



# REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

## REGULATORY GUIDE 2.6

### EMERGENCY PLANNING FOR RESEARCH REACTORS

#### A. INTRODUCTION

Section 50.34, "Contents of Applications; Technical Information," of 10 CFR Part 50, "Domestic 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,"<sup>1</sup> which was developed to help applicants establish adequate plans for coping with emergencies. This regulatory guide provides additional guidance on emergency planning for research reactors and describes a method acceptable to the NRC staff for complying with the Commission's regulations with regard to the content of emergency plans for these facilities.

#### 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 de-

velop a completely detailed plan encompassing every conceivable type of emergency situation, advance planning, including the preparation of procedures to implement the planning objectives and provisions for ensuring the availability of necessary equipment, supplies, and services, can create a high order of preparedness and ensure an orderly and timely decisionmaking process at times of crises.

In the judgment of the NRC staff, the potential radiological hazards to the public associated with the operation of research reactors are considerably less than those involved with nuclear power plants. Moreover, because there are many different kinds of research reactors, the potential for emergency situations arising and the consequences thereof vary from facility to facility. These differences and variations should be reflected realistically in the emergency plans and procedures developed for each research reactor facility.

General guidance for meeting the regulations in Appendix E to 10 CFR Part 50 is provided in ANSI standard ANSI/ANS 15.16-1978, "Emergency Planning for Research Reactors."<sup>2</sup> This regulatory guide provides more detailed guidance for emergency planning for research reactors.

In the development or modification of emergency plans for a specific research reactor, the applicant should be guided by the following:

1. The plans should be an expression of the overall concept of operation that describes how the elements of advance planning that are identified in Appendix E to 10 CFR Part 50

<sup>1</sup>Copies may be obtained by written request to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555. Attention: Director, Office of Nuclear Reactor Regulation.

<sup>2</sup>Copies may be obtained from the American Nuclear Society, 555 North Kensington Avenue, La Grange Park, Illinois 60525.

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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 Branch.

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have been considered and the provisions that have been made to cope with emergency situations. Guidance on the scope and content of such plans is provided in Annex A, "Scope and Content of Emergency Plans for Research Reactors," to this guide.

2. Features and candidate subjects that should be considered in the preparation of specific procedures for implementing the emergency plans are described in Annex B, "Implementing Procedures for Emergency Plans," to this guide.

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 plans. Implementing procedures that are not expected to change with time may, but need not, be incorporated into the plans described in the SAR.

#### C. REGULATORY POSITION

1. Each applicant's emergency plans should include provisions for coping with emergencies within and beyond the immediate boundary of the facility. Responsibility for planning and implementing all emergency measures within the facility boundaries rests with the licensee. In this context, the licensed facility boundaries should be clearly defined. Planning and implementation of measures to cope with reactor-related emergencies beyond the facility boundary should be commensurate with and based upon the potential consequences of credible accidents or incidents and specified emergency action criteria. The emergency plan should de-

scribe this planning basis and the corresponding arrangements and agreements among the licensee and the local, State, or Federal agencies expected to respond.

2. The scope and content of emergency plans for research reactors authorized to operate at power levels of approximately 100 kW or more and reactor facilities presenting comparable risks should be substantially equivalent to those described in Annex A to this guide. The scope and content of emergency plans for research reactors authorized to operate at power levels less than 100 kW should include at least those elements of Annex A to this guide except those that are marked with an asterisk.

3. To ensure that a state of preparedness is maintained, provisions should be made (1) for a biennial review and updating of the emergency plans and implementing procedures to reflect changes onsite or in the environs and (2) for specified periodic testing, exercises, and drills.

#### D. IMPLEMENTATION

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

Except in those cases in which the applicant or licensee proposes an acceptable alternative method for complying with specified portions of the Commission's regulations, the method described herein will be used in evaluating emergency plans submitted with new and renewal applications for research reactor operating licenses until this guide is revised as a result of suggestions from the public or additional staff review.

## ANNEX A

### SCOPE AND CONTENT OF EMERGENCY PLANS FOR RESEARCH REACTORS

#### 1. DEFINITIONS

Definitions of any terms that are unique to the facility under consideration or are given connotations that differ from normally accepted usage should be provided. 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.

1.1 Assessment actions—those actions taken during or after an accident to obtain and process information that is necessary to make decisions to implement specific emergency measures.

1.2 Corrective actions—those measures taken to ameliorate or terminate an emergency situation at or near the source of the problem in order to prevent an uncontrolled release of radioactive material or to reduce the magnitude of a release.

1.3 Protective actions—those measures taken in anticipation of or 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.

1.4 Population at risk—those persons for whom protective actions are being or would be taken.

1.5 Recovery actions—those actions taken after the emergency to restore the facility to a safe status.

1.6 Protective action guides (PAG)—projected radiological dose or dose commitment values to individuals in the general population that warrant protective action following a release of radioactive material. Protective actions would be warranted provided the reduction in individual dose expected to be achieved by carrying out the protective action is not offset by excessive risks to individual safety in taking the protective action. The projected dose does not include the dose that has unavoidably occurred prior to the assessment.

1.7 Emergency action levels—radiological dose rates; specific contamination levels of airborne, waterborne, or surface-deposited concentrations of radioactive materials; or specific instrument readings that may be used as thresholds for initiating specific emergency measures, e.g., designating a particular class of emergency, initiating a notification procedure, or initiating a particular protective action.

#### 2. EMERGENCY CONDITIONS

##### 2.1 Classification System

An emergency plan should characterize several classes of emergency situations. The system of classification used should consist of mutually exclusive groupings, and it should cover the entire spectrum of credible radiological emergency situations. Each class defined should be associated with a particular set of immediate actions that are to be taken to cope with the situation.

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 the following subsections.

##### 2.1.1 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 reactor, and immediate operator action to alter reactor status is not necessarily required. A Personnel Emergency would not be expected to activate an entire emergency organization but may require special local services such as ambulance and medical. Emergencies in this class may be expected to occur during the life of a research reactor.

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

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

The recognition of this class of emergency is primarily a judgment matter for supervisory 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.

##### 2.1.2 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

reactor or harm to personnel but may warrant an immediate shutdown of the reactor if it is in an operating mode. 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. Emergency Alert situations may be brought on by either manmade or natural phenomena and can be expected to occur during the life of a research reactor.

Emergency Alert conditions imply a rapid transition to a state of readiness by the reactor personnel and possibly by some offsite emergency support organizations, the possible cessation of certain routine functions or activities that are not immediately essential, and possible precautionary actions that a specific situation may require. Examples of situations that should be placed in this class are threats to or breaches of security measures such as bomb threats or civil disturbance;<sup>3</sup> severe natural phenomena in the reactor environment such as a flood, hurricane, or tornado; emergency situations such as nearby fires; or release of a toxic or noxious gas in or near the reactor area.

#### 2.1.3 Reactor Emergency

This class includes physical occurrences within the facility requiring emergency organization response. The initial assessment leading to this class should indicate that it is unlikely that an offsite hazard will be created. However, substantial modification of reactor operating status is a highly probable corrective action to ensue if the automatic protective systems have not already produced such action. Although this class is associated with a judgment that the emergency situation can be corrected and controlled by the onsite staff, notification through normal reporting mechanisms of an appropriate offsite agency to alert it as to the nature and possible extent of the incident should be a measure associated with this class. Protective evacuations or isolations of certain areas of the facility may be necessary.

Situations that might fall into this class are those accidents that are predicted to have insufficient radiological consequences offsite to warrant taking protective measures. Fires and minor explosions in the facility, e.g., the failure of an experiment under pressure, should fall into this class.

Activation levels for declaring Reactor Emergencies should be based on the recognition of an immediate need to implement in-house emergency measures to protect or provide aid to affected persons or to mitigate the consequences of damage to equipment, coupled with a positive observation that radiological monitors

<sup>3</sup>Details of measures to cope with security incidents should be described in the facility physical security plan required pursuant to 10 CFR 50.34(c) and should be withheld from public disclosure pursuant to 10 CFR 2.790(d).

do not indicate the possibility of a more serious emergency.

#### 2.1.4 Facility Emergency\*

Because of measures taken to guard against their occurrence, emergency situations more severe than a Reactor Emergency are not expected to occur during the life of a research reactor. Nevertheless, it is considered necessary and prudent that facilities make provisions for a class that involves an uncontrolled release of radioactive materials into the air, water, or ground to an extent that the initial assessment indicates protective actions offsite should be considered.<sup>4 5</sup> Alerting principal offsite emergency organizations is a recommended associated measure. Assessment actions should include provisions for monitoring the environment.

Emergency action levels for declaring a Facility Emergency should be defined in terms of instrument readings or alarms. To avoid unnecessary response to false alarms, the activation criteria for monitors should be defined so as to require a rapid method of corroborating an actual alarm condition. The bases and criteria used to specify these emergency action levels should be described and their relationship to protective action guides explained.

An example of a situation that might fall into this class is an act, circumstance, or event, e.g., a serious failure of an experiment, that results in a major disruption of the core with subsequent fission product release.

### 3. ORGANIZATIONAL CONTROL OF EMERGENCIES

Starting with the normal operating organization as a base, the plan should describe the emergency organization that would be activated at the facility and any augmentation from off-site groups as necessary. Authorities and responsibilities of key individuals and groups should be delineated. Adequate communication links established for notifying, alerting, and mobilizing all emergency personnel should be identified.

#### 3.1 Facility Emergency Organization

The mobilization billets of staff personnel for emergency situations should be described. Include the position title of that person who is designated to take charge of emergency control measures and the specific line of succession for this authority.

\*Item need not be included in emergency plans for research reactors authorized to operate at power levels of less than 100 kW (see Regulatory Position C.2).

<sup>4</sup>"Background Material for the Development of Radiation Protection Standards," Federal Radiation Council, Report No. 5, July 1964, and Report No. 7, May 1965.

<sup>5</sup>Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (Chapter 2), U.S. Environmental Protection Agency, EPA-520/1-75-001, September 1975.

### 3.2 Augmentation of Facility Emergency Organization

The extension of the organizational capability for handling emergencies to be provided by ambulance, medical, hospital, and firefighting organizations should be described. The arrangements and any written agreements reached with such organizations should be included.

### 3.3 Coordination with Participating Government Agencies

The principal State agency (designated State authority) and other governmental agencies (local, county, State, and Federal) having action responsibilities for radiological emergencies in the area in which the reactor is located should be identified. A description should be given of the authority and responsibility of each such 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 any written agreements with such agencies should be included.<sup>6</sup>

## **4. EMERGENCY RESPONSE**

Specific emergency response measures should be identified for each emergency class and related to action levels or criteria that specify when the measures are to be implemented.

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

### 4.1 Activation of Emergency Organization

The communication steps taken to alert or activate emergency personnel under each class of emergency, including, in particular, action levels for notification of offsite agencies, should be described and should ensure that they can be taken rapidly. The existence, but not the details, of a message authentication scheme should be noted for such agencies.

### 4.2 Assessment Actions

Effective coordination and direction of all elements of the emergency organization require continuing assessment throughout an emergen-

<sup>6</sup>As an alternative method of providing the information requested in these subsections, the applicant may choose to submit copies of such agencies' radiological emergency response plans as evidence of acceptable coordination.

cy situation. The details of assessment functions should be incorporated in explicit implementing procedures. The plan should include a description of the methodologies and techniques to be used to an extent sufficient to demonstrate, in a timely manner, that there is reasonable assurance (1) that the magnitudes of releases of radioactive materials can be determined, (2) that the magnitude of any resulting radioactive contamination can be determined, (3) that projected exposures to persons within or beyond the facility boundaries can be estimated, and (4) that emergency action levels specified can be determined.

### 4.3 Corrective Actions

In some emergency situations, actions can be taken to correct or mitigate the situation at or near the source of the problem to prevent an uncontrolled release of radioactive materials or to reduce the magnitude of a release. Corrective actions should be considered as a supplement to design features and as both a backup and an extension of automatically initiated actions. Proficiency in corrective actions such as firefighting, repair, and damage control should constitute a major objective of the training effort and onsite drill program.

### 4.4 Protective Actions

This section should describe the nature of protective actions for which the plan provides, the criteria (Protective Action Guides) for implementing these protective actions, the area involved, and the means of notifying or warning the persons at risk.

#### 4.4.1 Protective Cover, Evacuation, Personnel Accountability\*

The emergency plan should provide for timely evacuation of persons in order to prevent or minimize radiological exposure. The following items should be included:

##### 1. Facility

- a. Action criteria,
- b. The means to provide rapid warning or advice to persons involved, i.e.:

(1) Employees or students not having emergency assignments,

(2) Working and nonworking visitors.

##### 2. Offsite areas

- a. Actions planned to immediately protect persons beyond the boundaries of the facility and criteria for their implementation,

- b. The means to warn or advise the persons involved.

#### 4.4.2 Use of Reactor Facility 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 facility distribution of special equipment or supplies to reactor personnel. Measures that should be considered for persons within the reactor facility include individual respiratory protection and the use of protective clothing.

#### 4.4.3 Contamination Control Measures

Provisions should be made for preventing or minimizing exposure to radioactive materials deposited on floors, the ground, or other surfaces. Such measures should include:

1. Isolation or quarantine and area access control,
2. Criteria for permitting return to normal use.

#### 4.5 Aid to Affected Personnel

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

##### 4.5.1 Emergency Personnel Exposure

This should specify exposure guidelines for entry or reentry to areas in order to (1) remove injured persons and (2) undertake corrective actions. Exposure guidelines should also be specified for emergency personnel who will be providing first aid, decontamination, ambulance, or medical treatment services to injured persons, and a description of how these guidelines will be implemented. Methods for permitting volunteers to receive radiation exposures in the course of carrying out life-saving activities should ensure expeditious decisionmaking and a reasonable balance of relative risks.

##### 4.5.2 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.

##### 4.5.3 Medical Transportation

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

#### 4.5.4 Medical Treatment

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

For both hospital and medical service, 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 should be included.

### 5. EMERGENCY FACILITIES AND EQUIPMENT

The emergency plan should identify, describe briefly, and give the locations and general type of items to be used or maintained by the licensee.

#### 5.1 Emergency Control Centers\*

This section should identify the principal location from which effective emergency control direction is given.

#### 5.2 Communications Systems

The plan should include descriptions of facility communications systems that would be required to perform vital functions in transmitting and receiving information throughout the course of an emergency.

#### 5.3 Assessment Facilities

The plan should identify monitoring systems and laboratory facilities that are to be used to determine the need to initiate emergency measures, as well as those to be used for continuing assessment, e.g.:

1. Portable and fixed radiological monitors,
2. Sampling equipment,
3. Instrumentation for specific radionuclide identification and analysis,
4. Nonradiological monitors or indicators that may provide pertinent system or status information,
5. Fire detection devices.

#### 5.4 First Aid and Medical Facilities

A summary description of medical and first aid facilities should be provided.

### 6. MAINTAINING EMERGENCY PREPAREDNESS

The plan should include a description of how the plan will continue to be effective throughout the lifetime of the facility.

## 6.1 Organizational Preparedness

### 6.1.1 Training

The plan should include a description of specialized training to be provided to emergency personnel.

### 6.1.2 Drills and Exercises

The plan should describe provisions for the conduct of periodic drills and exercises to test the adequacy of timing and content of implementing procedures and methods, to test emergency equipment, and to ensure that emergency organization personnel are familiar with their duties. Preplanned descriptions or simulations of accidents or similar events should be used to prepare scenarios appropriate to the objectives of each drill or exercise.

The plan should provide for emergency test exercises, one prior to initial criticality and biennially thereafter, using scenarios appropriate to serious emergency situations. Each of these exercises should contain provisions for coordination with offsite emergency personnel and should test, as a minimum, the communications links and notification procedures with those offsite agencies.

The plan should also provide for annual on-site drills using scenarios appropriate to test firefighting, contamination control measures, and building evacuation. These drills should be conducted onsite as action drills with each required emergency measure being executed as realistically as is reasonably possible. Provisions should be made for critiques of all drills and exercises, including timely evaluation of observer comments about the implementation and corrective action.

## 6.2 Review and Updating of the Plan and Procedures

Provision should be made for a biennial review of the emergency plan and for updating and improving procedures to incorporate results of training and drills and to account for changes in the facility or in the environs. Means for informing elements of the total emergency organization of the revisions to the plan or relevant procedures should be described. Provisions for reviewing and updating all written agreements at these times of revision should be included.

## 6.3 Maintenance and Inventory of Emergency Equipment and Supplies

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

## 7. RECOVERY

General plans, including applicable criteria, for restoring the facility to a safe status should be described.

## 8. APPENDIX

The appendix to the plan should include the following items:

1. General building layout plans and area maps.
2. Copies of agreement letters with offsite emergency response supporting organizations and copies of referenced interfacing emergency plans.
3. 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.
4. Listings, by title, of written procedures that implement the plans.

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

5. An analysis that sets forth the basis for the emergency plan (Planning Basis). This should include descriptions of the types of credible incident and accident situations, their expected consequences, and their conservatively analyzed potential consequences. If this analysis, in whole or in part, has been submitted previously to NRC, a clear and specific reference thereto is acceptable, and the analysis need not be repeated.

## ANNEX B

### IMPLEMENTING PROCEDURES FOR EMERGENCY PLANS

(Applicable to Research Reactors Authorized to Operate at Power Levels  
Approximating 100 kW or Greater or Reactor Facilities Presenting Comparable Risk)

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 (by title) 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. These immediate actions should be memorized by major participants with a follow-up check of the procedure to ensure that needed actions were included.

###### 1.4.1 Title and Purpose

Each procedure should have a title that is descriptive of its purpose. However, if the title is not sufficiently descriptive, the

purpose of the procedure should be stated separately.

###### 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 they 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 or procedure subsection for each identified class of emergency to specify and implement the planned 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 by priority 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 (by title) and elements of the emergency organization. Communications procedures should require formality; acknowledgements of orders and reports; and designation of relative priority of communications with the scene of the emergency, the facility emergency control center, outside activities, etc. Effective methods for rapid internal and external transmission of information may include prepositioned messages (fill in the blanks in specified sequence) and instructions for use of voice, telephone, and radio transmission.

## 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 planned locations if feasible, for emergency radiological surveys onsite and offsite. The procedures should include provisions for transmitting 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 and buildings, and the site. Primary and secondary evacuation routes and assembly areas should be designated. These procedures

should refer to or be related 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 in the area and buildings onsite 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 the reactor facility. The procedures should contain appropriate checksheets and signoffs 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 de-escalate emergency response actions. They should identify the types and sources of information available. 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, and handling injured persons and providing for their medical treatment 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. They should cover the responsibilities and capabilities of both onsite, and, if applicable, offsite firefighting teams and equipment. The procedures should include the clear decision-making chain for interface with offsite agencies. 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. These procedures should include specific guidelines for maximum emergency radiation exposures for reentry and rescue personnel. Procedures should be developed for permitting the voluntary acceptance of emergency exposure for lifesaving actions.

#### 2.2.10 Facility Security

The facility 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 to a safe 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, 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 outlines. The program should include training for licensee employees and for offsite organizations and personnel who are to provide support in the emergency response. The training for offsite personnel who may be required to enter the facility should typically include familiarization with the facility layout and instructions on site procedures necessary for their safety and for their effective interface with onsite personnel. Offsite personnel training may include emergency dosimeter issue procedures, firefighting equipment locations, vehicle access routes, and facility alarms.

Training should include delineation of methods to evaluate its effectiveness and to correct weak areas through feedback with emphasis on schedules, practical training, or periodic examinations.

#### 2.3.5 Tests and Drills

Procedures should provide for onsite practice drills that use detailed scenarios to test both specific procedures and implementation of the major aspects of the emergency plan. The scenarios should be planned simulations of emergency situations, and they should be approved by facility management after they have been reviewed for scope and adequacy.

The procedures should consider testing on both an announced and unannounced basis. They should require the use of observers during the conduct of test drills and should contain provisions for appropriate critique of the drills.

### 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.