



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

50-112
NR R

October 6, 1978

Docket No. 50-112

The University of Oklahoma
College of Engineering
ATTN: Dean William R. Upthegrove
Office of the Dean
Engineering Center, Room 107
202 West Boyd
Norman, Oklahoma 73019

Gentlemen:

We are in receipt of your letter regarding your intentions to renew your AGN-211 License No. R-53.

There is some new guidance for Emergency Planning for research reactors that has been developed since our letter of June 28, 1978. In order to assist your application preparation, we are enclosing copies of proposed NRC Regulatory Guide 2.XX "Emergency Planning for Research Reactors" and draft ANS 15.16 "Standard for Emergency Planning for Research Reactors". It is anticipated that these documents will be finalized and published in the next few months. In the interim, we are using the proposed Regulatory Guide in reviewing your emergency plan.

Please do not hesitate to contact Mr. Steve Ramos (301-492-7435) for any questions in this matter.

Sincerely,

Robert W. Reid, Chief
Operating Reactors Branch #4
Division of Operating Reactors

Enclosures:

1. Regulatory Guide 2.XX
2. Draft ANS 15.16

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Regulatory Guide 2.XX

EMERGENCY PLANNING FOR RESEARCH REACTORS

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 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.

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

3. 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, including the preparation of procedures to implement the planning objectives, can create a high order of preparedness and insure an orderly and timely decision-making process at times of stress, as well as the availability of necessary equipment, supplies, and services.

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. In addition, because there are many different kinds of research reactors, the potential for emergency situations arising and the potential consequences of such situations varies somewhat from facility to facility. These differences and variations are expected to be reflected realistically in the emergency plans and procedures developed for each specific research reactor facility.

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

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 10 CFR Part 50, Appendix E 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 to this guide.

2. 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."

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 which 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 described.

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 describe this planning basis and the corresponding arrangements and agreements between the licensee and local, State, or Federal agencies who are expected to respond.

2. The scope and content of emergency plans for research reactors authorized to operate at power levels approximating 100 kw or greater, and reactor facilities presenting comparable risks, should be substantially equivalent to that described in Annex A of this guide, "Scope and Content of Emergency Plans for Research Reactors". 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 of this guide which are marked with an asterisk.

3. To assure that a state of preparedness is maintained provisions should be made for a biennial review and updating of the emergency plan and implementing procedures to reflect changes onsite or in the environs and 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. Assessment actions - those actions taken during or after an accident to obtain and process information which is necessary to make decisions to implement specific emergency measures.

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.

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.

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

5. Recovery actions - those actions taken after the emergency to restore the facility as nearly as possible to its preemergency condition.

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.

7. 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, such as, 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 employed should consist of mutually exclusive groupings (to avoid ambiguity) but should cover the entire spectrum of credible radiological emergency situations. Each class defined should be associated with and have the meaning that a particular set of immediate actions is 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 the handling of this class of emergency may also be incorporated in 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. Inherently 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 man-made 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*; 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

* 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 1.790(d).

will be created. However, substantial modification of operating status is a highly probable corrective action if this has not already taken place by the actions of automatic protective systems. Although this class is associated with a judgment that the emergency situation can be corrected and controlled by the onsite staff, ^{that onsite staff or other personnel} notification 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 may be necessary.

Examples of 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 (such as failure of an experiment under pressure) in the facility 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 do not indicate the possibility of a more serious emergency.

2.1.4 Facility Emergency

Due to 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 some facilities make provisions for a class which involves an uncontrolled release of radioactive materials into the air, water, or ground to an extent that the initial assessment indicates that protective actions offsite should be considered.^{2,3} Alerting principal offsite emergency organizations is a recommended associated measure. Assessment actions should include provisions for monitoring of 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 that results in a major disruption of the core or with subsequent fission product release.

²"Background Material for the Development of Radiation Protection Standards," Federal Radiation Council, Report No. 5, July 1964, and Report No. 7, May 1965.

³Manual 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. 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 offsite groups as necessary. Authorities and responsibilities of key individuals and groups should be delineated. Adequate communication links established for notifying, alerting, and mobilizing emergency personnel should be identified.

3.1 Facility Emergency Organization *

The mobilization billets of staff personnel for emergency situations, as appropriate, should be described, including 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.

3.2 Augmentation of Facility Emergency Organization *

The extension of the organizational capability for handling emergencies to be provided by ambulance, medical, hospital, and fire fighting organizations should be described. The arrangements and 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, and a description 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 written agreements with such agencies should be included*.

4. EMERGENCY RESPONSE *

Specific emergency response measure 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 description 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 into assessment actions, corrective actions, protective actions, and aid to affected persons, where applicable to each class.

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 assure 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 the duration of an

* As an alternate 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.

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

4.3 Corrective Action

Many emergency situations involve actions that 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 fire-fighting, repair, and damage control, should constitute a major objective of the training effort and onsite drill program.

4.4 Protective Actions

The plan 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 (urban & commercial areas)
 - a. Actions planned to protect persons ^{Immediately} 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, and
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 assure expeditious decision making 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 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 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 and/or maintained by the licensee.

5.1 Emergency Control Centers

This 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 & first aid facilities should be provided.

6. MAINTAINING EMERGENCY PREPAREDNESS *

The plan should include a description of the means to be employed to ensure that 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 assure 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 an emergency test exercise prior to initial criticality and for biennial exercises thereafter, using scenarios appropriate to serious emergency situations. Each of these exercises should contain provisions for coordination with offsite emergency personnel, testing as a minimum the communications links and notification procedures with those offsite agencies.

The plan should also provide for annual onsite 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 and 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 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 assured. 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:

General

1. 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 which 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 THERE TO IS ACCEPTABLE AND 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 insure that needed actions were not missed.

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 or procedure subsection 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 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, designation of relative priority of communications with the scene of the emergency, 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 preplanned 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, 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 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 deescalate 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, 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 if applicable and offsite firefighting teams and equipment, including 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. Specific guidelines should be included in these procedures for maximum emergency radiation exposures for reentry and rescue personnel. The procedures should specify the methods for permitting the voluntary acceptance of emergency exposures 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 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, 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, fire fighting equipment locations, vehicle access routes and facility alarms.

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

2.3.5 Tests and Drills

Procedures should provide for onsite practice drills which utilize 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 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.

VALUE-IMPACT ASSESSMENT ON GUIDANCE TO
APPLICANTS RELATIVE TO EMERGENCY PLANNING
REQUIREMENTS FOR RESEARCH REACTORS

I. The Proposed Action

A. Description

1. To issue a regulatory guide that gives specific guidelines for the development and use of emergency plans for research reactors, and associated training of personnel.

B. Need for the Proposed Action

1. Applications for research reactor operating licenses received since December 1970 have frequently lacked sufficient information for adequate review by the NRC staff. Staff usually needs to request additional information, sometimes more than once which results in unnecessary delays.

2. Most research reactor licensees received their OL prior to December 1970 and have not established nor submitted an emergency plan for NRC evaluation. This guide would provide these licensees with a basis for developing their emergency plans as the need arises.

3. Clear guidance, identifying elements that must be addressed in an acceptable emergency plan, is not available at the present time.

4. This guide will help establish a uniformity or standardization of licensee emergency plans.

C. Value-Impact of Proposed Action

1. NRC

- a. Staff may spend more time early in review
- b. Staff will spend less time later in review
- c. Estimate less staff time required in total
- d. Staff will spend considerable time evaluating emergency plans submitted by licensees who did not have an emergency plan prior to the publication of the proposed guide.
- e. This regulatory guide was requested by NRR and I&E. A copy of the formal NRR request is attached.

2. Other Government Agencies

The guide suggests that licensees make cooperative agreements and arrangements with State and local governments.

3. Industry or Universities

a. Applicants will spend less time in developing their emergency plan because they will know in the beginning what the staff needs for an adequate review.

b. Licensees who do not have an emergency plan will spend a considerable amount of time developing and maintaining an emergency plan in accordance with the proposed regulatory guide.

c. Applications will benefit from accelerated review time.

d. There will be an overall improvement in the quality of emergency plans with a potential increase in the level of public safety.

4. Public

a. The proposed guide would establish uniform guidelines for research reactor's emergency plan thereby facilitating prompt and effective action to minimize the consequences of an emergency. This would result in a secondary effect of improving public relations.

D. NRC Statutory Authority

1. The overall statutory authority for the proposed action is vested with NRC by the Atomic Energy Act of 1954 (as amended).

2. The specific regulation covering the proposed action is 10 CFR Part 50.34(a)(10) and 10 CFR Part 50.34(b)(5)(v) which require that applicants have satisfactory plans for coping with emergencies. Appendix E to 10 CFR Part 50 sets forth items to be included in the emergency plans, which have not to date been implemented uniformly for research reactors.

E. Need for NEPA Assessment

1. This assessment, and internal reviews, indicate that the proposed action:

a. is not a major action that will significantly affect the quality of the human environment, and

b. is not now, and is not likely to be, controversial.

2. On the basis of this conclusion, a NEPA environmental impact statement is not required.

F. Decision on Proposed Action

1. It is judged that adverse impacts are more than offset by favorable impacts and values. Therefore, the proposed action should be implemented.

II. Alternative Methods of Accomplishing Action

A. Alternatives

1. NRC regulation
2. ANSI Standard, endorsed by a Regulatory Guide
3. NUREG
4. Branch Position
5. Regulatory Guide

B. Value-Impact of Alternatives

1. NRC regulation

a. The basic elements that should be in an emergency plan are already a part of the regulations, Appendix E to 10 CFR Part 50. These basic elements now need amplification.

b. A new regulation would not cover the licensing requirements in the necessary detail.

c. Would require more time and effort than a Regulatory Guide.

d. Would legally require conformance,

e. Staff has successfully convinced applicants to conform to Regulatory Guides

f. Great difficulty in making changes.

2. Endorsed ANSI Standard

a. The ANSI standard that is now being developed to cover this subject (ANS 13.16) is considered by the staff to be inadequate and therefore will not be endorsed.

3. NUREG

- a. NUREGs are informational and cannot contain staff positions.
- b. A NUREG document would be inappropriate because the proposed Regulatory Guide would take a position for complying with the Commission's regulations with regard to the content of emergency plans for research reactors.

4. Branch Positions

- a. Considered to be a temporary measure until action is accomplished by another alternative (Regulatory Guide).
- b. Branch positions have limited distribution.

5. Regulatory Guide

- a. Can be published for public comment and be effective in about one year.
- b. Less time and effort required than for a new ANSI standard to be developed and endorsed.
- c. Less time and effort required than for NRC regulation.

C. Decision on Method

A Regulatory Guide is the preferred method of accomplishing the action.

III. Relationship to Other Existing or Proposed Regulations or Policies

- A. Guide will use Appendix E to 10 CFR Part 50 as a basis.
- B. Backfitting should be required.

IV. Summary and conclusions

- A. A Regulatory Guide on Emergency Planning Requirements for Research Reactors should be issued.

Return to [unclear]

DRAFT

STANDARD FOR EMERGENCY PLANNING
FOR RESEARCH REACTORS

Prepared By
Subcommittee ANS 15.16
of the
Standards Committee
American Nuclear Society

Fifth Draft
August 1977
DEC 1977

Emergency Planning for Research Reactors

The ANS Standards Secretariat established Subcommittee ANS-15 in the fall of 1970 with the task of preparing a standard for the operation of research reactors. In January 1972 this charter was expanded to the multiple tasks of preparing all standards for research reactors. To implement this enlarged responsibility, a number of Subcommittee Work Groups have been established to develop standards for consideration and complementary action by Subcommittee ANS-15. ANS-15.16 is one of these groups.

Work Group ANS-15.16 was assigned the task of developing a draft standard for Emergency Planning in June 1975 with the following membership:

Wade Richards (Chairman)	Argonne National Laboratory-West
Peter Gray	Savannah River Laboratory
Richard Curtis	University of California, Berkeley*
Thomas Crites	Lawrence Livermore Laboratory

The draft standard developmental program was as follows:

- | | |
|---|-------------------------------|
| 1. Work Group task established | June 1975 - New Orleans |
| 2. Work Group formed | June 1975 - Chairman |
| 3. Work Group meeting (draft document) | July 1975 - Livermore |
| 4. ANS-15 review and restructuring | August 1975 - Albuquerque |
| 5. Work Group meeting (draft document) | October 1975 - Livermore |
| 6. ANS-15 Review and restructuring | November 1975 - San Francisco |
| 7. Work Group meeting (draft document) | November 1975 - San Francisco |
| 8. Sent out for Peer Group Review | December 1975 - Mail liaison |
| 9. Work Group meeting (resolution of Peer Group comments) | April 1976 - Livermore |
| 10. Standard sent to ANS 15.0 for balloting | April 1976 - Chairman |
| 11. Standard Sent to N-17 for balloting | November 20, 1976 |
| 12. Work Group meeting (Resolve N-17 comments) | August 1977 - Chatanooga |
| 13. Standard Sent to N-17 Chairman | December 1977 - Chairman |

* presently with HRC

We affirm that the use of any standard of performance, conduct or excellence is volitional. The decision to use a standard is a management matter, presumably on technical advisement. The institutionalizing of a standard can and almost must be conditional; i.e., high probability exists that some exception or addition will compromise the absolute, unconditional application of a document which was composed to cross lines of functional and material discipline.

It is a management function to ameliorate or mitigate conditional matter. It is not the function of a standard to attempt to accommodate the many different management systems. Neither is its function to preempt management prerogatives.

This standard is promulgated in the context of these considerations, and in the context of a family of related research reactor standards, a Work Group and an actively participating Subcommittee in an atmosphere of direct exchange of ideas across multi-discipline and multi-system boundaries.

The family of standards and task assignments include:

- ANS-15.1 (N378): Development of Technical Specifications (ANSI N378-1974)
- ANS-15.2 (N398): Quality Verification for Plate-type U-AL Fuel Elements (ANSI N398-1974)
- ANS-15.3 (N399): Records and Reports (ANSI N399-1974)
- ANS-15.4 (N380): Selection and Training of Personnel (ANSI-ANS-15.4-1977)
- ANS-15.6 (N401): Review of Experiments (ANSI N401-1974)
- ANS-15.7 (N379): Site Evaluation (ANSI-15.7-1977)
- ANS-15.8 (N402): Quality Assurance Program Requirements (ANSI-15.8/N402-1976)
- ANS-15.10 (N440): Decommissioning
- ANS-15.11 (N628): Radiological Control (ANSI-15.11-1977)
- ANS-15.12 (N647): Design Criteria---Effluents---(ANSI-15.12-1977)
- ANS-15.14 (N700): Physical Security
- ANS-15.15 (N701): Core Protective Systems
- ANS-15.17 (): Fire Protection (In obedience)

The membership of ANS-15 at the time of approval of this standard was:

Don F. Hanlen (Chairman)	Brown & Root, Inc.
Mayhue A. Bell	US-ERDA, Washington
Franklin T. Binford	ORNL
Lloyd Bonzon	Sandia Laboratory
Jerry Carter	USNRC, Washington
Thomas R. Crites	Lawrence Livermore Laboratories
A. C. Ellingson	Sandia Laboratory
Preston Farrar	University of Virginia
George Geisler	Penn. State University
Pat Kraker	U. S. Geologic Survey, Denver
Tawfik M. Raby	US-NBS, Washington
Wade J. Richards	Lawrence Livermore Laboratories
Robert R. Walston	US-NRC, Albuquerque
William L. Whittemore	Gulf General Atomic

In this process of creating standards against the background of established and varied practices in many operating facilities it is important to consider:

- a. It is not intended that the standard be used as a demand model for back-fitting purposes.
- b. It should be vital aid for the new owner-agency.
- c. It should be helpful for the facility undergoing change/modification.
- d. Its thoughtful use by industry should ease the burden of regulatory agencies.

The need for this standard resulted from a request from Nuclear Regulatory Commission to either have a standard well developed by the first of the year 1976 or have Regulatory impose their standard on the research reactor community.

The work group has attempted to generate a standard which offers guidance in emergency planning.

This proposed standard has attempted to establish a clear and helpful set of planning steps to ensure that emergencies can be handled in a safe and efficient manner. We have incorporated many concepts from 10 CFR 50 Appendix E, Regulatory Standard Review Plan Sec. 13.3 and many other guides for emergency planning. We have departed from the format of Sec. 13.3 in the belief that the new format is more concise and one can get an overall idea of the scope involved in emergency planning. The definition of research reactor, used in this standard and all ANS-15 standards is being revised. Until such revision is complete the present definition will apply.

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Proposed Standard 15.16

1

Standard for Emergency Planning for Research Reactors

2

- 1.0 Scope - This standard identifies the elements of an emergency plan and 3
its implementing procedures. The emphasis given each of these elements 4
shall be commensurate with the potential risk involved. An emergency 5
plan is prepared to describe the approach to coping with emergencies 6
and minimizing consequences of accidents at research reactor facilities. 7
The emergency plan shall be implemented by emergency procedures. 8

2.0 Definitions

The following special definitions will be useful in understanding this standard.

2.1 Shall, Should and May

The word "shall" is used to denote a requirement; the word "should" to denote a recommendation; and the word "may" to permission, neither a requirement nor a recommendation.

2.2 Research Reactor

A device designed to support a self-sustaining neutron chain reaction for research, developmental, educational, training, or experimental purposes, and which may have provision for production of nonfissile radioisotopes.

2.3 Emergency

An emergency is a condition which calls for immediate action, beyond the scope of normal operating procedures, to avoid an accident or to mitigate the consequences of one.

2.4 Emergency Plan

Emergency Plan provides the basis for actions to cope with an emergency. It outlines the objectives to be met by the emergency procedures and defines the authority and responsibilities to achieve such objectives.

2.5 Emergency Procedures

Emergency Procedures document in detail the implementation actions and methods required to achieve the objectives of the Emergency Plan.

2.6 On-Site

The geographical area which is administratively controlled by the reactor owner/operator.

2.7 Off-Site

The geographical area outside the administrative control of the reactor owner/operator.

2.8 Action Levels

Action levels are specific radiological dose rates, contamination levels, instrument readings, or any other pertinent parameters which shall be used to prescribe specific emergency measures.

3.0 General Requirements of the Emergency Plan

An emergency plan shall be prepared that addresses the following sections. In the preparation of the plan, it shall be recognized that activation of various elements shall be in response to the severity of the emergency.

3.1 Organization

1. Define and establish an Emergency Organization having clear lines of authority and responsibility to cope with emergency situations. The positions so identified shall be assigned authority and responsibilities.
2. Establish a system, with responsibility designated, for periodic review, testing, appraisal, and updating of the emergency plan and procedures.
3. Ensure the timely circulation of the plan and procedures, and all changes, to all participants.

3.2 Coordination with On- and Off-Site Authorities

1. Coordinate the Emergency Plan with on-site emergency support organizations and with federal, state, and local authorities as appropriate.
2. Make emergency response agreements, confirmed in writing where appropriate, with off-site authorities.
3. Ensure timely circulation of changes to the plan and procedures.
4. Identify the interfaces and communications paths between the on-site emergency organization and the supporting off-site assistance groups.

3.3 Types of Emergencies

1. Evaluate the consequences of potential emergencies ranging from those affecting only employees or property of the owner/operator to those which could affect members of the public, their property, or the environment.

3.4 Instrumentation and Special Equipment

1. Provide instrumentation to allow for an early and continued determination of the existence and extent of an accident.
2. Provide in readily accessible areas equipment to be used in an emergency.
3. Provide for periodic inspection, testing, and maintenance of instruments and equipment.
4. Provide emergency power sources for emergency alarms, instruments, lights, communications, and other emergency equipment.

3.5 Action Levels

1. Establish action levels, types of alarm signals, and limits to specify when emergency action is to be initiated on-site, and when to request emergency action by federal, state, county, or local government and private organizations.

3.6 Emergency Communications

1. Establish central emergency control centers.
Emergency control centers beyond the influence of the potential accident shall be considered.
Control centers shall be accessible around the clock.

Systems of emergency communications shall be established to communicate instructions and to disseminate information both on and off site.

2. Establish periodic tests of the communication systems, with test frequency commensurate with the reliability of the system.

3.7 Protective Measures

1. Establish evacuation and/or take cover criteria, including emergency evacuation routes and evacuee assembly areas. These routes should be coordinated with local authorities.
2. Establish criteria for evacuation of one area and assembly at the next area.
3. Provide methods to assure that personnel are accounted for and are monitored for radiation exposure and contamination where appropriate.
4. Establish, where appropriate, plans for actions other than evacuation that can be taken to reduce the consequences of the emergency.

3.8 Medical Assistance

1. Make prior arrangements with physicians, hospitals, ambulances, or rescue services for medical assistance and transportation for contaminated, injured, and exposed individuals.
2. Provide on-site capabilities for emergency first-aid treatment, personnel monitoring and facilities for decontamination of personnel.

3.9 Public Information

1. Make plans for authorized release of the information to the public following an emergency.

3.10 Reentry Planning

1. Establish a recovery and reentry plan which describes general measures for recovery and reentry.
2. Provide for the rescue of personnel and for obtaining essential information needed to evaluate the emergency. Establish maximum exposure guides for rescue personnel.
3. Establish reentry authority and responsibility for the facility.

3.11 Training

1. Establish programs to train and periodically retrain on-site personnel for participation in the Emergency Plan and to give specified training to on and off site personnel who have specific emergency response assignments.
2. Make provisions for periodic emergency exercise, including utilization of appropriate emergency equipment. Participation of persons outside the owner/operator organization should include periodic checks of communication with such persons.
3. Provide for emergency exercise critiques which are designed to reveal weakness in procedures, equipment, and personnel. Correct weakness identified by these critiques.

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4.0 Emergency Procedures to Implement the Emergency Plan

In the implementation of the Emergency Plan, written procedures are necessary to place the facility in a safe condition and to control and mitigate the effects of the emergency.

The procedures, which must be short, concise, and direct if they are to be of maximum value in an emergency, shall specify steps to implement effectively the objectives of the emergency plan. The format may vary from facility to facility, but the items described below shall be covered (these items below bear numbers that correspond to like-numbered sub-categories in 3.0 General Requirements of the Emergency Plan). To ensure concise, effective procedures, only applicable points below should appear in any one procedure; the entire body of procedures taken as a whole should cover the points below:

4.1 Organization

Individual assignment of authority and responsibility for performance of specific tasks, including: Emergency teams, succession of command, alternates, notification lists, around the clock coverage.

4.2 Coordination with On- and Off-Site Authorities

Current notification lists and specific actions for coordination with support groups on and off site.

4.3 Types of Emergencies

Types of potential emergencies (e.g., operational, natural phenomena, injury, fire, civil disorders), their severity and corresponding response.

4.4 Instrumentation and Special Equipment

Utilization of available instrumentation to confirm existence and magnitude of emergency; provisions for an utilization of special equipment to control and mitigate effects of the accident and to effect rescue and treatment of personnel; annual or more frequent

	functional test and inventory.	1
4.5	<u>Action Levels</u>	2
	Action levels requiring implementation of the various emergency steps; action required at these levels; identification of alarm types for various emergencies.	3 4 5
4.6	<u>Emergency Communications</u>	6
	Identification, location, and specification of communication networks; identification of backup or alternate networks including portable equipment; identification of notification requirements at various steps in the emergency; annual or more frequent functional test.	7 8 9 10
4.7	<u>Protective Measures</u>	11
	Conditions for evacuation, taking cover, or other actions; identi- fication of evacuation routes and assembly areas (primary and alternates); distance for evacuation; duration of shelter occupation; transportation; segregation of involved (potentially contaminated) personnel; personnel accountability; conditions for handling injured or disabled personnel; action levels and steps for recommending when on- and off-site populations is to evacuate or take other protective measures.	12 13 14 15 16 17 18 19
4.8	<u>Medical Assistance</u>	20
	Determination of nature and general extent of injury; provision of interim care or first aid; notification (including notification methods) of medical authorities; information of possible exposure or contamination.	21 22 23 24
4.9	<u>Public Information</u>	25
	Notification of owner/operator's management of emergency conditions; list of pertinent information needed for public information release, to be made available to authorized spokesman.	26 27 28

4.10 Reentry Planning

Identification of person (and alternates) to authorize reentry; steps to restore the condition to normal; exposure guides for reentry and for rescue personnel; conditions for reentry; identification of rescue personnel or reentry teams and authority for their rescue operation; specification and location of rescue and reentry emergency equipment and of vital records.

4.11 Training

Current list of currently qualified emergency response personnel; annual or more frequent training of operations personnel with specific emergency response assignments and criteria to determine levels of proficiency; annual or more frequent orientation of on-site personnel; instructions to off-site personnel with specific emergency response assignments.