan should be substantially equivalent to that recommended in Annex A to this guide, "Organization and Content of Emergency Plans for Nuclear Power Plants." Provision should be made for an annual review of the emergency plan and for updating and improving procedures based on training, drills, and changes onsite or in the environs.

3. Features and candidate subjects that should be considered in the preparation of specific procedures for implementing the emergency plan are described in Annex B to this guide, "Implementing Procedures for Emergency Plans." Implementing procedures should not be incorporated into the plan and are not required to be submitted as part of the Final Safety Analysis Report to the Commission. These procedures should, however, be available for review by the Office of Inspection and Enforcement during its prelicensing and routine inspections.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC staff's plans for utilizing this regulatory guide.

With the exception of Annex B, this guide reflects current Nuclear Regulatory Commission practice as outlined in the USNRC Standard Review Plan. Except in those cases in which the applicant proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described in Annex A is being and will continue to be used in the evaluation of Final Safety Analysis Reports until this guide is revised as a result of suggestions from the public or additional staff review.

Annex B is being published now for comment and review; it may be revised as a result of suggestions from the public or additional staff review.

ANNEX A

ORGANIZATION AND CONTENT OF EMERGENCY PLANS FOR NUCLEAR POWER PLANTS

1. DEFINITIONS

This section should provide definitions of any terms that are unique to the power plant under consideration or are given connotations that differ from normally accepted usage. Listed below are some terms used in this guide along with the definitions that should be applied to these terms when they are used in emergency plans.

1. **Assessment actions** – those actions taken during or after an accident which are collectively necessary to make decisions to implement specific emergency measures.

2. **Corrective actions** – those emergency measures taken to ameliorate or terminate an emergency situation at or near the source of the problem.

3. **Protective actions** – those emergency measures taken after an uncontrolled release of radioactive material has occurred for the purpose of preventing or minimizing radiological exposures to persons that would be likely to occur if the actions were not taken.

4. **Population at risk** – those persons for whom protective actions are or would be taken.

5. **Affected persons** – individuals who have been radiologically exposed or physically injured as a result of an accident to a degree requiring special attention, e.g., decontamination, first aid, or medical services.

6. **Recovery actions** – those actions taken after the emergency to restore the plant as nearly as possible to its preemergency condition.

7. **Protective action guides** – projected radiological dose or dose commitment values to individuals in the general population that warrant protective action following a release of radioactive material.

8. **Emergency action levels** – radiological dose rates; specific contamination levels of airborne, waterborne, or surface-deposited concentrations of radioactivity; or specific instrument readings that may be used as thresholds for initiating specific emergency measures.

2. SCOPE AND APPLICABILITY

This section of the plan should define the unit, plant, station, or area to which the plan is applicable and present a summary of the plan's interrelationships with (1) its implementing procedures, (2) plant operating, radiological control, and industrial security procedures, (3) other emergency plans of the company (e.g., an overall corporate plan), and (4) emergency plans of other participating agencies, particularly the responsible State agency or other governmental authority having emergency planning responsibilities in the immediate offsite area.

3. SUMMARY OF EMERGENCY PLAN

This section should describe the key elements of overall emergency planning logic, incorporating graded emergency classifications of increasing severity and their relationship to the participating status of onsite and offsite personnel and agencies.

4. EMERGENCY CONDITIONS

4.1 Classification System

An emergency plan should characterize several classes of emergency situations. The system of classification employed should consist of mutually exclusive groupings (to avoid ambiguity) but should cover the entire spectrum of possible situations. Succinct verbal rather than numerical or alphabetical classification designations are recommended to give better immediate information to personnel as to the scope and character of the situation.

The plan should describe the limiting scope considered for each identified class of emergency, that is, the area and/or persons affected by the consequences. The plan should also describe, for each class, the preliminary actions to be taken to cope with the situation, the authority or title of the individual responsible for initiating these actions, and the organizations and agencies that would be alerted and mobilized.

Specific implementing procedures should be prepared for each identified class of emergency (see Annex B).

An acceptable classification scheme is described in qualitative terms in Sections 4.1.1 through 4.1.5. This part of the emergency plan should describe the criteria for recognizing and declaring each class, including specific emergency action levels for the last three classes.

4.1.1 Personnel Emergency

This class involves accidents or occurrences onsite in which emergency treatment of one or more individuals is required. It includes those situations that

ANNEX A

ORGANIZATION AND CONTENT OF EMERGENCY PLANS FOR NUCLEAR POWER PLANTS

1. DEFINITIONS

This section should provide definitions of any terms that are unique to the power plant under consideration or are given connotations that differ from normally accepted usage. Listed below are some terms used in this guide along with the definitions that should be applied to these terms when they are used in emergency plans.

1. **Assessment actions** – those actions taken during or after an accident which are collectively necessary to make decisions to implement specific emergency measures.

2. **Corrective actions** – those emergency measures taken to ameliorate or terminate an emergency situation at or near the source of the problem.

3. **Protective actions** – those emergency measures taken after an uncontrolled release of radioactive material has occurred for the purpose of preventing or minimizing radiological exposures to persons that would be likely to occur if the actions were not taken.

4. **Population at risk** – those persons for whom protective actions are or would be taken.

5. **Affected persons** – individuals who have been radiologically exposed or physically injured as a result of an accident to a degree requiring special attention, e.g., decontamination, first aid, or medical services.

6. **Recovery actions** – those actions taken after the emergency to restore the plant as nearly as possible to its preemergency condition.

7. **Protective action guides** – projected radiological dose or dose commitment values to individuals in the general population that warrant protective action following a release of radioactive material.

8. **Emergency action levels** – radiological dose rates; specific contamination levels of airborne, waterborne, or surface-deposited concentrations of radioactivity; or specific instrument readings that may be used as thresholds for initiating specific emergency measures.

2. SCOPE AND APPLICABILITY

This section of the plan should define the unit, plant, station, or area to which the plan is applicable and present a summary of the plan's interrelationships with (1) its implementing procedures, (2) plant operating, radiological control, and industrial security procedures, (3) other emergency plans of the company (e.g., an overall corporate plan), and (4) emergency plans of other participating agencies, particularly the responsible State agency or other governmental authority having emergency planning responsibilities in the immediate offsite area.

3. SUMMARY OF EMERGENCY PLAN

This section should describe the key elements of overall emergency planning logic, incorporating graded emergency classifications of increasing severity and their relationship to the participating status of onsite and offsite personnel and agencies.

4. EMERGENCY CONDITIONS

4.1 Classification System

An emergency plan should characterize several classes of emergency situations. The system of classification employed should consist of mutually exclusive groupings (to avoid ambiguity) but should cover the entire spectrum of possible situations. Succinct verbal rather than numerical or alphabetical classification designations are recommended to give better immediate information to personnel as to the scope and character of the situation.

The plan should describe the limiting scope considered for each identified class of emergency, that is, the area and/or persons affected by the consequences. The plan should also describe, for each class, the preliminary actions to be taken to cope with the situation, the authority or title of the individual responsible for initiating these actions, and the organizations and agencies that would be alerted and mobilized.

Specific implementing procedures should be prepared for each identified class of emergency (see Annex B).

An acceptable classification scheme is described in qualitative terms in Sections 4.1.1 through 4.1.5. This part of the emergency plan should describe the criteria for recognizing and declaring each class, including specific emergency action levels for the last three classes.

4.1.1 Personnel Emergency

This class involves accidents or occurrences onsite in which emergency treatment of one or more individuals is required. It includes those situations that

have no potential for escalation to more severe emergency conditions. There may be no effect on the plant, and immediate operator action to alter plant status is not necessarily required. A Personnel Emergency does not activate the entire emergency organization but may activate such teams as the first aid team. It may also require special local services such as ambulance and medical.

Implementing procedures for the handling of this class of emergency may also be incorporated in the plant's radiation protection procedures and general industrial safety procedures.

Included in this class are injuries that may be complicated by contamination problems or excessive radiation exposures to onsite personnel.

The recognition of this class of emergency is primarily a judgment matter for plant supervisory or management personnel. Its importance as part of the classification scheme rests to some extent on its "negative" information content, viz, that the incident giving rise to the emergency is restricted in its scope of involvement. This section of the plan should designate the classification criteria and should enumerate discrete accident situations that could give rise to this class.

4.1.2 Emergency Alert

This class involves specific situations that can be recognized as creating a hazard potential that was previously nonexistent or latent. The situation has not yet caused damage to the plant or harm to personnel and does not necessarily require an immediate change in plant operating status. Inherently, however, this is a situation in which time is available to take precautionary and constructive steps to prevent an accident and to mitigate the consequences should it occur. An Emergency Alert situation may be brought on by either man-made or natural phenomena.

Emergency Alert conditions imply a rapid transition to a state of readiness by the plant personnel, the possible cessation of certain routine functions or activities within the plant that are not immediately essential, and possible precautionary actions that a specific situation may require. Examples of situations that might be placed in this class are threats to or breaches of plant security measures such as bomb threats or civil disturbance; severe natural phenomena in the plant environment such as floods, earthquakes, tsunami, hurricanes, or tornadoes; emergency situations such as fires at adjacent locations; or release of a toxic or noxious gas in or near the plant. This section of the emergency plan should identify specific candidate situations for Emergency Alerts and the quantitative criteria that would guide the decision to implement each. Qualitative criteria should be added for other candidate situations to guide the decisions of onsite supervisory personnel.

4.1.3 Plant (Unit) Emergency

This class includes physical occurrences within the plant requiring full plant staff emergency organization response. The initial information and assessment indicates that it is very unlikely that an offsite hazard will be created. However, substantial modification of plant operating status is a highly probable corrective action if this has not already taken place by the actions of automatic protective systems. Although it is judged that the emergency situation can be corrected and controlled by the plant staff, notification of corporate headquarters staff to put them on an alert status is prudent. Notification of appropriate offsite agencies as to the nature and extent of the incident is also advisable. Evacuation of the plant is not anticipated in this class of emergency, although protective evacuations or isolations of certain plant areas may be necessary.

Examples of situations that might fall into this class are those accidents analyzed in the FSAR as events that are predicted to have no radiological consequences offsite. Fires, explosions or explosive gas releases, or in-plant flooding conditions may fall into this class.

Activation levels for declaring Plant Emergencies should be based on the recognition of an immediate need to implement in-plant emergency measures to protect or provide aid to affected persons in the plant or to mitigate the consequences of damage to plant equipment, coupled with a positive observation that (1) effluent and other radiological monitors do not indicate the possibility of a Site Emergency and (2) there is no apparent breach of any fuel cladding, primary system boundary, or containment. This section should describe the alarm conditions or combinations of alarm conditions and the emergency action levels for initiating a Plant Emergency.

4.1.4 Site (Station) Emergency

This class involves an uncontrolled release of radioactive materials into the air, water, or ground to an extent that initial information and assessment indicate protective actions offsite may be desirable. Mobilization and readiness of offsite emergency organizations is prudent. Protective actions are likely to include evacuation of plant areas other than control rooms and emergency stations and should include the evacuation of construction personnel when additional units are under construction on the same site. Assessment actions will include monitoring of the environment.

Situations likely to fall into this class include those accidents analyzed in the FSAR that are predicted to have small to moderate releases at the exclusion radius. It should be anticipated that Site Emergencies would not normally be preceded by a Plant Emergency, although the possibility of this evolution should not be excluded.

Emergency action levels for declaring a Site Emergency should be defined in terms of instrument readings or alarms in the control room, including indications from effluent monitors. To avoid false alarms or to minimize their frequency of occurrence, the levels may be defined so as to require corroborating evidence from two independent sources that provide input to the control room. Site Emergencies should also be declared on the basis of evidence of apparent breaches in fuel cladding, primary system boundaries, or containment. The bases and criteria used to define the instrument alarm levels should be described. Suitable criteria would be protective action guide values at a security fence, exclusion area, or site boundary, and the bases would show how the effluent monitor readings relate to such values. Federal agency guidance[1,2] is available to assist in the selection of acceptable protective action guides.

4.1.5 General Emergency

This is an occurrence characterized by consequences requiring that protective actions be taken in offsite areas as a matter of prudence or necessity. Evacuation of the site may also be necessary under extreme circumstances.

Action levels for declaring the General Emergency case should be defined. The action levels should recognize both short-term and long-term hazards. The selection of action levels for the former should be guided by direct radiation hazards and inhalation hazards that may be presented by the passage of a cloud of radioactive material released from the plant. The selection of action levels for the long-term hazards should be guided by contamination hazards that could result from fallout or deposition of radioactive materials released from the plant.

Protective actions should be planned and implemented at the prescribed action levels. Action levels for severe short-term situations requiring rapid implementation of protective actions should be defined in terms of readily available information such as readings of effluent monitors or other onsite monitor indications. Implementation of protective actions may also be based on confirmatory measurements taken in the field to the extent it can be shown that field measurements can be taken and evaluated rapidly enough to permit adequate time for the protective actions to be accomplished. In either event, the bases and criteria used to define the action levels should be described in the plan.

[1] "Background Material for the Development of Radiation Protection Standards," Federal Radiation Council, Report No. 5, July 1964, and Report No. 7, May 1965.

[2] "Emergency Response Protective Action Guides—Airborne Releases from Fixed Nuclear Facilities," Office of Radiation Programs, U.S. Environmental Protection Agency, January 1975.

4.2 Spectrum of Postulated Accidents

Accident analysis sections of Safety Analysis Reports are primarily concerned with the design responses of a plant to postulated malfunctions or equipment failure and include estimates of the radiological consequences of discrete accidents. By contrast, emergency planning is concerned with individual and organizational responses to the continuum of potential accident situations, including those discrete accidents that have been hypothesized. This section of the emergency plan should show that each postulated accident is encompassed within the emergency characterization classes and should provide a summary analysis of their implications for emergency planning. Implications to be considered should include:

1. Instrumentation capability for prompt detection and continued assessment, including functional applicability, range, response time, locations of sensing and readout elements (including alarms), and backup or redundant capability;

2. Manpower requirements for assessment, including recordkeeping; for corrective actions; for protective actions, including communications requirements; and for aid to affected persons; and

3. The timing of and the time required for the implementation of each emergency measure that may be brought into play.

5. ORGANIZATIONAL CONTROL OF EMERGENCIES

Starting with the normal operating organization as a base, this section of the plan should describe the emergency organization that would be activated on the site and its augmentation and extension offsite. Authorities and responsibilities of key individuals and groups should be delineated. The communication links established for notifying, alerting, and mobilizing emergency personnel should be identified.

5.1 Normal Plant Organization

Both day and night shift staffs (crews) should be described, indicating clearly who is in the immediate onsite position of responsibility for the plant or station (normally a shift supervisor) and his authority and responsibility for declaring an emergency.

5.2 Onsite Emergency Organization

This section should describe the mobilization billets of plant staff personnel for controlling each class of emergency for both day and night shift situations.

5.2.1 Direction and Coordination

The position title of that person who is designated to take charge of onsite emergency control measures should be clearly identified. A specific line of succession for this authority should also be given. A policy statement describing the scope of authority and responsibility vested in that role by the company (applicant) should be included. Functional responsibilities assigned to this individual should be described and should include a summary of those preliminary assessment procedures that would be followed to prescribe or guide his decision to classify and declare an emergency.

5.2.2 Plant Staff Emergency Assignments

The plan should specify the functional areas of emergency activity to which members of the plant staff are assigned, including an indication of how the assignments are made for both day and night shifts and for plant staff members both onsite and away from the site. Functional areas should include:

1. Plant systems operations,
2. Radiological survey and monitoring,
3. Firefighting,
4. Rescue operations,
5. First aid,
6. Decontamination,
7. Security of plant and access control,
8. Repair and damage control,
9. Personnel accountability,
10. Recordkeeping,
11. Communications.

5.3 Augmentation of Onsite Emergency Organization

This section should describe two categories of offsite support assistance to the plant staff emergency organization. These can be either directed, authorized, or requested by the company management to perform special emergency assistance functions.

5.3.1 Licensee Headquarters Support

Headquarters management, administrative, and technical personnel should be prepared to augment the plant staff, both in emergency planning and in the performance of certain functions required to cope with an emergency. The following special functions are considered appropriate for headquarters support and should be incorporated in the overall plan, although company policy and organizational features may dictate variations in modes of assigning responsibilities for these functions among headquarters personnel, plant staff personnel, and outside support organizations:

1. Environs monitoring,

2. Logistics support for emergency personnel, e.g., transportation, temporary quarters, food and water, sanitary facilities in the field, and special equipment and supplies procurement,

3. Technical support for planning and reentry/recovery operations,

4. Notification of governmental authorities, and

5. Public relations and information release, coordinated with governmental authorities, including steps taken to inform visitors to the plant, site, or information center and occupants in the environs of the site how the emergency plans provide for notification to them and how they can expect to be advised what to do.

The emergency organization status of supporting headquarters personnel should be specified, relative particularly to the person directing the plant emergency organization.

In some instances, companies may provide for certain emergency supporting services to their plants by contracts with private organizations. Where this is the case, the nature and scope of the support services should be characterized here. (The Commission may find it necessary to request evidence of the qualifications of such contractors.) Specific services by contractors should be identified at the appropriate places in the emergency plan.

5.3.2 Local Services Support

This section should identify the extension of the organizational capability for handling emergencies to be provided by ambulance, medical, hospital, fire, and police organizations. Evidence of the arrangements and agreements reached with such organizations should be included in an appendix. This section should contain references to that appendix and to the parts of the plan in which the functions of these organizations are described.

5.4 Coordination with Participating Agencies

This section should identify the principal State agency (designated state authority) and other governmental agencies (local, county, State, and Federal)

having planning or action responsibilities for emergencies, particularly for radiological emergencies, in the area in which the plant is located. If the boundary line between two political entities, e.g., counties or states, passes within the low-population zone or within approximately four miles of the site, agencies from both governmental entities should be included. Subsections for each such agency should include:

1. The identity of the agency.

2. A summary of the written agreement with the agency that clearly defines the authority and responsibility of the agency for emergency preparedness planning and for emergency response, particularly in relation to those of the licensee and to those of other agencies. Copies of such agreements should be included in an appendix, along with a copy or summary of relevant parts of that agency's emergency plan.

3. Activation of the agency function, including titles and alternates for both ends of the communication links, and primary and alternative means of communication.

4. The designation and location of the Emergency Operations Center of each agency.

5. Support of the agency function that may be provided by the company emergency organization, which may include (a) information on plant status, monitoring results, dose predictions, (b) recommendations or requests for specific actions, and (c) logistics support.

Typical agencies to be included here are law enforcement agencies not included above (e.g., State Police/Highway Patrol), departments of health or environmental protection, civil defense or emergency/disaster control agencies, and the Regional Coordinating Offices of USERDA's Radiological Assistance Program.

6. EMERGENCY MEASURES

Specific emergency measures should be identified in this section and related to action levels or criteria that specify when the measures are to be implemented. They should be organized with respect to each emergency classification. Preplanned action levels and criteria should be designed to assist and guide, or in some cases specify, the decision-making functions.

The planning represented by this section should lead to more detailed emergency procedures and assignments for executing tasks by appropriate members of the total emergency organization. Emergency measures begin with the activation of an emergency class and its associated emergency organization. The additional measures may be organized into assessment actions, corrective actions, protective actions, and aid to affected persons.

6.1 Activation of Emergency Organization

The emergency conditions classified in Section 4.1 involve the alerting or activation of progressively larger segments of the total emergency organization. This section should describe how the necessary communication steps are taken to alert or activate emergency personnel under each class of emergency, including, in particular, action levels for notification of offsite agencies.

6.2 Assessment Actions

Effective coordination and direction of all elements of the emergency organization require continuing assessment throughout the duration of an emergency situation. Assessment functions should be incorporated in explicit procedures for each emergency classification. They should be identified in this section and may include the following:

1. Surveillance of control room instruments and emergency control center, radiological and meteorological monitors.

2. Surveillance of containment integrity.

3. In-plant radiological surveys.

4. Site and site boundary surveys.

5. Environs surveys and monitoring.

a. Plume and other effluent surveillance for short-term assessment. Planning should consider type of data sought; instrument and equipment requirements; transportation facilities for monitoring team (e.g., aircraft, boats, other vehicles); methods and accuracy of plume location; and potential use of fixed offsite monitoring facilities.

b. Contamination surveillance. Planning should consider the timing, frequency, and types of samples to be collected, such as soil, vegetation, food, milk, and water supplies, and potential locations for reconcentration, e.g., in air intake filters.

6. Data reporting, reduction, and analysis.

7. Interviewing of evacuees or other witnesses of the accident.

8. Notification of assessment results for modification of emergency measures in progress, if necessary.

6.3 Corrective Actions

Many emergency situations involve actions that can be taken to correct or mitigate the situation at or near the source of the problem. This section should identify

those actions, e.g., fire control, repair, and damage control, that would be implemented when necessary. Emergency exposure criteria for personnel undertaking corrective actions should be included.

6.4 Protective Actions

This section should describe the nature of protective actions that the plan contemplates, the emergency action levels, the area involved, and the means of notification to the population at risk. Protective actions to be taken offsite by other agencies should be described.

6.4.1 Protective Cover, Evacuation, Personnel Accountability

The emergency plan should provide for timely relocation of persons to prevent or minimize exposure to radioactivity. The following items should be included:

1. Plant Site

a. Action criteria.

b. The means and the time required to notify persons involved. These should include:

(1) Employees not having emergency assignments,

(2) Working and nonworking visitors,

(3) Contractor and construction personnel.

c. Control of public access areas on or passing through the site or within the exclusion area.

d. Evacuation routes, transportation of personnel, and reassembly areas, including alternatives for inclement weather and high traffic density.

e. Missing persons check.

f. Radiological monitoring of evacuees.

2. Offsite Areas

a. Action criteria, including inclement weather alternatives.

b. Responsibilities of company emergency organization.

c. Agency responsibilities.

d. The means and the time required to notify the persons involved and their expected response. These should include:

(1) Adjacent businesses, property owners, and tenants,

(2) Nearby schools or recreational facilities,

(3) General public in the environs.

6.4.2 Use of Protective Equipment and Supplies

Additional protective actions that should be considered in emergency planning include measures for minimizing the effects of radiological exposures or contamination problems by the distribution of special equipment or supplies. Measures that should be considered include:

1. Individual respiratory protection.

2. Use of protective clothing.

3. Use of radioprotective drugs, e.g., individual thyroid protection.

For each measure that might be used, a description should be given of:

1. Criteria for issuance,

2. Locations of items, and

3. Means of distribution to onsite and offsite persons.

6.4.3 Contamination Control Measures

Provisions should be made for preventing or minimizing exposure to radioactive materials. Control of in-plant contamination should be described in specific radiological protection procedures and need not be repeated here. Measures for the protection of offsite persons and onsite persons outside of fenced security areas should include:

1. Isolation or quarantine and area access control.

2. Control of the distribution of affected commercial agricultural products.

3. Control of public water supplies.

4. Means for providing advisory information regarding the use of potentially affected home food and water supplies.

5. Criteria for permitting return to normal use.

Action levels and responsibility for execution of each measure contemplated should be described.

6.5 Aid to Affected Personnel

This section of the emergency plan should describe measures that will be used to provide necessary assistance to persons injured or exposed to radioactivity. The following matters should be included:

6.5.1 Emergency Personnel Exposure Criteria

This should specify exposure limits for entry or reentry to areas to remove injured persons and limits for emergency personnel who may provide first aid, decontamination, ambulance, or medical treatment services to injured persons. An individual or authority should be designated to authorize or approve the acceptance of emergency radiation exposure for life-saving purposes.

6.5.2 Decontamination and First Aid

Capabilities for decontaminating personnel for their own protection and to prevent or minimize further spread of contamination should be included, along with a brief description of first aid training and capabilities of appropriate members of the emergency organization.

6.5.3 Medical Transportation

Arrangements for transporting injured personnel, who may also be radiologically contaminated, to medical treatment facilities should be specified.

6.5.4 Medical Treatment

Arrangements made for local and backup hospital and medical services and the capability for the evaluation of radiation exposure and uptake should be described.

For both hospital and medical services, the plan should incorporate assurance not only that the required services are available, but also that persons providing them are prepared and qualified to handle radiological emergencies. Written agreements with respect to arrangements made by the applicant, which should be included in the appendix, would facilitate this determination.

7. EMERGENCY FACILITIES AND EQUIPMENT

This section of the emergency plan should identify, describe briefly, and give the locations of the items identified below. Where appropriate, references may be made to applicable sections of the Safety Analysis Report for additional detail.

7.1 Emergency Control Centers

This should include the principal and, if provided for, alternative onsite locations from which effective emergency control direction is given. One alternative offsite location under the jurisdiction of the applicant should also be described. Their locations should be related to the reactors, prevailing wind direction, and evacuation routes.

7.2 Communications Systems

This should give brief descriptions of both onsite and offsite communications systems, including redundant power sources that would be required to perform vital functions in transmitting and receiving information throughout the course of an emergency.

7.3 Assessment Facilities

Many of the emergency measures described in Section 6 will depend on the availability of monitoring instruments and laboratory facilities. This section should list monitoring systems that are to be used to initiate emergency measures, as well as those to be used for continuing assessment. The listing should be organized as follows:

7.3.1 Onsite Systems and Equipment

1. Natural phenomena monitors, e.g., meteorological, hydrologic, seismic.

2. Radiological monitors, e.g., process, area, emergency, effluent, and portable monitors and sampling equipment.

3. Nonradiological monitors, e.g., reactor coolant system pressure and temperature, containment pressure and temperature, liquid levels, flow rates, status or lineup of equipment components.

4. Fire detection devices.

7.3.2 Facilities and Equipment for Offsite Monitoring

1. Natural phenomena monitors.

2. Radiological monitors.

3. Laboratory facilities, fixed and mobile.

7.4 Protective Facilities

Specific facilities that are intended to serve a protective function should be described with emphasis on those features of each facility that ensure its adequacy with respect to capacity for accommodating the number of persons expected and with respect to shielding, ventilation, and inventory of supplies. Such facilities might include fallout shelters or similar areas and reassembly points. If design details have been provided elsewhere in the Safety Analysis Report, only a brief summary need be given here, along with a reference to the detailed information.

7.5 First Aid and Medical Facilities

A summary description of onsite facilities should be provided. (Offsite medical facilities should be described in the appendix, along with the agreements providing for their use.)

8. MAINTAINING EMERGENCY PREPAREDNESS

This section of the plan should describe the means to be employed to ensure that the plan will continue to be effective throughout the lifetime of the nuclear facility.

8.1 Organizational Preparedness

8.1.1 Training

This should include a description of periodic training programs to be given to all categories of emergency personnel. Specialized training for the following categories should be included:

1. Directors or coordinators of the plant emergency organization.

2. Personnel responsible for accident assessment, including control room shift personnel.

3. Radiological monitoring teams.

4. Fire control and repair and damage control teams.

5. First aid and rescue team members.

6. Local services personnel.

7. Medical support personnel.

8. Licensee's headquarters support personnel.

8.1.2 Drills

Periodic (at least annual) announced drills should be incorporated in the emergency plan. These should be preplanned simulations of accidents to test the adequacy of timing and content of specific implementing procedures and to test emergency equipment. Arrangements should be made for critiques of the drills. Coordinating drills should be held with participating agencies at least annually; as a minimum, the communications links and notification procedures with those agencies should be tested. An initial coordinated drill with participating agencies should be planned and carried out prior to fuel loading of the first unit at any site.

8.2 Review and Updating of the Plan and Procedures

Provision should be made for an annual review of the emergency plan and for updating and improving procedures to incorporate results of training and drills and to account for changes onsite or in the environs. Means for maintaining all coordinate elements of the total emergency organization informed of revisions to the plan or relevant procedures should be described.

8.3 Emergency Equipment and Supplies

The operational readiness of all items of emergency equipment and supplies should be ensured. The plans and schedules for performing maintenance, surveillance testing, and inventory on emergency equipment and supplies should be described.

9. RECOVERY

This section should describe general plans, including applicable criteria, for restoring the plant as nearly as may be possible to its preemergency status.

10. APPENDIX

The appendix should include the following items:

1. Copies of agency agreement letters and copies or summaries of interfacing emergency plans.

2. Plots of calculated time-distance-dose for the most serious design basis accident as called for in the latest revision of Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."

3. Listings, by title, of written procedures that implement the plan.

4. Listings, by general category, of emergency kits, protective equipment, and supplies that are stored and

maintained for emergency purposes. A detailed catalog of individual items should not be included in the plan.

The written procedures themselves and a detailed catalog of protective equipment and supplies should be available at the plant site for inspection at any time by a representative of the Commission's Office of Inspection and Enforcement.

ANNEX B

IMPLEMENTING PROCEDURES FOR EMERGENCY PLANS

This annex provides guidance regarding the preparation and content of procedures that implement the emergency plan.

1. CONTENT AND FORMAT OF PROCEDURES

This section describes desirable features that should be incorporated, where appropriate, into individual implementing procedures.

1.1 Organization and Responsibilities

Wherever appropriate, each procedure should specify the individual or organizational element having the authority and responsibility for performing specific critical tasks covered by the procedure.

1.2 Action Levels

Emergency action levels and protective action guides should be specified in procedures, along with the emergency actions or protective actions required and the individuals or organizational units responsible for their implementation.

1.3 Actions by Support Agencies

The specific actions to be performed by support groups should be identified in the procedures dealing with their activities. If the emergency actions performed by these groups require coordination with other elements of the emergency organization, the particulars and requirements of this coordination should be specified in the controlling procedure.

1.4 Procedure Format

A rigid format for implementing procedures is not suggested in this guide. An acceptable format should display the action steps so the user of the procedure can clearly understand his duties. The format of procedures that specify immediate actions to be taken has special significance because the user needs brief and explicit instructions that can be followed easily and quickly.

1.4.1 Title and Purpose

Each procedure should have a title that is descriptive of its purpose. The purpose of the procedure should be stated separately, however, if the title is not sufficiently descriptive.

1.4.2 Conditions and Prerequisites

Each procedure should specify the prerequisites and conditions that should exist before the specified actions or operations are performed. These should be in the form of action levels or protective action guides.

1.4.3 Actions and Limitations

Procedures should present the required actions in a succinct and concise manner and in step-by-step order and logical sequence. The instructions should be sufficiently detailed for a qualified individual to perform the required actions without supervision but need not provide a completely detailed description of the actions, methods, or processes.

If the user is given the latitude to exercise judgment in implementing specific actions or parts of the procedure, guidelines should be provided in the procedure to aid the user in making decisions.

1.4.4 Cautions and Precautions

Important steps or precautions should be noted or highlighted within the procedure.

1.4.5 References

When procedural steps require other functions or jobs to be performed, the controlling procedure should contain the reference to other applicable procedures.

1.4.6 Signoff Sheets and Checklists

Complex or lengthy controlling procedures should have provisions for signoff sheets or checklists to document the fact that required actions have been taken or have been completed. Examples include notification call lists and personnel accountability checks.

2. SCOPE OF IMPLEMENTING PROCEDURES

2.1 Immediate Action Procedures

There should be a separate procedure for each identified class of emergency to specify and implement the preplanned response actions required for that emergency condition. Each procedure should (1) clearly identify the action level, the protective action guide, or the conditions for declaring the emergency condition, (2) list the individuals and elements of the emergency organization that are to be notified and mobilized, and (3) specify the emergency actions that are to be taken by designated individuals and elements of the emergency organization.

2.2 Emergency Action Procedures

The following sections list subjects that should be covered by written procedures. The titles of specific procedures, as well as their contents, may vary among licensees, but the actions or subjects described below should be covered within the group of procedures that implement the emergency plan.

2.2.1 Notifications

Call lists to alert and mobilize the emergency organization and supporting agencies should be specified for each identified class of emergency. If call lists are not too lengthy or complex, they should be incorporated into the immediate action procedure.

2.2.2 Radiological Surveys

Procedures should specify the methods, and preplanned locations if feasible, for emergency radiological surveys in the plant and in the environs of the plant. The procedures should include or refer to requirements for providing collected data and information to the individual or organizational element responsible for emergency assessment functions.

2.2.3 Personnel Monitoring and Decontamination

The procedures should require monitoring of individuals leaving restricted areas or other areas known or suspected to be contaminated. The procedures should specify contamination levels that require decontamination actions. They should also include or refer to decontamination procedures for various types and levels of radioactive contamination.

2.2.4 Evacuation of Onsite Areas

Procedures for evacuation should include the action levels that require evacuation of specified areas, buildings, and the site. Primary and secondary evacuation routes and assembly areas should be designated. These procedures should be related to or refer to those procedures for personnel accountability and personnel monitoring.

2.2.5 Personnel Accountability

A method of personnel accountability should be specified in procedures to ensure that, at all times, all individuals within the site confines and areas and buildings within the site are warned of imminent threats or hazardous conditions and evacuated from affected areas if required.

The procedures should designate individuals having the responsibility of accounting for persons within areas and buildings within the site. The procedures should contain appropriate checksheets and sign-offs and should provide for reporting of information to the central authority in charge of the emergency response actions.

2.2.6 Assessment Actions

Procedures should describe the system for gathering information and data on which to base decisions to escalate or deescalate emergency response actions. They should identify the types and sources of information available such as control room radiological and meteorological instruments and radiation and contamination levels as defined by in-plant, site boundary, and onsite and offsite surveys. The procedures should specify action levels, protective action guides, and other guidelines as a basis for decisions to initiate emergency measures and actions or to terminate or otherwise modify emergency actions in progress. The procedures should assign responsibilities for gathering and using assessment data and information.

2.2.7 First Aid and Medical Care

The procedures that specify the methods and instructions for receiving, transporting, handling, and providing medical treatment of injured persons should specifically include the precautions and special handling required for contaminated patients. The procedures should cover separately the provisions for, and use of, medical treatment facilities in both onsite and offsite areas.

2.2.8 Firefighting

The procedures should cover precautions for fighting fires involving radioactive materials and for situations where firefighters may otherwise be exposed to radiation. They should cover the responsibilities and capabilities of both in-house and offsite firefighting teams and equipment. They should include specific instructions for monitoring the exposure to radiation of offsite personnel involved in firefighting.

2.2.9 Reentry

Procedures and guidelines should be developed for reentry to previously evacuated areas for the purposes of saving lives, search and rescue of missing and injured persons, or manipulation, repair, or recovery of critical equipment or systems. Specific guidelines should be included in these procedures for maximum emergency radiation exposures for reentry and rescue personnel. The procedures should designate the individual or authority having the responsibility for approving the voluntary acceptance of emergency exposures.

2.2.10 Plant Security

The normal plant security procedures should provide for security and access control during emergency conditions.

2.2.11 Recovery

Action levels and guidelines should be developed for restoring operations and property as nearly as possible to their preemergency status. The less complex operations such as personnel emergencies and emergency alerts should require only brief recovery action procedures. The more complex emergency operations, however (site and general emergencies for example), will generally require correspondingly complex recovery actions. It is not practicable to plan detailed recovery actions for all conceivable situations, but procedures that include at least the initial planning considerations for recovering, repairing, decontaminating, etc. potentially affected portions of the facility should be developed.

During recovery operations, personnel exposures to radiation should be maintained within 10 CFR Part 20 limits.

2.3 Supplemental Procedures

This section lists subjects for procedures that supplement those covering emergency response actions. The specific titles and contents may vary, but the described subjects should be covered in the licensee's procedural system.

2.3.1 Communications

Procedures should be available for activating, operating, testing, and maintaining the emergency communications systems.

2.3.2 Documentation and Records

Procedures should include requirements for recording the implementation and completion or termination of emergency response actions, logging assessment data, reports of personnel accountability, and maintenance of required records and logs.

2.3.3 Equipment and Instrumentation

Operating instructions for equipment and instrumentation should be prepared and stored with the equipment. Procedures should include inventory lists of kits, equipment, and instruments and provisions for periodic inventory, inspection, calibration, and maintenance.

2.3.4 Training

The training program for the emergency organization should be documented in the form of schedules and lesson plans or lesson outlines. The program should include training for licensee employees and for offsite organizations and personnel who are to provide support in the emergency response.

2.3.5 Tests and Drills

Procedures should provide for practice drills to test the state of preparedness of the emergency organization. The procedures should include guidance for the development of detailed scenarios to test both specific procedures and implementation of the major aspects of the emergency plan. The scenarios should be preplanned simulations of emergency situations, and they should be approved by plant management after they have been reviewed for scope and adequacy.

The procedures should consider the utility of testing on both an announced and unannounced basis. They should require the use of an observer staff during the conduct of test drills and should contain provisions for appropriate checklists or critique sheets to be used by the observer staff.

The procedures for practice drills should include coordination with offsite support organizations. Communications drills with support organizations are sufficient to test the licensee's notification procedures.

3. REVIEW AND APPROVAL OF PROCEDURES

The procedural system used by licensees should contain written rules and instructions governing the writing, revising, and updating of implementing procedures. The instructions should specify the methods to be used to ensure that procedures, revisions, and changes are reviewed for adequacy, approved for use, and distributed to user organizations and individuals having the responsibility for implementing the procedures.