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# Standard Review Plan for the Review of Radiological Contingency Plans for Fuel Cycle and Materials Facilities

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**U.S. Nuclear Regulatory  
Commission**

**Office of Nuclear Material Safety and Safeguards**



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**Division of Fuel Cycle and Material Safety  
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STANDARD REVIEW PLAN  
FOR THE REVIEW OF RADIOLOGICAL CONTINGENCY PLANS  
FOR FUEL CYCLE AND MATERIALS FACILITIES

INTRODUCTION

This Standard Review Plan (SRP) has been prepared for the guidance of staff reviewers in the Office of Nuclear Material Safety and Safeguards (NMSS) in performing reviews of Radiological Contingency Plans. The purpose of the SRP is to define acceptance criteria to assure that uniform and complete reviews are made by different reviewers.

The reviews are based on the information provided by the licensees in their Radiological Contingency Plans. These plans are required of licensees who are authorized to possess radioactive materials in excess of limiting amounts as determined by NMSS criteria. The information to be supplied in these plans is identified in NUREG-0762, "Standard Format and Content for Radiological Contingency Plans for Fuel Cycle and Materials Facilities." The SRP sections follow the organization of the "Standard Format" and are numbered accordingly.

The Standard Review Plan is necessarily designed to cover a variety of site conditions and licensed activities. Each section is written to provide the scope of the review and acceptance criteria for all of the areas of review pertinent to that section. Due to the variety of NMSS-licensed activities, the staff review may not carry out in detail all of the review steps listed in each section.

Each SRP section is organized into two subsections as follows:

I. Areas of Review

The Area of Review subsection describes the subject of review. It identifies the organization, system, equipment or facility data or other information that is to be reviewed as part of the particular section of the Radiological Contingency Plan. The Area of Review subsection usually presents an abbreviated description of the major subsections of the "Standard Format."

II. Acceptance Criteria

The Acceptance Criteria subsection contains a statement of performance goals and describes the basis for determining the adequacy of the programs identified in the Area of Review Subsection. The reviewer, through comparison of the various sections of the licensee's radiological contingency plan with the pertinent Acceptance Criteria subsections, should assure that: (1) good analyses are made by licensees of worst case accidents and that equipment and procedures are provided which will minimize or prevent accidental releases of radioactive materials, (2) equipment important to safety will function under accident conditions (i.e., will perform under the environmental conditions to which it may be subjected, including exposure to corrosive chemicals or high

radiation fields) and equipment and facilities important to safety are adequately protected against fire and other hazards, (3) there is provision for good confinement systems, alarms on effluent streams and, where feasible, automatic shutoff systems to stop accidental releases when elevated concentrations or radiation levels are detected, (4) adequate radiological contingency response actions have been planned and provided for, and (5) adequate procedural descriptions are provided.

### Review Procedures

A preliminary review will be performed prior to accepting the applicant's submittal. The reviewer must determine whether sufficient and adequate information has been provided to analyze and evaluate the proposed radiological contingency plan. In evaluating the proposed plan, the reviewer must determine if each of the sections in the "Standard Format" appears to have been substantively addressed. If the submittal is inadequate, i.e., more than about six sections or subsections of the standard format appear to have not been substantively addressed, the plan should be returned to the applicant with a letter describing the deficiencies and specifying a new submittal date. Following the acceptance of each Radiological Contingency Plan, the review is conducted on a schedule that is established for each plan. The review consists of an evaluation of the emergency planning information submitted by the licensee with respect to the performance goals and acceptance criteria given in this review plan.

For each case assigned to him, the reviewer is expected to determine whether or not the performance goals and identified acceptance criteria have been satisfactorily met. Deviations from these should be brought to the attention of the Section Leader, Environmental Radiation and Emergency Support Section, and may possibly form the basis for requests for additional information to the applicant. Such further review may result in a determination that (a) the applicant has proposed acceptable alternatives, (b) the facts of the case do not warrant the application of the criterion in question, or (c) additional information is required.

It should be recognized that the application of the acceptance criteria will require the exercise of judgment on the part of the reviewer. The reasonableness and adequacy of the factors involved should be reviewed in the light of the overall radiological contingency plan bearing in mind that the objective of the plan is to anticipate accidents that might occur, specify steps to protect against them, and assure that proper planning is made to mitigate their consequences.



## 1. GENERAL DESCRIPTION OF PLANT/LICENSED ACTIVITY

### General

The information in this chapter is required to provide perspective about the plant and licensed activity with respect to emergency preparedness. This chapter should enable the reviewer to obtain a basic understanding of the overall facility/activity without having to refer to the subsequent chapters.

#### 1.1 Area of Review - Licensed Activity Description

This section is to provide a summary description of the principal characteristics of the licensed activity.

##### Acceptance Criteria

A description of the licensed activity adequate to provide a general characterization of the type of operations involved and associated radioactive materials is required. The following should be described:

- o The type of activity (fuel manufacture, conversion, radiopharmaceutical manufacturing, etc.).
- o The types of product and wastes produced.
- o The type, form, and quantities (possession limits) of radioactive materials involved.

#### 1.2 Area of Review - Site and Facility Description

Descriptions of the principal characteristics of the site, site location, and facilities will be provided.

##### Acceptance Criteria

A summary description of the site characteristics is to be presented. A narrative section should augment the following graphic requirements by pointing out features of the site that were considered in preparing the radiological contingency plan.

- A. The elements of the graphic site description that are detailed in the "Standard Format" are repeated here in a form to facilitate review. These following elements are required:
  - o The site on a general area map showing approximately a 10-mile radius.
  - o The site on a USGS 7.5' topographical map.

- o A site plan or aerial photograph indicating onsite structures and near-site structures (about 1-mile radius).
  - o The photograph or site plan should identify:
    1. the location of population centers (office buildings, schools, arena, stadiums, etc.)
    2. the location of facilities that could present potential evacuation problems (prisons, nursing homes, and hospitals)
    3. the primary routes for access of emergency equipment or for evacuation as well as potential impediments to traffic flow (rivers, drawbridges, railroad-grade crossings, one-way streets, etc.)
    4. the location of any emergency facilities (fire station, hospital with capability for handling radioactive contamination, etc.)
    5. other sites of potential emergency significance (LPG terminals, pipelines, filling stations, etc.)
  - o Approximate populations, both commuters and residents, associated with onsite and near-site structures should be indicated.
  - o The graphic presentations should be clearly legible and of suitable scale to facilitate location of the plant structures and routes in relation to the site. All symbols and notations used to depict the location of the structures and routes should be identified in legends and tables. Topographic features should be included on the maps in sufficient detail to adequately illustrate the information presented.
- B. There should be provided a concise description of the facilities and operations. The descriptions should be sufficient to allow the reviewer to judge the adequacy of containment and other systems and structures to function as planned. There should at least be included:
- o A discussion of the design criteria with respect to equipment, systems, and facilities important to controlling/containing radioactive materials during normal operations. The discussion of design criteria should briefly explain the rationale for choosing a particular operating scheme and equipment. The discussion should include the engineering and design requirements of the equipment that were determined to be important to mitigate or prevent an uncontrolled release following an accident. A more thorough description of the design criteria for the performance under accident conditions of those systems important to safety is presented in the following chapter.

- o A description of the process or manufacturing systems sufficient to indicate the general features of the system, i.e., equipment, processing flow paths, etc.
- o A description of confinement systems for handling and storage of radioactive and other hazardous materials. The discussion should address the general engineering design considerations made to protect against uncontrolled release of radioactivity to the environment during routine operations.
- o A description of auxiliary systems such as ventilation and radioactive waste management systems. The discussion should address the general engineering design considerations with respect to routine operations and functions. Procedures and equipment (dampers, sluice gates, etc.) for controlling airborne and liquid effluents will be given.
- o A general description of alarms to detect radioactive releases and the means for limiting these releases when detected. A more detailed description is presented in Chapter 2.
- o Schematic diagrams of equipment, piping, and instrumentation pertinent to the processing or confinement of radioactive materials. These diagrams are useful as a general and rapid systems familiarization tool and should not be so detailed as to be difficult to interpret.
- o The arrangement of structures and major equipment items should be indicated on plan and elevation drawings in sufficient number and detail to provide a reasonable understanding of the general plant layout.

### 1.3 Area of Review: Process Description

Descriptions of the process(es) used in the facility are presented.

#### Acceptance Criteria

The process description should be sufficient to support an independent assessment of the radioactive consequences of accidents. At least the following should be provided:

- o Reactants, products, and waste streams should be identified to provide sufficient detail, including flow diagrams, to provide an understanding of the process involved.
- o The location of radioactive material or hazardous chemical material should be identified. This description should include:
  1. the kinds and quantity/activity of material in process or storage, and
  2. the location of the material.



## 2. ENGINEERED PROVISIONS FOR ABNORMAL OPERATIONS

### General

Descriptions should be provided of those facility process and control measures that contribute to: (1) promptly detecting accidental releases of radioactive materials and effecting corrective or mitigating responses; (2) limiting releases of radioactive materials and potentially dangerous nonradioactive materials that could adversely affect the safety of licensed operations; and (3) permitting safe and prompt recovery actions to be taken in the event of abnormal operations.

### 2.1 Area of Review - Criteria for Accommodation of Abnormal Conditions

Descriptions should be provided of the design criteria, i.e., the intended performances, for facility systems that contribute to safety during abnormal operations and conditions.

### Acceptance Criteria

For the following systems a description will be provided of their intended performance during abnormal operations and conditions, including accidents. The description shall be adequate to permit the reviewer to clearly identify performance goals for the subject systems. A description of the systems is to be provided in Section 2.2.

#### 2.1.1 Process Systems

A description will be provided of the manner in which process systems (i.e., processes, process equipment items, process controls and operating procedures) are intended to provide for the maintenance of primary confinement, protection against criticality hazards, control of conventional process hazards (i.e., fire, explosion, and severe corrosion), and control of effluents in the event of abnormal occurrences including process upset, operator error, equipment malfunction, and equipment failure. The description should include considerations of the following:

- o The need to provide for automatic or manual safe shutdown under abnormal conditions.
- o The limits and conditions under which safety features are activated. The activation limits should be low enough to preclude significant releases of radioactive materials.
- o The performance of safety systems for maintaining the facility in a safe shutdown condition.
- o The performance of special design features needed to preclude criticality.

### 2.1.2 Alarm Systems and Release Prevention Capability

A description will be provided of the intended performance of the alarm systems and equipment provided to prevent releases of hazardous material. The description should include any systems designed to detect and thereafter prevent accidental releases of hazardous materials that could occur as a result of equipment failure or malfunction, operator error, controls malfunction, sabotage, or severe natural phenomena and that could cause radiation doses to individuals on the order of the threshold Protective Action Guide (PAG) doses. Alarm systems intended to alert operators to such releases or to otherwise mitigate the consequences of such releases should generally provide for the following considerations:

- o Detectors for associated alarm systems shall provide on-scale readings of radiation levels and concentrations anticipated from the most severe calculated accidental release.
- o Each monitor providing an engineered safety function should have a local alarm and variable alarm set point. Monitors located in high noise areas should also have visual alarms.
- o There should be readout and annunciation in a control room or other central point.
- o The alarm/trip setpoint or automatic trip setpoint for each instrument should be specified and should correspond to a value that represents a safe margin of assurance that a release is either effectively contained by activating engineered safety features to prevent a release or the impacts of the release are mitigated, e.g., as by causing prompt evacuation.
- o Administrative features should include provision that any safety-related alarm system made inoperable by maintenance, failure, or other cause will be promptly indicated as being inoperable and noted both at the instrument and the control room or other central point.
- o The alarm/trip setpoint for any gaseous effluent radiation monitor should be determined on the basis of concentrations that would deliver doses approaching the PAGs as calculated for the accident scenario.
- o Instrumentation to monitor for accidental criticality should meet the criteria of 10 CFR Part 70.24(1) and Regulatory Guide 8.12, "Criticality Accident Alarm Systems."
- o The effectiveness of dampers or any other alarm-activated safety feature to preclude a release of radioactivity should be specified.
- o Engineered safety features that are required in order to preclude large releases of radioactivity in the event of an accident should be capable of being activated both automatically and manually.

### 2.1.3 Support Systems

A description of the expected performances of the various support systems under accident conditions will be described. These will include the following:

#### 2.1.3.1 Structural Performance vs. Site Environmental Factors

##### 2.1.3.1.1 Severe Natural Phenomena

A description of the expected performances of facility structures when subjected to severe natural phenomena will be presented. This should include provisions for confinement of radiological and other hazardous materials when subjected to natural events such as tornado, hurricane, flood, heavy snow loading, high winds, and lightning, as appropriate for the facility.

##### 2.1.3.1.2 Accidents at Neighboring Activities

A description of the extent to which facility structural elements are expected to resist the effects of foreseeable accidents at neighboring activities will be included. Accidents to be considered include fire and explosion and others as applicable.

#### 2.1.3.2 Confinement Barriers and Systems

A description of the expected performances of confinement barriers and systems under foreseeable accident conditions will be presented. Those barriers typically include fume hoods, glove boxes, room and building walls (unless already described as facility structural elements in Section 2.1.3.1, above), filters, scrubbers, absorbers, holding tanks, etc., as appropriate. The expected performance of confinement systems such as ventilation and effluent treatment systems should be similarly described.

#### 2.1.3.3 Access and Egress of Operating Personnel and Emergency Response Teams

A description of the expected performance of aisles, traffic ways, elevators, stairways, roadways, bridges, etc., regarding timely access and egress to and from the licensed activity should be presented.

##### 2.1.3.3.1 Onsite

A description of provisions for onsite access and egress for the evacuation of personnel and for the access by onsite- and offsite-based emergency response participants should be included.

##### 2.1.3.3.2 Near Site

A description of provisions for near-site access and egress including offsite evacuation of personnel as well as for onsite response by offsite-based emergency response participants will be provided.

#### 2.1.3.4 Fire and Explosion Resistance and Suppression

Information will be presented on the expected performance of systems and structures important to safety when subjected to fire or explosion. Effects on the expected performance of fire detectors, alarms, sprinklers, hose stations, etc., should be included. Information on the performance goals relative to the effects of explosions and minimization of both the probability of and the effects of explosions should be described.

#### 2.1.3.5 Shielding

A description of the expected effectiveness of shielding under accident conditions will be specified.

#### 2.1.4 Control Operations

Performance goals should be specified for assuring continued proper performance of plant engineered systems important to safety through monitoring, auditing, and appropriate maintenance operations.

### 2.2 Area of Review - Demonstration of Engineered Provisions for Abnormal Operation

The plant engineered systems important to safety will be described. The description is to include the systems' anticipated performances relative to detection and sounding of an alarm for accidental releases of radioactive materials or potentially hazardous nonradioactive materials that could adversely affect radiological safety. Similarly, engineered systems should be described that limit releases of radioactive materials and exposures of persons to radiation during and following an abnormal occurrence or operation.

#### Acceptance Criteria

Plant systems important to safety shall be adequate to meet the performance goals described in Section 2.1. The description of these systems shall be sufficiently detailed to permit an independent review to determine that performance goals will be met.

- o The engineered safety systems should be designed for high functional reliability.
- o The systems should include sufficient redundancy and independence such that no single component failure, intentional bypass maintenance operation, calibration operation, or test to verify operational availability will impair the ability of the system to perform its intended safety function.
- o The design should permit on-line testing to determine failures in any channel or loss of redundancy in the system.
- o Those systems necessary for the safe operation of the facility will be designed to fail into a safe state.



### 3. CLASSES OF RADIOLOGICAL CONTINGENCIES

#### General

An emergency plan should characterize several classes of emergency situations covering the entire range of possible and probable accidents.

#### 3.1 Area of Review - Classification System

A standard emergency classification scheme is to be described.

#### Acceptance Criteria

The classification scheme shown in the "Standard Format" is recommended.

Exceptions should be justified. The scheme should include the following:

- o The system should be descriptive rather than numerical or alphabetical to better give immediate information to personnel as to the scope and character of the situation.
- o Each class defined should be associated with a particular set of immediate actions to be taken to cope with the situation.
- o The system should cover the entire range of credible emergency situations.
- o The system should consist largely of mutually exclusive groupings.
- o The system should provide for escalating events in the case of an increase in the severity.
- o The scheme should include the purpose of each classification.
- o The scheme should include the actions that the licensee plans to take for each class of accident including notification procedures.

#### 3.2 Area of Review - Recommended Classification

A standard classification scheme is presented.

#### Acceptance Criteria

A model classification scheme acceptable to the staff is presented for comparison in Section 3.2 of the "Standard Format." Specific implementing procedures are to be prepared for each class of emergency. Those procedures should include the following for each class:

- o The procedures should clearly identify the emergency action level, the associated Protective Action Guide, or the conditions for declaring the emergency condition.

- o The procedures should list by priority the individuals and elements of the emergency organization.
- o Formal communication procedures should include acknowledgements of orders and reports and designation of relative priority of communication with those at the scene of the emergency, onsite technical support center, control room, and offsite authorities. Effective methods for rapid internal and external transmission of information may include written communications, instructions for use of voice (telephone and radio transmission), and telewire facsimile (TWX); use of manual status boards for details of the emergency; and use of maps, charts, and plant configuration drawings for site and local areas.
- o A rigid format for implementing these procedures is not recommended. An acceptable format should display the action steps so the user of the procedure can clearly understand his or her duties.
- o The format of procedures that specify immediate actions to be taken need to be brief and explicit so that they can be followed easily and rapidly.
- o Each procedure should explain the prerequisites and conditions that should exist before the specified actions are performed. These should be in the form of emergency action levels or Protective Action Guides.
- o The specific actions to be performed by the support group should be identified in the procedures dealing with their activities. If the response 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.
- o 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.
- o 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 a decision.
- o Important steps or precautions should be noted or highlighted within the procedure.
- o When procedural steps require other functions or jobs to be performed, the controlling procedure should contain the reference to other applicable procedures.
- o Complex or lengthy controlling procedures should have provisions for signoff sheets or check lists to document the fact that required actions have been taken or have been completed. Examples include notification calls and personnel accountability checks.

### 3.3 Area of Review - Range of Postulated Accidents

Accidents are to be hypothesized for the facility/activity.

#### Acceptance Criteria

To properly plan for possible emergencies, a range of accidents are to be hypothesized and associated radiological and chemical consequences calculated. The discussion is to include models, assumptions, and other supporting data sufficient for the reviewer to perform an independent analysis of the accident scenarios and associated consequences. The following should be addressed:

- o The accidents hypothesized will be reasonable with respect to the process or event identified.
- o A range of events will be considered from highly improbable events usually of larger consequence to more frequent events of small consequence.
- o The accidents hypothesized will be associated with a particular emergency class.
- o The rationale for including the accidents in their respective classes (as identified in Section 3.2 of this guide) will be given.
- o An assessment of offsite impact for each of the accidents will be given.
- o Instrumentation capability for prompt detection and continued assessment will be identified for each accident calculated.
- o The timing of the events will be included in the accident description.
- o The manpower needs associated with responding to the accident will be given.



#### 4. ORGANIZATION FOR CONTROL OF RADIOLOGICAL CONTINGENCIES

##### General

The radiological contingency organization is to be described.

##### 4.1 Area of Review - Normal plant operation.

A brief description of the plant organization for normal operations is to be given.

##### Acceptance Criteria

Unambiguous authority is typically a prerequisite for efficient responses to emergency situations. The description will be sufficient for the reviewer to identify the positions of those individuals that have the responsibility and authority to declare an emergency and initiate the appropriate response. The organizational description will also indicate clearly the position of the person who has the immediate onsite responsibility for the operation of the facility.

##### 4.2 Area of Review - Onsite Radiological Contingency Response Organization

The onsite response organization for all shifts and its relation to the responsibilities and duties of the normal staff complement are described

##### Acceptance Criteria

This section will provide information in sufficient detail for the reviewer to judge that on-shift licensee responsibilities for emergency response are unambiguously defined and that adequate staffing is provided to assure that key functional areas will continuously operate. The organization description shall include the following:

- o The response organization will be described for each class of emergency for all shift situations, if applicable.
- o Organization charts and tables are recommended.
- o A response coordinator who will be on shift at all times and who will have the authority and responsibility to immediately and unilaterally initiate any emergency actions, including providing protective action recommendations to authorities responsible for implementing offsite emergency measures, will be indicated. Personnel knowledgeable about the daily operations and procedures of the facility are recommended.
- o A line of succession for the response coordinator will be identified and should include the specific conditions for higher level officials assuming this function.

- o A policy statement describing the scope of authority and responsibility vested in the response coordinator by the company (licensee) will be included.
- o The authority and responsibility should include the ability to directly control the situation, terminate the emergency alarm condition, and directly manage the coordination of the emergency response staff.
- o The response coordinator is to have the stated authority to obtain all information concerning the event.
- o The organization description will indicate which functional groups provide capability in the areas identified in Section 4.2.2 of the "Standard Format."
- o A description will be provided of the response organization's duties, authority, and interface with other groups and outside assistance. It will include:
  1. methods of communication between groups.
  2. designation of group leaders and line of succession.

#### 4.3 Area of Review - Offsite Assistance to Facility

The provisions and arrangements for assistance to onsite personnel during and after a radiological emergency are to be presented.

##### Acceptance Criteria

Rapid, efficient response to accidents requires that groups likely to be involved are aware that they may be requested to provide assistance and that means have been provided for alerting them. The reviewer is to assure that adequate information is presented to determine that preplanning has addressed the support groups.

For the support groups identified in Section 4.3 of the "Standard Format," the following will be presented:

- o The types of assistance to be provided.
- o The adequacy of that assistance will be evaluated with respect to the range of hypothesized accidents.
- o Letters of agreement describing the arrangements reached with each support group.
- o The means of alerting and communicating with the local support groups should be indicated and alternate methods listed.

- o The position title of that person onsite who is designated to supervise the support groups will be identified as well as the position title of the onsite emergency response staff member(s) responsible for (1) determining a need for aid, (2) requesting the aid, and (3) communicating with the offsite groups while they are at the facility.

#### 4.4 Area of Review - Coordination with participating government agencies.

State and other government (local, county, and federal) agencies or organizations having action responsibilities for radiological emergencies in the area of the facility are to be identified. (This section should be included for completeness of the plan; however, the capabilities of those to respond as planned will not be assessed as part of the review of the Radiological Contingency Plan).

#### Acceptance Criteria

For each agency identified:

- o A description of the authority and responsibility of the agency for emergency preparedness planning and incident response should be included.
- o A description of the specific response capabilities in terms of the expertise of personnel and available equipment resources should be given only as they may augment the capabilities of the onsite staff.
- o Copies of letters of agreement describing the arrangements for responding to emergencies by the government agencies should be included.
- o The means of alerting and communicating with the appropriate government agencies should be indicated and alternate methods listed.
- o Its location with respect to the facility should be given if not included in the maps and figures of Chapter 2.





## 5. RADIOLOGICAL CONTINGENCY MEASURES

### General

Radiological contingency response measures will be identified for each contingency class and related to action levels or criteria that specify when the measures are to be implemented.

#### 5.1 Area of Review - Activation of Radiological Contingency Response Organization

This section describes the written procedures that will be used to alert or activate emergency personnel for each class of emergency.

### Acceptance Criteria

The description should provide sufficient information for the reviewer to conclude that appropriate procedures have been incorporated into the contingency plan to ensure a prompt response in an emergency. The following are to be included in the notification procedures:

- o A description of the communication steps taken to alert or activate response personnel (descriptions will be provided for each class of radiological contingency as defined in Section 3.1).
- o The activation procedures for response personnel will describe the responsibilities associated with the selected action level.
- o The activation procedures should include an alternate means of alerting response personnel.
- o The method of communication to be used (i.e., telephone, radio, teletype, etc.).
- o Call lists will include organizational title and alternates for both ends of the communication pathways.
- o The activation procedures should provide for 24-hour per day notification capability.

#### 5.2 Area of Review - Assessment Actions

For each class of radiological contingency, as defined in Section 3.1 of the Standard Format, discuss the actions to be taken to determine the extent of the problem.

### Acceptance Criteria

Adequate emergency response requires that a capability to rapidly assess radiological emergency conditions has been provided. The information given must demonstrate that preplanning is adequate to ensure that the radiological consequences from an accident can be rapidly calculated. The following will be included:

- o A description of the staff designated to analyze consequences of accidents including assignments and responsibilities.
- o The procedural steps in gathering the data needed for proper analysis.
- o The methodology and parameters to be used in calculating doses (Regulatory Guide 1.109 should be used as a model).
- o The method for calculating atmospheric dispersion (X/Q) (Regulatory Guide 3.34/3.35 methodologies are acceptable).
- o A listing, description, and sample printout of any computer program.

### 5.3 Area of Review - Corrective Actions

The corrective actions taken for events identified in Chapter 3.0 are detailed. These actions are to be considered as a supplement to design features and as both a backup and an extension of the automatically initiated actions.

#### Acceptance Criteria

The applicant should provide information sufficient for the reviewer to determine that preplanning for actions to mitigate or correct an emergency situation near the source of the problem is adequate. The following will be discussed:

- o General requirements and commitments to assure capable response for such actions as fire control, repair, and damage control.
- o For each class and type of accident, identify the type of corrective action that could mitigate or correct the problem.
- o Procedures for initiating the corrective actions shall include identification of the responsible individuals and/or teams.

### 5.4 Area of Review - Protective Actions

The protective actions implemented to prevent or minimize exposure to radiation and radioactive materials are presented.

#### Acceptance Criteria

The protective actions to be taken, the criteria for implementing the actions, the area involved and the means of notifying persons at risk will be addressed. The information presented must be stated in sufficient detail to enable the reviewer to independently assess whether or not preplanning is adequate to assure that appropriate protective measures will be taken in the event of a radiological emergency. The description will include the following:

- o For each class of emergency defined in Chapter 3.0, a range of protective actions will be discussed as a function of the associated accident type.

The criteria for establishing the appropriate level of action should be included.

- o The conditions which indicate that an evacuation should be initiated (i.e., dose rate, airborne concentration alarms, fire or criticality alarms).
- o A description of offsite notification procedures will include organizational titles and alternates for both ends of the communication links. Lists of names and telephone numbers should be included as an appendix to the plan but do not require NMSS review.
- o Primary and backup communications systems for both onsite and offsite should be described for each class of emergency.
- o The time (after the event occurs) within which notification will be provided to the appropriate personnel will be specified and discussed. Times should be specified for each emergency class as well as the rationale for choosing them.
- o Onsite evacuation routes and assembly areas should be stated for each type of postulated event. The plan should ensure that routes and assembly areas will not conflict for a specific event (i.e., don't evacuate into the accident).
- o A description of the procedures for performing a missing persons check and reporting the results should be given.
- o A description of the procedures for monitoring at onsite assembly and other designated points should be included.
- o A description of the procedures to be used for the distribution of protective equipment such as respirators and protective clothing will be included.
- o The storage locations of protective equipment should be given.
- o The criteria for returning the facility to normal use will be given.

#### 5.5 Area of Review - Exposure Control in Radiological Contingencies

The means for controlling radiological exposures for emergency workers will be given.

#### Acceptance Criteria

A primary goal of radiological contingency response is to control exposures. The procedures which will be used to control exposures to emergency workers should be sufficiently detailed for the reviewer to judge the adequacy of the proposed control measures. The following considerations should be included:

- o Guidelines for controlling exposures should assure that the total body Protective Action Guides of 25 rems for emergency workers and 75 rems for lifesaving activities are not exceeded. Similar guidelines to control thyroid exposure for emergency workers to less than 125 rems will be included.
- o A description of procedures for deciding whether to permit onsite volunteers to receive lifesaving and other emergency doses will be discussed including:
  - (1) The organizational titles of individual(s) responsible for making the decision.
  - (2) The information necessary for decision-making and the sources for that information will be given (i.e., monitoring information).
- o There should be included provisions for radiation dose measurement capability including pocket chamber dosimeters (one dosimeter with a range of 0-200mR and one with a range of 0-200R are recommended for each emergency worker) and survey equipment suitable for assessing radiation that may be encountered. Permanent recording devices such as film or TLDs should also be used.
- o The procedures for decontamination of emergency personnel, wounds, supplies, instruments, and equipment to ensure that the contamination will not be spread.
- o Provisions for decontaminating relocated onsite personnel will include provisions for extra clothing and decontaminants suitable for the type of contamination expected. The Radiological Health Handbook<sup>1</sup> lists acceptable decontamination procedures and decontaminants.

## 5.6 Area of Review - Medical Transportation

Provisions for medical transportation will be provided.

### Acceptance Criteria

Preplanning should assure that medical transportation will be available when needed. In order for the reviewer to assess the adequacy of the planning, provisions for transporting injured personnel, who may also be radiologically contaminated, to medical treatment facilities will be described. Preplanning to ensure that contamination is eliminated or confined will be included in the procedure.

## 5.7 Area of Review - Medical Treatment

The arrangements for local and backup medical services will be given.

<sup>1</sup>"Radiological Health Handbook." U.S. Department of Health, Education, and Welfare, Public Health Service. Rockville, MD, January 1970.

Acceptance Criteria

Offsite medical treatment may be necessary following an accident. Sufficient information must be presented for the reviewer to determine if adequate provisions have been made to assure proper preparation for accommodating injured and contaminated workers. These provisions will include:

- o A description of the radiation safety instructions to be given the medical personnel assigned to treat contaminated workers.
- o Description of facilities to be used.
- o Alternate treatment facilities included as a backup.



## 6. EQUIPMENT AND FACILITIES

### General

The facilities and equipment designated for use during a radiological emergency will be defined. Sufficient detail will be provided for the reviewer to independently determine the adequacy of the equipment to perform its intended function.

#### 6.1 Area of Review - Control Point

The principal, and if provided for, alternate onsite locations from which emergency control will be exercised is to be described.

### Acceptance Criteria

Preplanning should establish a central point from which emergency response control will be conducted. Sufficient information must be presented for the reviewer to judge that the applicant has demonstrated that, in the event of an emergency, an operations center used in directing and controlling response functions will be available. The following considerations should be addressed:

- o The onsite emergency control location(s) will be provided.
- o The location(s) selected should be minimally affected by the accident.
- o The points selected should afford adequate access to emergency personnel following the accident and during recovery operations.

#### 6.2 Area of Review - Communications Equipment

A description will be provided of the onsite communication system that will perform vital functions in transmitting and receiving information throughout the course of an emergency and subsequent recovery.

### Acceptance Criteria

In order to effect adequate control during an emergency, preplanning should assure that communications capability will be available. The description should be adequate for the reviewer to independently determine that appropriate planning has been accomplished. The description should include the following:

- o The communications system for each location where emergency control may be exercised is to be given.
- o The communication systems and equipment for mobile units such as reentry, monitoring and firefighting teams will be given.
- o If the assessment teams are located other than at the command center, their communications system will be included to ensure continuous communication capability with the command center.

- o A description of surveillance testing procedures will be given for the communications system and equipment. An operational check on a monthly basis and after each use should be considered.
- o A description of a backup system to be available in case of failure of the primary system will be given.
- o A description of the storage location of communications equipment identified for emergency use will be given. The location will be accessible to emergency response personnel during the emergency.

### 6.3 Area of Review - Facility for Assessment Teams

A description of facilities designated for use by staff performing postaccident and recovery assessment as well as protective action functions will be provided.

#### Acceptance Criteria

The assessment teams will be required to provide technical support to plant management and plant operations personnel during an emergency. The information presented here should be sufficient to assure the reviewer that preplanning has made provisions for facilities adequate for the assessment teams. The description of facilities designated for use by the assessment teams following an accident should include at least the following considerations:

- o The location(s) of facilities designated for use by the assessment teams.
- o The facilities should be habitable during any event, that is, there will be no condition requiring evacuation from the facility due to the initiating event.

A list of equipment and supplies available in the assessment team facility to assist the assessment teams in their diagnosis of plant conditions and evaluation of radioactive releases will be presented. These should include appropriate engineering drawings and operating procedure manuals.

### 6.4 Onsite Medical Facilities

The facilities and medical supplies at the site designated for emergency first aid treatment and decontamination of onsite individuals are described.

#### Acceptance Criteria

Facilities to support rapid medical treatment following an accident should be planned for. In order for the reviewer to independently determine that preplanning is adequate to assure the availability of medical support following an accident, the following should be included:

- o The inventory of equipment and supplies should be detailed.



- o The storage location(s) should be given.
- o The steps to be taken to assure routine replenishment of supplies should be described.

Recognizing that requirements will be different for the various facilities and activities covered by a contingency plan, below is an example of the type of supplies and equipment to be on hand for administering onsite emergency first aid to contaminated patients. Quantities of materials are not specified since they depend on the type and magnitude of the accident and should be set as a function of the maximum hypothetical accident.

For team personnel:

Anticontamination clothing including:

- o coveralls
- o caps
- o rubber or plastic gloves (cotton lined or household type)
- o rubber gloves, surgical
- o plastic shoe covers or overshoes

Masking tape, adhesive tape, or electric tape.

Radiation signs:

Caution: High Radiation Area.  
 Caution: Radiation Area.  
 Caution: Radioactive Materials.  
 Caution: Airborne Radioactivity.

Identification tags for injured persons (on which will be listed the victim's name, nature of injuries, contamination information, rescuer's initials, and the date and time).

Dust respirators with suitable filters. Extra filters should be provided.

500 feet of rope.

Personnel dosimeters and dosimeter charger, 200 mR and 200 R levels.

Flashlight and batteries, screwdriver, pocket knife, pliers.

For patients:

Scissors  
 Long patient gowns or coveralls  
 Blankets  
 Foot covers  
 Cloth or plastic bags - large

Tags and gummed labels  
 Crayons, pencils, and chalk  
 Notebook, paper  
 1-pint and 1-quart ice-cream containers  
 Swabs, cotton with envelopes

#### Survey meters:

Portable beta-gamma survey meter

Portable alpha detector.

Portable air sampler.

Extra batteries for each instrument. Extra Geiger-Muller tubes.

Screwdriver.

(Note: Batteries should not be left in instruments unless used frequently. Instruments should be periodically tested.)

Earphones are useful for survey work with Geiger-Muller detectors.

#### 6.5 Area of Review: Emergency monitoring equipment.

Emergency monitoring equipment that is to be available for personnel and area monitoring will be described.

##### Acceptance Criteria

In order to effectively monitor radioactive releases following an accident, monitoring equipment should be available and in working order. The description of emergency monitoring equipment will assure the reviewer that adequate capability for monitoring radioactive releases from a facility accident has been planned for. The following should be described to demonstrate the adequacy of the planning:

- o The procedures for verifying the capability of the equipment to function properly during an emergency.
- o Operational data for the instrumentation (i.e., sensitivity, range, backup power, calibration frequency) to demonstrate that the instruments will function as designed through the full range of postulated accidents and environmental conditions.
- o Any alarm function and associated set point. These should be verified to be operable through the range of postulated accidents and environmental conditions.

- o The location of all monitoring equipment. The equipment will be available to emergency personnel for each postulated accident. Surveillance procedures should be defined to assure that the instrument supplies are adequately maintained following removal of same for maintenance and calibration as well as for other reasons.
- o Maintenance and calibration requirements (see Section 7).

Below is an example of a typical inventory for an emergency monitoring kit, recognizing that requirements will be different for the various facilities and activities covered by a contingency plan.

#### Anticontamination clothing (per team member)

##### Item

Coveralls (anticontamination)  
 Gloves (rubberized)  
 Shoe covers (rubber)  
 Head covers (hoods)  
 Full face or half face mask with cartridge(s)  
 2-inch masking tape

(Additional quantities of anticontamination clothing may be kept in large plastic bags placed near the control point, main gate, etc.)

#### Radiation Detection Instruments and Accessories (per team)

##### Item

Alpha detection instruments  
 Low-energy gamma detector  
 Low-level beta-gamma detectors  
 Head phones  
 High-level beta-gamma detectors (at least 1000 R/hr full scale)  
 Air samplers (battery operated)  
 Filter paper (Whatman No. 41)  
 Dosimeter charger  
 Dosimeters (0-200mR and 0-200R)  
 Neutron activation detectors, (Indium foils)  
 Flashlights with batteries  
 Spare flashlight batteries

#### Area and Personnel Control Equipment

##### Item

Health physics handbook (with reference tables)  
 Notebook  
 Retractable pens

Grease pencils  
Area access log  
Survey log  
Survey grid map  
Rand-McNally Road Atlas (U.S.A.) or equivalent (for offsite monitoring)  
Telephone list for control point(s)  
Nasal swabs  
Swab containers  
Smear papers  
Envelopes for samples  
Reel of barricade ribbon (bright color, 5000 feet)  
Contaminated material stickers  
Radiation area signs  
Large plastic bags  
First aid kit  
Antifog solution

## 7. MAINTENANCE OF RADIOLOGICAL CONTINGENCY PREPAREDNESS CAPABILITY

### General

The administrative procedures for maintenance, review, and testing the radiological contingency plan are defined.

#### 7.1 Area of review - Written procedures

Implementing written procedures should clearly state the duties, responsibilities, action levels, and actions that will be taken by each group or individual in responding to an emergency.

### Acceptance Criteria

For an efficient emergency response, unambiguous control authority should be established and agreed upon in advance of an accident. The information presented in this section should be sufficient for the reviewer to determine that an appropriate chain of command has been described. The applicant's discussion of provisions for approval of the procedures and their periodic review will include the following considerations:

- o A planning coordinator will be designated with responsibility for the development and updating of radiological contingency plans.
- o The contingency plans and approved changes to the plans will be forwarded to all organizations and appropriate individuals with responsibility for implementation of the plans.
- o An independent review of the plan is recommended (an independent review is one conducted by any competent organization either internal or external to the licensee's organization, which is not directly responsible for the radiological contingency response program).
- o Any disagreement or uncertainty with respect to the duties, responsibilities, action levels, and actions that are to be taken by each group or individual will be transmitted to the planning coordinator or other appropriate authority. A description of the administrative steps to be taken in resolving the issues will be included.

#### 7.2 Area of review

A description of the training of onsite radiological emergency staff and offsite support personnel is to be presented.

### Acceptance Criteria

Adequate training is a prerequisite to effective emergency response. This section should provide the plans for radiological emergency response training for those who may be called to assist in an emergency. The information presented

should be sufficient for the reviewer to independently determine that training will be adequate for the types of emergency conditions that may be encountered. The plans should address the following:

- o Classroom and practical training schedule is to include the estimated number of hours of training for each group or individual as well as a syllabus or equivalent course description and the expected frequency of retraining. Classroom and on-the-job training should be distinguished.
- o The training is to include notification procedures, responsibilities, discussion of range of accidents, training in specialized equipment and communication procedures.
- o Procedures that demonstrate incorporation of lessons learned from tests and drills following appropriate review.
- o The program will discuss training provisions for the following persons:
  - 1. Directors or coordinators of the response organizations;
  - 2. Accident assessment personnel;
  - 3. Radiological monitoring teams and radiological analysis personnel;
  - 4. Security and fire brigade personnel;
  - 5. First aid and rescue personnel;
  - 6. Licensee headquarters support personnel if appropriate; and
  - 7. Personnel responsible for transmission of emergency information and instructions.
- o For those individuals/groups offsite who may be involved, training or other orientation plans should include:
  - 1. Local support services personnel including Civil Defense/Emergency Service personnel.
  - 2. Medical support personnel.
- o Individuals assigned to licensee first aid teams should receive training at least equivalent to the Red Cross Multimedia course.
- o Training for offsite response personnel shall include instruction in notification procedures, basic radiation protection, and expected roles.
- o Support services personnel who may enter the site should also be trained in site access procedures and informed of the identity (by position and title) of the individual in the onsite emergency organization who will control the organization's support activities.

### 7.3 Area of review - Tests and drills

This section should describe the conduct of periodic drills and exercises.

#### Acceptance criteria

In order to maintain proficiency in emergency response, tests and drills should be performed to exercise all or part of the emergency response system. The applicant should describe the provisions made for conducting periodic tests to evaluate major portions of the emergency response capabilities, and those made for periodic drills to develop and maintain key skills and to identify and correct deficiencies discovered as a result of exercises and drills. Sufficient information must be presented for the reviewer to independently determine the adequacy of the applicant's provisions for conducting tests and drills. The following should be considered for tests and drills.

- A. Tests - A test is an event that measures the integrated capability and a major portion of the basic elements existing within emergency preparedness plans and organizations.
  - o The description of a test will include plans for simulating a radiological emergency that would result in hypothesized releases.
  - o A test procedure will include plans for activating the entire onsite response organization.
  - o Tests for onsite personnel should be held annually.
  - o Tests including offsite respondents as well as observers and evaluators should be held initially and every 5 years thereafter.
  - o Procedures should be employed to critique the test and to identify mechanisms to change the plan to reflect lessons learned from the test.
  - o The test should include various scenarios.
- B. Drills - A drill is a supervised instruction period to test, develop, and maintain skills in emergency response. A drill is often a component of a test.
  - o Drills should be supervised by a predesignated individual responsible for conducting and evaluating the drill.
  - o Drills will generally be conducted as follows:
    - 1. Communications drills with onsite response personnel will be held monthly. A verification that the messages were properly received and understood shall be included.

2. Fire drills will be conducted 3 times per year for onsite personnel. A fire drill involving offsite personnel will be conducted annually.
3. A medical emergency drill involving a simulated contaminated individual will be conducted annually.
4. Radiological monitoring drills will be conducted annually. The drills should include collection and analysis of all appropriate sample media as well as provision for communications and recordkeeping.
5. Onsite health physics drills including protective action responses to simulated airborne and liquid releases as well as to direct radiation will be conducted semiannually.
6. Health physics and radiological monitoring drills will provide for the use of those instruments designated in Chapter 6 of this plan.

#### 7.4 Area of review - Review and updating of the plan and procedures

The program for annual review of the radiological contingency plans and procedures should be described.

##### Acceptance Criteria

Conditions change with respect to facilities, personnel and processes. Periodic reviews are necessary to assure the adequacy of the plan with respect to the current situation. The plan will commit the applicant to annually review the radiological contingency plan in order to assure continued response capability. The following should be included.

- o A description of the procedures for reviewing the plan for adequacy.
- o The functions/titles of persons responsible for the reviews.
- o A description of procedures for review of alterations in chemical or physical processes, kinds of materials, inventory at risk, or plant organization that could affect the contingency plan.

#### 7.5 Area of review - Maintenance and inventory of radiological emergency equipment, instrumentation, and supplies.

The procedures for assuring that the equipment and instrumentation are in working condition and that the emergency supplies are maintained should be described.

##### Acceptance Criteria

An appropriate inventory of equipment and supplies should be kept available for use when needed during an emergency. Procedures should be sufficiently described



for the reviewer to independently determine that equipment and supplies required for responding to a radiological contingency will be available and functional when needed. A recommended schedule for maintenance and inventory checks is given below.

- o Radiation detection instruments will be operationally checked monthly, inventoried quarterly, and calibrated quarterly.
- o Auxiliary lighting will be checked quarterly.
- o Protective breathing equipment and protective clothing will be checked quarterly for proper function and intact inventory.
- o Other supplies designated for emergency use will be checked quarterly.
- o The maintenance and inventory program description will discuss the procedures for corrective actions to be taken when deficiencies are found during checks.
- o All equipment and supplies will be immediately replaced or repaired if found missing from the inventory or not functioning properly.
- o Essential emergency equipment will be kept secured to prevent pilfering and misappropriation.



## 8. RECORDS AND REPORTS

### General

The requirements for recording incidents, maintaining records of preparedness, and reporting incidents should be presented in this chapter.

#### 8.1 Areas of Review - Records of incidents

A description of recordkeeping requirements is given.

### Acceptance Criteria

Proper incident records should be kept not only to document the event but as an aid to modify and improve response planning. The reviewer should assure that the applicant has made a commitment for adequate recordkeeping. The applicant should describe the records that he will maintain. The following should be considered.

- o For each type of record, if the retention time is not otherwise stipulated by present requirements, there will be a commitment to retain these records until the termination of the license.
- o Records of each of the four classes of contingencies will be kept and will include at least the following:
  1. The cause of the event. This record will include both the direct cause as well as any indirect cause.
  2. The extent of any injury and/or damage.
  3. Radiological data such as area surveys, effluent releases, calculated and measured doses, and contamination measured on surfaces and personnel.
  4. The number and type of personnel and/or equipment involved.
  5. The corrective action taken to terminate the event and an identification of personnel responsible for making those decisions.
  6. The offsite support assistance that was requested as well as actual assistance received.
  7. The extent to which response equipment was used.
  8. The dates and times that any accident situation is reported offsite and the names of organizations and individuals contacted.
  9. The personnel and their titles who are designated to be responsible for maintaining records will be identified.

## 8.2 Area of Review - Records of preparedness assurance

A description of the records to be kept confirming that preparedness is maintained will be presented.

### Acceptance Criteria

Records should be kept confirming the maintenance of preparedness to respond to radiological contingencies. Sufficient information should be presented for the reviewer to independently determine the adequacy of the recordkeeping. The applicant will address the following:

- o Records of training (including the type and time spent during the training, and names of individuals trained).
- o Records of drills and tests (including the results of critiques and any commitment to change the plans).
- o Records of inventories and locations of emergency equipment and supplies.
- o Records on the maintenance, surveillance, and testing of equipment and supplies.
- o Documentation of the reviews and updates of the radiological contingency plan, as well as any personnel changes.

## 8.3 Area of review - Reporting arrangements

The arrangements for reporting accidents and related information offsite will be presented.

### Acceptance Criteria

Reporting arrangements are necessary to keep local, state, and federal agencies, corporate management, and the public informed during and following an emergency. Sufficient information should be presented for the reviewer to determine that the preplanning will provide adequate reporting. The following should be addressed:

- o A description of the notification procedures for each class and associated initiating event.
- o A description of the specific procedures for notification of local, state, and federal agencies as well as corporate management are to include the title(s) and telephone numbers of the individuals or offices to be contacted.
- o A spokesperson for the plant will be identified who has access to all necessary information following an accident.
- o Procedures for keeping offsite individuals informed of the current state of events.

## 9. RECOVERY

### General

General plans should be described for reentry and for restoring the plant to normal operations.

#### 9.1 Area of review - Reentry

Plans and criteria for reentering an affected area following an accident should be discussed.

#### Acceptance Criteria

Reentry procedures should be described in sufficient detail to permit an independent review to determine that the health and safety of response team workers and the public will not be jeopardized. The following features should be included:

- o Allowable radiation exposure for emergency workers and lifesaving activities.
- o Reentry during emergency conditions should be considered only if necessary to save human life or to limit releases of radioactive materials.
- o Alarm system should be reactivated and operationally checked to assure proper response in the event of a recurrence of accident conditions.
- o Description of the positions of the individual(s) responsible for ordering the reentry.

#### 9.2 Area of review - Plant restoration

This section should describe the plans for restoring the facility to a safe status.

#### Acceptance Criteria

The restoration plans should be described in sufficient detail to permit an independent review to determine that an orderly and safe restoration will be accomplished. The following features should be considered and described:

- o Plans for assessing any damage and the capability of the facility to contain radioactivity.
- o Plans for determining the actions necessary to reduce or prevent ongoing releases of radioactive and other hazardous material.
- o Procedures for checking and restoring normal operation and safety equipment involved (i.e., criticality alarms, radiation monitoring equipment, respiratory equipment, air filters).

- o The positions of person(s) responsible for declaring that the plant is safely restored.
- o Reinventory of emergency equipment and restocking if necessary.

### 9.3 Area of Review - Resumption of Operations

Criteria will be defined for resumption of operations and procedures will be described for ensuring that the criteria have been met.

#### Acceptance Criteria

The criteria should be stated in sufficient detail to enable an independent reviewer to determine that the plant and equipment will be returned to a safe operating condition and that the performance goals of the engineered provisions for abnormal operation (Chapter 2) will again be met. The following determinations should also be included:

- o Radiation/contamination surveys performed in areas where real or potential contamination was caused by the accident.
- o Engineering check of systems to assure that all parameters are as required for restart.
- o Completion of an investigation to determine the cause of the incident.
- o Necessary corrective actions have been taken.

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