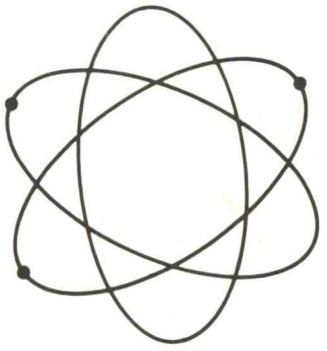
DEPARTMENT OF COMMERCE / National Oceanic and Atmospheric Administration

FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

National Plan for Radiological Emergencies at Commercial Nuclear Power Plants



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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Federal Coordinator for
Meteorological Services and Supporting Research

NATIONAL PLAN FOR RADIOLOGICAL EMERGENCIES

Washington, D.C.

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National Plan for Radiological Emergencies

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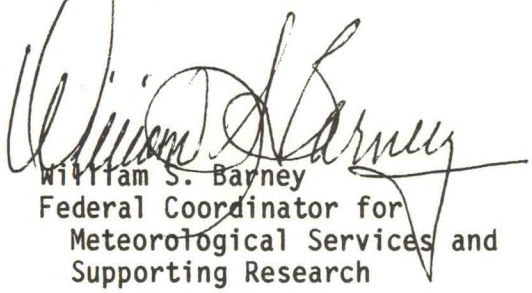
FORWARD

The need to formalize plans to provide meteorological services during a radiological emergency was recognized as a result of the Three Mile Island nuclear power plant incident. This version of the National Plan is specifically concerned with commercial nuclear power plants.

The Federal Emergency Management Agency (FEMA) requested the Federal Coordinator For Meteorology to take the lead in preparing support plans for radiological emergencies since the interagency coordination mechanism already existed for meteorology under Office of Management and Budget (OMB) Circular A-62. Subsequently, the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) established the Task Group on Meteorological Plans for Radiological Emergency Responses (TG-MPRER) to develop a plan.

The ICMSSR has approved this document as the interagency national plan for providing meteorological services during a radiological emergency at a commercial nuclear power plant. FEMA has agreed to incorporate this plan as the meteorological part of its overall Federal plan for radiological emergencies and has asked that the plan be extended to cover all radiological emergencies. TG-MPRER is working on this extension.



William S. Barney
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CHAPTER I

INTRODUCTION

1. Introduction. If radioactive materials are released accidentally from a nuclear power plant, the plant operator must be prepared to advise offsite authorities, including state and local emergency service agencies, of the protective actions the residents should take. For the operator to make recommendations and the offsite authorities to make decisions, they must obtain information: (1) about meteorological, hydrological, and oceanographic events that could threaten the integrity of the nuclear power plant safety systems and cause, or contribute to, the accidental release of radioactive materials into the air and/or nearby rivers, streams, lakes, etc., and (2) on the meteorological and hydrologic factors relevant to dispersion of radioactive materials.

The plant operator is responsible for the primary and backup meteorological support systems at the commercial nuclear power plant. These requirements and responsibilities are described in NUREG-0654, FEMA-REP-1, Rev. 1, Appendix 2 (See Appendix A) as contained in Nuclear Regulatory Commission (NRC) Regulatory Guide 1.101.

Experience during the Three Mile Island accident showed that, in any future emergency, assistance probably will be needed to augment the meteorological support systems required of and provided by the plant operator. FEMA and the NRC plans and procedures mention field offices of the National Oceanographic Atmospheric Administration/National Weather Service (NOAA/NWS) and the Department of Defense (DOD) environmental service organizations as sources of supplementary meteorological support. The purpose of this plan is to list possible needs for assistance as a function of the level of emergency declared by the plant operator; describe the extent to which these needs can be met within the technical capability and resources available; and describe how and by whom these emergency hydro-meteorological services will be provided and funded.

2. Levels of Emergency. The levels of emergency defined in NUREG-0654, Appendix 1, and the general concept of operations for hydro-meteorological support as a function of the level of emergency are listed below. (See Appendix B for full text of Appendix 1 of NUREG-0654).

a. NOTIFICATION OF UNUSUAL EVENT. Events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring off-site response or monitoring are expected unless further degradation of safety systems occurs.

No special off-site support actions are required when a NOTIFICATION OF UNUSUAL EVENT occurs.

b. ALERT. Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the Environmental Protection Agency (EPA) Protective Guideline exposure levels, except near the site boundary.

Under ALERT conditions, off-site release in excess of technical specifications is possible, and it is assumed that the utility will have activated the on-site preparedness systems involving dose modeling based on the station meteorology.

For all ALERTS which involve operation of the utility class "A" predictive model, the proposed procedure should include notifying the Department of Energy (DOE) (See Appendix A for discussion of model.). This action places the mechanism for support service in a state of readiness, including the DOE's Atmospheric Release Advisory Capability (ARAC) operation.

c. SITE AREA EMERGENCY - Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to exceed EPA Protective Action Guideline exposure levels except near the site boundary.

Under this category, the Federal Radiological Monitoring and Assessment Plan (FRMAP) will be activated and off-site dose estimates will be provided by the utility and NRC. Off-site monitoring systems will be operated under the FRMAP procedures.

Initial Actions: (15 minutes to 2 hours after notification of SITE AREA EMERGENCY).

(1) Place special DOD and/or NOAA/NWS meteorological support teams on call for immediate action. Also notify, as appropriate, DOE installations with portable observational equipment.

(2) Place selected NWS and DOD fixed upper air stations on call for immediate action.

(3) Request general area forecast from NWS.

(4) Monitor event through NRC Operations Center for indications the situation is degrading.

Later Actions: (within 2 hours after notification)

(1) Begin deployment of special DOD and/or NOAA/NWS support teams to locations designated by the DOE.

(2) Activate, as needed, upper air measurements at fixed stations (NWS and DOD) within about 100km (about 60 miles) of plant (based on DOE request).

(3) Request special NWS 12/24 hour forecast of meteorological parameters important to dispersion and diffusion; e.g., wind speed and direction, stability, gustiness, mixing depths/transport layer, precipitation, humidity, frontal approach, wind shifts, etc. (requests may originate from NRC or DOE).

(4) Where appropriate, begin deployment of special portable observational capabilities available at selected DOE installations.

d. GENERAL EMERGENCY - Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels off-site for more than the immediate site area.

Under this category, the full support system would be activated under the general criteria listed in NUREG-0654. As requested by DOE, actions would include:

(1) Taking upper air observations at all fixed DOD and/or NOAA/NWS stations within about 100km (about 60 miles) of the accident site at 3-hourly intervals.

(2) Taking upper air (3-hourly), low level wind, and surface observations at DOD and/or NOAA/NWS mobile sites.

(3) Preparing special 12/24 hour NWS forecasts on a routine basis.

(4) Providing aviation observational (mobile DOD units) and NOAA/NWS forecast support.

CHAPTER 2

REQUIREMENTS

1. Introduction. This chapter outlines the information requirements of the agencies served under this plan during various levels of emergency. It also addresses other requirements of the various participating agencies which must be met if the plan is to be successfully executed.

2. Information Requirements of Agencies Served.

a. During Routine and Emergency Conditions. Officials of FEMA, DOE, NRC, state and local emergency services agencies, and the nuclear power plant need watches and warnings of potentially hazardous hydro-meteorological and oceanographic conditions expected to affect the plant site and surrounding communities (examples: tornadoes, strong winds, thunderstorms, floods, hurricanes, winter storms, etc.). There is also a need for routine public weather forecasts -- some elements of the forecast, such as precipitation or low visibility, may be of interest when an emergency exists.

Routine schedules and methods used by NOAA/NWS to produce and disseminate the public weather forecasts, watches, and warnings satisfy user requirements for timeliness, frequency, and format. (Note: Arrangements should be made between the plant operator and the appropriate state or local emergency services agency to place the plant operator on the dissemination list for watches and warnings received by the emergency service agency from the NWS, and to conduct periodic tests of the "watch and warning" communications link between emergency services and the plant operator. If the plant operator requires a more detailed discussion of the watch or warning, the plant operator should contact the NWS field office with warning responsibility for the area.)

b. During SITE AREA EMERGENCY AND GENERAL EMERGENCY. The NRC and DOE may need the following:

(1) Special adaptive weather forecasts for periods of 12 and 24 hours for an area about 100km (about 60 miles) around the site of emergency with emphasis on factors affecting dispersion -- wind direction and speed in lower levels, mixing depth (atmospheric stability in the lower levels), precipitation, frontal activity, squall lines, and wind shifts. (Forecaster's insight into local effects is of particular value. Knowledge of location and telephone numbers of other weather observing facilities in the 100km (about 60 miles) area that do not disseminate observations routinely will also be useful.)

(2) Special surface and upper air observations from fixed facilities and/or locations designated by DOE. In addition, the following may be required:

(a) Hourly surface observations from representative locations in the vicinity of the plant site. The observations should include wind direction and speed, temperature, and relative humidity. If possible, wind observations should be made at both 10 meters and 30 meters above ground level. These observations should be transmitted immediately to DOE/ARAC and the NRC Operations Center.

(b) Upper air observations to 6km (about 18,000 feet) at three hourly intervals from a special site designated by DOE in the vicinity of the plant site -- wind speed and direction, temperature, and relative humidity. Data are needed at 100m intervals through the first km, at 200m intervals through the second km, and 500m intervals through the next four kilometers. Data for the first 2 kilometers are needed most urgently and should be transmitted to the DOE/ARAC and NRC as rapidly as possible. (Note: The non-standard reporting levels for upper air observations apply only to mobile team operations.)

(3) Aviation weather support for the emergency site and nearby airfield(s) to include:

(a) Hourly aviation surface observations and specials.

(b) Terminal forecasts -- issued in standard format, at standard time intervals, and amended in accordance with current directives; such forecasts meet requirements for frequency, format, and timeliness.

3. Coordination. Hydro-meteorological service agencies must be provided with any special criteria for observations and forecasts.

During an emergency, provision of meteorological support must be coordinated with the DOE Offsite Technical Director and the NRC Operations Center, Bethesda, Maryland.

4. Training/Indoctrination. Officials of FEMA, DOE, NRC and state and local emergency services agencies, and the nuclear power plants should be indoctrinated in the use of the routine forecasts, and the watches and warnings received from NOAA/NWS. Also, exercises should be conducted to test and evaluate agency capabilities to carry out the plan.

5. Communications. Every agency (DOE, NRC, plant operator, FEMA) should provide their own:

a. Facilities for routine and passive receipt and display of NOAA/NWS routine forecasts, watches, and warnings. (Public weather forecasts, watches and warnings are disseminated primarily by commercial radio and television, NOAA Weather Radio, and NOAA Weather Wire Service. Warnings are also transmitted to state and local emergency service agencies via National Warning System (NAWAS) or commercial telephone; in some cases they are then disseminated via facilities of the emergency service agencies to the broadcast media and various organizations.)

b. Facilities or arrangements for sending special surface and upper air observations to appropriate offices in DOE, NRC, and NWS (See 2.b above).

6. Logistics. Two logistics items are important:

a. Airlift/surface transport for mobile upper air and surface observation teams and equipment from "home station" to the emergency site.

b. Emergency requisition of expendables -- RAWINSONDE/RAWIN/PIBAL -- to sustain operations during emergency or to replace those drawn from stock to support the emergency.

7. Protection of Personnel. NOAA/NWS personnel will not be required to operate at any location where there is a potential exposure to radiation in excess of applicable limits. The DOE will advise and assist NOAA/NWS officials regarding the protection of NOAA/NWS personnel. DOD will be responsible for the protection of its personnel in consultation with DOE.

8. Notification. Procedures for notifying organizations providing hydro-meteorological services must be simple and thoroughly coordinated.

9. Funding. Funding must be provided to reimburse the hydro-meteorological service agencies for special services rendered.

CHAPTER 3

AGENCY CAPABILITIES/RESPONSIBILITIES

1. NOAA/National Weather Service Capabilities.

a. Weather and flood watches and warnings for the U.S. and marine warnings for offshore areas; public, aviation, and marine forecasts -- prepared and disseminated routinely. Non-routine local forecasts prepared on request; not staffed to provide extensive "tailored" watch and warning services.

b. Complete rawinsonde observations at standard observation times from existing NWS upper air locations, plus special rawinsonde observations at three-hourly intervals. PRIMARY

c. Special rawinsonde observations from sites near the emergency designated by DOE. (NWS transportable rawinsonde unit expected to be available for service by the fall of 1982. When deployed, the rawinsonde team must be given the elevation of the location near the site from which the observations are to be taken -- elevation must be known to an accuracy of at least one meter.) PRIMARY

d. Special PIBAL wind observations near the emergency site. (A PIBAL is an optical theodolite observation and is limited by clouds, precipitation, and other obstructions to vision.) PRIMARY

e. Surface observations at standard times from fixed locations. PRIMARY

f. Special aviation forecasts to support aerial sampling missions in the vicinity of the emergency, including terminal forecasts for the emergency site and nearby airfields. PRIMARY

2. NOAA/Research Flight Center (RFC) Capabilities. Dropwindsonde observations in sparsely populated regions around the emergency site.

3. Department of Defense Capabilities.

a. Routine and special surface and upper air observations from fixed locations. BACKUP

b. Special surface observations (aviation, plus hourly observations to support diffusion and low level wind forecasting) on or near the emergency site on request. PRIMARY

c. Special upper air observations on or near the emergency site. BACKUP

d. Airlift support for teams and equipment from "home station" to location near emergency site. PRIMARY

The primary mission of DOD teams, equipment, and airlift is to support military operations. They are available to support other emergency operations on a non-interference basis with the primary mission, in response to a valid request and on a reimbursable basis. The Economy Act (31 USC 668) applies to all references to DOD support in this plan.

4. Coordination.

a. NOAA/NWS will make an individual available to NRC and DOE officials at the site and the NRC Operations Center, Bethesda, Maryland to coordinate hydro-meteorological support. (Note: Whether an individual is required to be present physically in each of these locations or readily available by telephone is to be determined.)

b. The DOE will provide deployed rawinsonde observing teams with the elevation of the designated deployed observing location.

c. The DOE will inform the hydro-meteorological service agencies of any special criteria for observations and forecasts required to support an emergency.

5. Training.

a. NOAA/NWS will provide training for officials from FEMA, DOE, NRC, state and local emergency service agencies, and nuclear power plants on the interpretation and use of forecasts, watches and warnings received routinely from NOAA/NWS.

b. DOE can provide training for NOAA/NWS, NOAA/RFC, and DOD on the applications of special observations and forecasts by ARAC.

c. FEMA, in coordination with other agencies, will conduct exercises to provide opportunities for each agency to test its capabilities to carry out its statutory and assigned responsibilities.

6. Communications.

a. Using agencies will provide for the routine, passive receipt and display of forecasts, watches and warnings produced and disseminated routinely by NOAA/NWS.

b. FEMA will assure that communications will be made available at appropriate on-site locations for use by deployed teams to:

(1) Relay special observations taken to support monitoring and assessment activities to NRC and DOE.

(2) Relay on-site aviation observations to the appropriate NWS field office, and to

(3) Receive special aviation forecasts for the emergency site and nearby airfields from the NWS field office.

7. Logistics.

a. The DOD will provide:

(1) Airlift of transportable rawinsonde equipment and teams (DOD or NOAA/NWS) from "home station" to the emergency site.

(2) Transportation for surface observing equipment and teams to the emergency site.

(3) Expendables used in DOD special observations.

b. The NOAA/NWS will provide:

(1) Transportation for PIBAL equipment and observer teams to the emergency site.

(2) Surface transportation to move the transportable rawinsonde unit from home base at Sterling, Virginia, to (a) the site of emergency or (b) to the appropriate airfield for airlift by DOD to the emergency site.

(3) Expendables used in special NWS observations.

8. Protection of Personnel. The DOE will advise and assist that NOAA/NWS officials regarding the protection of personnel from exposure to radiation. DOD will be responsible for protecting its personnel in consultation with DOE.

9. Notification.

a. DOE will notify NOAA/NWS, Office of Meteorology and Oceanography (OM&O) when an emergency exists which requires special observations from fixed facilities or the deployment of teams and observing equipment to the site of the emergency. OM&O will notify its own units and/or DOD as necessary (see Chapter IV, Implementation).

b. DOE and/or NRC will notify the appropriate NWS field office if local forecasts are required for the area around a nuclear power plant. The field office will notify OM&O through the NWS Regional Meteorological Services Division. OM&O will notify the Director, NWS.

10. Funding.

a. Services provided from or through routine operations will be funded by the organization providing the service -- NOAA/NWS or DOD.

b. Service that requires other than routine operation -- additional people or staff hours and expendables for special observations, travel and per diem, transportation of equipment/supplies, airlift, special communications, etc. -- shall be funded by the agency for whom the special service is provided (the Cognizant Federal Agency (CFA). In the case of this plan, the CFA would normally be NRC.

In summary, agencies will pay all expenses associated with emergencies and emergency preparedness, with the exception that additional expenses associated with actual emergencies and designated major excercises will be paid for by the CFA.

CHAPTER 4

IMPLEMENTATION

1. Introduction. This chapter describes how the plan would be implemented in response to an emergency at a commercial nuclear power plant.

2. Actions for UNUSUAL EVENT and ALERT. During conditions of UNUSUAL EVENT and ALERT designated NOAA/NWS field offices will respond to requests from officials of FEMA, DOE, NRC, and state and local emergency service agencies for routine and/or special data and forecasts that are within the technical and staffing capabilities of the office. NOAA/NWS field offices will respond also to requests from plant operators for more detailed discussion of weather and watches and warnings.

3. Actions for SITE AREA EMERGENCY and GENERAL EMERGENCY. During conditions of SITE AREA EMERGENCY and GENERAL EMERGENCY, notification and response will proceed on two levels: Level 1, requiring only the interpretation and application of available data and guidance material by the NWS field office, and Level 2, requiring special observations and deployment of equipment and people by the NOAA/NWS and/or DOD (and possibly DOE).

a. Level One. The DOE's Lawrence Livermore National Laboratory unit which provides the ARAC and/or the NRC Incident Response Center will contact the NWS field office having warning responsibility for the area in which the emergency exists and request the following:

(1) A 12 and 24 hour forecast for the area within 100km (about 60 miles) of the emergency site to include low level wind speed and direction, mixing depth (atmospheric stability in the lower levels), precipitation, frontal activity, squall lines, and wind shifts. Of particular value will be the forecaster's insight into local effects on any of the above factors/parameters. Information may be requested also about the location and telephone numbers of other observing sites in the area which do not routinely disseminate observations.

(2) A periodic update of the 12 and 24 hour forecast described above.

The NWS field office will:

(1) Provide all information requested that is within the technical capability of the office, and arrange for another office [Weather Service Forecast Office (WSFO), National Meteorological Center (NMC), etc.] to provide information beyond their capability.

(2) Notify NWS/OM&O/Operations Division (OD), through the regional Meteorological Services Division (MSD), of the request and of the level of emergency at the site, if known.

(3) Provide or arrange for updated forecasts to ARAC and NRC, consistent with a(1) above.

NWS/OM&O will notify the Director, NWS.

b. Level Two. An official of the DOE normally will notify NWS/OM&O if special observations are needed from fixed location(s) or by teams and equipment deployed to the vicinity of the emergency (a request could come directly from NRC). Notification will include the name and office of the DOE official, the location and nature of the emergency, and the support required. During normal office hours the DOE call will be made to Chief, Applied Services Branch, OD (301-427-7858) or Chief, OD (301-427-7706), NWS Headquarters. During other hours the DOE call will be placed to the NOAA/NWS Communications Operating Branch, NMC, Camp Springs, Maryland (FTS: 763-8189 or COMM: 301-581-1818). The individual in the Communications Operating Branch receiving the call will notify the Chief or Deputy Chief, Applied Services Branch or the Chief, OD; the Executive Officer, OM&O, or the Associate Director, OM&O, in that order.

NWS/OM&O will take the following actions to implement the NWS response plan and will also notify the Director, NWS:

(1) Notify NWS Region involved. They will direct field office support and will also notify the meteorological service coordinator(s) designated to serve the Emergency Operations Facility activated at the site of the emergency. Research Flight Center (RFC) would be notified if dropwindsonde capability were appropriate.

(2) Notify Office of Technical Services, Data Systems Division, Soundings Systems Branch if special PIBAL or rawinsonde observations are required and/or if deployment of the transportable rawinsonde unit is required.

(3) Notify the DOD Environmental Services Division, through the National Military Command Center (Emergency Actions Element), Telephone No. 697-6340, if any of the following is required: (a) on-site surface and low level wind observations, (b) airlift for the NWS transportable unit or (c) additional on-site or fixed upper air observing support.

(4) Notify Marine Services Branch, OM&O if special marine forecasts are required.

(5) Notify the NWS meteorological service coordinator(s) designated to serve the NRC Incident Response Center, Bethesda, Maryland.

Fixed facilities requested to make special surface and upper air observations will make the observations on or as near the desired schedule as possible and distribute the observations as follows:

(1) Surface wind speed and direction, temperature and humidity for surface observations and for the first 2 kilometers of the upper air observations to the ARAC (Lawrence Livermore National Laboratory) and NRC as soon as the data are available.

(2) The full surface and upper air observation to NMC (required by ARAC within 2-3 hours).

Observing teams deployed to the emergency site will:

(1) Contact the head of the deployed DOE team and confirm location designated for operating mobile equipment. Mobile rawinsonde units will obtain information from the DOE on elevation or altitude of the operating location. Elevation must be known to an accuracy of at least one meter.

(2) Observations will be taken on or as near to the required schedule as possible. Observations will be distributed as follows:

(a) Surface measurements of wind speed and direction and temperature and humidity, and the upper air measurements of wind speed and direction and temperature and humidity through the first 2 kilometers will be forwarded to ARAC and NRC by the most expeditious means immediately after the observations are available.

(b) The complete coded observations will be forwarded to the NMC and ARAC by the most convenient means available.

(c) The hourly aviation observations and specials will be telephoned to the NWS field office providing special aviation forecasting support for the emergency site.

4. Duration of Special Support. Agencies will continue to provide special support required until advised that the emergency has been resolved.

APPENDIX 2

(OF NRC REGULATORY GUIDE 1.101)

METEOROLOGICAL CRITERIA FOR EMERGENCY PREPAREDNESS

AT OPERATING NUCLEAR POWER PLANTS *

Introduction

10 CFR Part 50.47 requires that the Emergency Plan shall provide "(A)dequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition ..."

The basic functions needed to comply with the meteorological aspects of these requirements are:

1. A capability for making meteorological measurements.

2. A capability for making near real-time predictions of the atmospheric effluent transport and diffusion.

3. A capability for remote interrogation of the atmospheric measurements and predictions by appropriate organizations.

A staged schedule is provided in Annex 1 to this appendix for implementation of the meteorological elements addressing emergency preparedness requirements.

Meteorological Measurements

The emergency facilities and equipment as stated in Appendix E to 10 CFR Part 50 shall include "(E)quipment for determining the magnitude of and for continuously assessing the impact of the release of radioactive materials to the environment." To address this requirement, in part, the nuclear power plant operator shall have meteorological measurements from primary and backup systems.

*NOTE: This applies to commercial licensed plants only.

Each site with an operating nuclear power plant shall have a primary meteorological measurements system. The primary system shall produce current and record historical local meteorological data. These data will provide a means to estimate the dispersion of radioactive material due to accidental radioactive releases to the atmosphere by the plant. The acceptance criteria for meteorological measurements are described in the proposed Revision 1 to U. S. NRC Regulatory Guide 1.23.

Each site with an operating nuclear power plant shall have a viable backup meteorological measurements system. The backup system shall provide meteorological information when the primary system is out of service and, thus, assurance that basic meteorological information is available during and immediately following an accidental airborne radioactivity release. The acceptance criteria for the backup meteorological measurements system are described in the proposed Revision 1 to U. S. NRC Regulatory Guide 1.23.

Atmospheric Transport and Diffusion Assessment

Appendix E to 10 CFR Part 50 states that "(T)he means to be used for determining the magnitude of and for continually assessing the impact of the release of radioactive materials shall be described ..." To address this requirement, in part, all licensees with operating nuclear power plants shall provide the description of their system for making current, site-specific estimates and predictions of atmospheric effluent transport and diffusion during and immediately following an accidental airborne radioactivity release from the nuclear power plant. The purpose of these predictions is to provide an input to the assessment of the consequences of accidental radioactive releases to the atmosphere and to aid in the implementation of emergency response decisions.

Near real-time, site-specific atmospheric transport and diffusion models shall be used when accidental airborne radioactive releases occur. Two classes of models are appropriate. The first, Class A, is a model and calculational capability which can produce initial transport and diffusion estimates for the plume exposure EPZ within 15 minutes following the classification of an incident. The second, Class B, is a numerical model which represents the actual spatial and temporal variations of plume distribution and can provide estimates of deposition and relative concentration of radioactivity within the plume exposure and ingestion EPZs for the duration of the release.

The Class A model shall use actual 15 minute average meteorological data from the meteorological measurements systems maintained by the licensee. The selected data shall be indicative of the conditions within the plume exposure EPZ. The Class A model shall provide calculations or relative concentrations (X/Q) and transit times within the plume exposure EPZ. Atmospheric diffusion rates shall be based on atmospheric stability as a function of site-specific terrain conditions. Site-specific local climatological effects on the trajectories, such as seasonal, diurnal, and terrain-induced flows shall be included. Source characteristics (release mode, and building complex influence) shall be factored into the model. The output from the Class A model shall include the plume dimensions and position, and the location, magnitude, and arrival time of (1) the peak relative concentration and (2) the relative concentrations at appropriate locations. The bases and justification for these model(s) and input data shall be documented. The performance and limitations of the model(s) shall also be included in the documentation.

The essential elements of the input, of model components, and of output to be incorporated in the Class A model are given to provide guidance for meteorological system implementation. Additional guidance will be prepared to outline the staff position on dose assessment capabilities to be used for emergency response.

Remote Interrogation

Appendix E to 10 CFR Part 50 states that there shall be "(P)rovisions for communications among the nuclear power reactor control room, the onsite technical support center and the near-site emergency operations facility ...." There shall also be "(P)rovisions for communications by the licensee with the NRC Headquarters and the appropriate NRC Regional Office Operations Center from the nuclear power reactor control room, the onsite technical support center, and the near-site emergency operations facility" and "... among the nuclear facility, the principal State and local emergency operations centers ...."

To address this requirement with respect to the meteorological information, all systems producing meteorological data and effluent transport and diffusion estimates at sites with operating nuclear power plants shall have the capability of being remotely interrogated. This will provide current meteorological data and transport and diffusion estimates to the licensee, emergency response organizations, and the NRC staff, on-demand, during emergency situations.

Proposed Revision 1 to Regulatory Guide 1.23 identifies the meteorological data that shall be available. The information that shall be available from the transport and diffusion assessment include the model outputs, input variables, model identification and data source information, plant identification, and data from other sources, as available.

The capability to make transport and diffusion calculations with specific inputs shall be provided. The primary and backup communications systems shall have a data transmission rate of 1200 BAUD and the rate(s) and other specifications indicated in proposed Revision 1 to Regulatory Guide 1.23.

Documentation for procedures to access and use the system shall be provided to the emergency response organizations and the NRC, and shall be available in the control room, the Technical Support Center (TSC) and the Emergency Operations Facility (EOF).

ANNEX 1 TO APPENDIX 2

SCHEDULES TO IMPLEMENT THE METEOROLOGICAL ELEMENTS

ADDRESSING EMERGENCY PLANNING RULES

Schedule for Operating Reactors -- For operating reactors the following implementation milestones shall be met to address the functional requirements.

Milestones are numbered and tagged with the following code; a-date, b-activity, c-minimum acceptance criteria. They are as follows:

(1) a. January 2, 1981

b. Submittal of radiological emergency response plans

c. A description of the emergency plan which addresses the meteorological functions shall be provided

(2) a. March 1, 1981

b. Submittal of implementing procedures

c. Methods, systems, and equipment to assess and monitor actual or potential offsite consequences of a radiological emergency condition shall be provided

(3) a. April 1, 1981

b. Implementation of radiological emergency response plans

c. Three functions of Appendix 2 with the exception of the Class B model of the assessment capability

Alternative to milestone (3) requiring compensating actions:

A meteorological measurements system which is consistent with the existing technical specifications as the baseline or a primary system and/or a backup system of Appendix 2, or two independent backup systems shall provide the basic meteorological parameters (wind direction and speed and an indicator of atmospheric stability) on display in the control room. An operable dose calculational methodology (DCM) shall be in use in the control room and at appropriate emergency response facilities. The following compensating actions shall be taken by the licensee for this alternative:

(i) if only a primary or a backup system is in use:

- The licensee (a person who will be responsible for making offsite dose projections) shall check communications with the cognizant National Weather Service (NWS) first order station and NWS forecasting station on a monthly basis to ensure that routine meteorological observations and forecasts can be accessed.

- The licensee shall calibrate the meteorological measurements at a frequency no less than quarterly and identify a readily available source of meteorological data (characteristic of site conditions) to which they can gain access during calibration periods.

- During conditions of measurements system unavailability, an alternate source of meteorological data which is characteristic of site conditions shall be identified to which the licensee can gain access.

- The licensee shall maintain a site inspection schedule for evaluation of the meteorological measurements system at a frequency no less than weekly.

- It shall be a reportable occurrence if the meteorological data unavailability exceeds the goals outlined in Proposed Revision 1 to Regulatory Guide 1.23 on a quarterly basis.

(ii) The portion of the DCM relating to the transport and diffusion of gaseous effluents shall be consistent with the characteristics of the Class A model outlined in the assessment capability of Appendix 2.

(iii) Direct telephone access to the individual responsible for making offsite dose projections (Appendix E to 10 CFR Part 50(IV)(A)(4)) shall be available to the NRC in the event of a radiological emergency. Procedures for establishing contact and identification of contact individuals shall be provided as part of the implementing procedures.

This alternative shall not be exercised after July 1, 1982. Further, by July 1, 1981, a functional description of the upgraded capabilities and schedule for installation and operation shall be provided (see milestones 4 and 5).

(4) a. April 1, 1982

b. Installation of Emergency Response Facility meteorological hardware and software

c. Three functions of Appendix 2, with exception of the Class B model of the assessment capability

(5) a. July 1, 1982

b. Full operation of milestone 4

c. The Class A model (designed to be used out to the plume exposure EPZ) may be used in lieu of a Class B model out to the ingestion EPZ. Compensating actions to be taken for extending the application of the Class A model out to the ingestion EPZ include access to supplemental information (meso and synoptic scale) to apply judgment regarding intermediate and long-range transport estimates. The distribution of meteorological information by the licensee should be as follows by July 1, 1982:

Meteorological Information	CR	TSC	EOF	NRC and Emergency Response Organizations
Basic Met. Data (e.g., 1.97 Parameters)	X	X	X	X (NRC)
Full Met. Data (1.23 Parameters)		X	X	X
DCM (for Dose Projections)	X	X	X	X
Class A Model (to Plume Exposure EPZ)	X	X	X	X
Class B Model or Class A Model (to Ingestion EPZ)		X	X	X

(6) a. July 1, 1982 or at the time of the completion of milestone 5, whichever is sooner

b. Mandatory review of the DCM by the licensee

c. Any DCM in use should be reviewed to ensure consistency with the operational Class A model. Thus, actions recommended during the initial phases of a radiological emergency would be consistent with those after the TSC and EOF are activated

(7) a. September 1, 1982

b. Description of the Class B model provided to the NRC

c. Documentation of the technical bases and justification for selection of the type Class B model by the licensee with a discussion of the site-specific attributes

(8) a. June 1, 1983

b. Full operation of the Class B model

c. Class B model of the assessment capability of Appendix 2

o Schedule for Near-Term OLs

For applicants for an operating license at least milestones 1, 2, and 3 shall be met prior to the issuance of an operating license. Subsequent milestones shall be met by the same dates indicated for operating reactors. For the alternative to milestone 3, the meteorological measurements system shall be consistent with the NUREG-75/087, "Standard Review Plan For the Review of Safety Analysis Reports for Nuclear Power Plants," Section 2.3.3 program as the baseline or primary system and/or backup system.

APPENDIX 1

(OF NRC REGULATORY GUIDE 1.101)

U. S. NUCLEAR REGULATORY COMMISSION

EMERGENCY ACTION LEVEL GUIDELINES

FOR NUCLEAR POWER PLANTS

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BASIS FOR EMERGENCY ACTION LEVELS FOR NUCLEAR POWER FACILITIES

Four classes of Emergency Action Levels are established which replace the classes in Regulatory Guide 1.101, each with associated examples of initiating conditions. The classes are:

Notification of Unusual Event

Alert

Site Area Emergency

General Emergency

The rationale for the notification and alert classes is to provide early and prompt notification of minor events which could lead to more serious consequences given operator error or equipment failure or which might be indicative of more serious conditions which are not yet fully realized. A gradation is provided to assure fuller response preparations for more serious indicators. The site area emergency class reflects conditions where some significant releases are likely or are occurring but where a core melt situation is not indicated based on current information. In this situation full mobilization of emergency personnel in the near site environs is indicated as well as dispatch of monitoring teams and associated communications. The general emergency class involves actual or imminent substantial core degradation or melting with the potential for loss of containment. The immediate action for this class is sheltering (staying inside) rather than evacuation until an assessment can be made that (1) an evacuation is indicated and (2) an evacuation, if indicated, can be completed prior to significant release and transport of radioactive material to the affected areas.

The example initiating conditions listed after the immediate actions for each class are to form the basis for establishment by each licensee of the specific plant instrumentation readings (as applicable) which, if exceeded, will initiate the emergency class.

Potential NRC actions during various emergency classes are given in NUREG-0728, Report to Congress: NRC Incident Response Plan. The NRC response to any notification from a licensee will be related to, but not limited by, the licensee estimate of severity; NRC will consider such other factors as the degree of uncertainty and the lead times required to position NRC response personnel should something more serious develop.

Prompt notification of offsite authorities is intended to indicate within about 15 minutes for the unusual event class and sooner (consistent with the need for other emergency actions) for other classes. The time is measured from the time at which operators recognize that events have occurred which make declaration of an emergency class appropriate.

Class	Licensee Actions	State and/or Local Offsite Authority Actions
NOTIFICATION OF UNUSUAL EVENT Class Description Unusual events are in process or have occurred which indicate a potential degradation of the level of safety of the plant. No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety systems occurs. Purpose Purpose of offsite notification is to (1) assure that the first step in any response later found to be necessary has been carried out, (2) bring the operating staff to a state of readiness, and (3) provide systematic handling of unusual events information and decisionmaking.	1. Promptly inform State and/or local offsite authorities of nature of unusual condition as soon as discovered 2. Augment on-shift resources as needed 3. Assess and respond 4. Escalate to a more severe class, if appropriate or 5. Close out with verbal summary to offsite authorities; followed by written summary within 24 hours	1. Provide fire or security assistance if requested 2. Escalate to a more severe class, if appropriate 3. Stand by until verbal closeout

EXAMPLE INITIATING CONDITIONS: NOTIFICATION OF UNUSUAL EVENT

1. Emergency Core Cooling System (ECCS) initiated and discharge to vessel

2. Radiological effluent technical specification limits exceeded

3. Fuel damage indication. Examples:

   a. High offgas at BWR air ejector monitor (greater than 500,000 uci/sec; corresponding to 16 isotopes decayed to 30 minutes; or an increase of 100,000 uci/sec within a 30 minute time period)

   b. High coolant activity sample (e.g., exceeding coolant technical specifications for iodine spike)

   c. Failed fuel monitor (PWR) indicates increase greater than 0.1% equivalent fuel failures within 30 minutes

4. Abnormal coolant temperature and/or pressure or abnormal fuel temperatures outside of technical specification limits

5. Exceeding either primary/secondary leak rate technical specification or primary system leak rate technical specification

6. Failure of a safety or relief valve in a safety related system to close following reduction of applicable pressure

7. Loss of offsite power or loss of onsite AC power capability

8. Loss of containment integrity requiring shutdown by technical specifications

9. Loss of engineered safety feature or fire protection system function requiring shutdown by technical specifications (e.g., because of malfunction, personnel error or procedural inadequacy)

10. Fire within the plant lasting more than 10 minutes

11. Indications or alarms on process or effluent parameters not functional in control room to an extent requiring plant shutdown or other significant loss of assessment or communication capability (e.g., plant computer, Safety Parameter Display System, all meteorological instrumentation)

12. Security threat or attempted entry or attempted sabotage

13. Natural phenomenon being experienced or projected beyond usual levels

    a. Any earthquake felt in-plant or detected on station seismic instrumentation

    b. 50 year floor or low water, tsunami, hurricane surge, seiche

    c. Any tornado on site

    d. Any hurricane

14. Other hazards being experienced or projected

    a. Aircraft crash on-site or unusual aircraft activity over facility

    b. Train derailment on-site

    c. Near or onsite explosion

    d. Near or onsite toxic or flammable gas release

    e. Turbine rotating component failure causing rapid plant shutdown

15. Other plant conditions exist that warrant increased awareness on the part of a plant operating staff or State and/or local offsite authorities or require plant shutdown under technical specification requirements or involve other than normal controlled shutdown (e.g., cooldown rate exceeding technical specification limits, pipe cracking found during operation)

16. Transportation of contaminated injured individual from site to offsite hospital

17. Rapid depressurization of PWR secondary side.

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Class	Licensee Actions	State and/or Local Offsite Authority Actions
ALERT Class Description Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels. Purpose Purpose of offsite alert is to (1) assure that emergency personnel are readily available to respond if situation becomes more serious or to perform confirmatory radiation monitoring if required, and (2) provide offsite authorities current status information.	1. Promptly inform State and/or local authorities of alert status and reason for alert as soon as discovered 2. Augment resources and activate on-site Technical Support Center and on-site operational support center. Bring Emergency Operations Facility (EOF) and other key emergency personnel to standby status 3. Assess and respond 4. Dispatch on-site monitoring teams and associated communications 5. Provide periodic plant status updates to offsite authorities (at least every 15 minutes) 6. Provide periodic meteorological assessments to offsite authorities and, if any releases are occurring, dose estimates for actual releases 7. Escalate to a more severe class, if appropriate 8. Close out or recommend reduction in emergency class by verbal summary to offsite authorities followed by written summary within 8 hours of closeout or class reduction	1. Provide fire or security assistance if requested 2. Augment resources and bring primary response centers and EBS to standby status 3. Alert to standby status key emergency personnel including monitoring teams and associated communications 4. Provide confirmatory offsite radiation monitoring and ingestion pathway dose projections if actual releases substantially exceed technical specification limits 5. Escalate to a more severe class, if appropriate 6. Maintain alert status until verbal closeout or reduction of emergency class

EXAMPLE INITIATING CONDITIONS: ALERT

1. Severe loss of fuel cladding

   a. High offgas at BWR air ejector monitor (greater than 5 ci/sec; corresponding to 16 isotopes decayed 30 minutes)

   b. Very high coolant activity sample (e.g., 300 uci/cc equivalent of I-131)

   c. Failed fuel monitor (PWR) indicates increase greater than 1% fuel failures within 30 minutes or 5% total fuel failures.

2. Rapid gross failure of one steam generator tube with loss of offsite power

3. Rapid failure of steam generator tubes (e.g., several hundred gpm primary to secondary leak rate)

4. Steam line break with significant (e.g., greater than 10 gpm) primary to secondary leak rate (PWR) or MSIV malfunction causing leakage (BWR)

5. Primary coolant leak rate greater than 50 gpm

6. Radiation levels or airborne contamination which indicate a severe degradation in the control of radioactive materials (e.g., increase of factor of 1000 in direct radiation readings within facility)

7. Loss of offsite power and loss of all onsite AC power (see Site Area Emergency for extended loss)

8. Loss of all onsite DC power (See Site Area Emergency for extended loss)

9. Coolant pump seizure leading to fuel failure

10. Complete loss of any function needed for plant cold shutdown

11. Failure of the reactor protection system to initiate and complete a scram which brings the reactor subcritical

12. Fuel damage accident with release of radioactivity to containment or fuel handling building

13. Fire potentially affecting safety systems

14. Most or all alarms (annunciators) lost

15. Radiological effluents greater than 10 times technical specification instantaneous limits (an instantaneous rate which, if continued over 2 hours, would result in about 1 mr at the site boundary under average meteorological conditions)

16. Ongoing security compromise

17. Severe natural phenomena being experienced or projected

    a. Earthquake greater than OBE levels

    b. Flood, low water, tsunami, hurricane surge, seiche near design levels

    c. Any tornado striking facility

    d. Hurricane winds near design basis level

18. Other hazards being experienced or projected

    a. Aircraft crash on facility

    b. Missile impacts from whatever source on facility

    c. Known explosion damage to facility affecting plant operation

    d. Entry into facility environs of uncontrolled toxic or flammable gases

    e. Turbine failure causing casing penetration

19. Other plant conditions exist that warrant precautionary activation of technical support center and placing near-site Emergency Operations Facility and other key emergency personnel on standby

20. Evacuation of control room anticipated or required with control of shutdown systems established from local stations

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Class

SITE AREA EMERGENCY

Class Description

Events are in process or have occurred which involve actual or likely major failures of plant functions needed for protection of the public. Any releases not expected to exceed EPA Protective Action Guideline exposure levels except near site boundary.

Purpose

Purpose of the site area emergency declaration is to (1) assure that response centers are manned, (2) assure that monitoring teams are dispatched, (3) assure that personnel required for evacuation of near-site areas are at duty stations if situation becomes more serious, (4) provide consultation with offsite authorities, and (5) provide updates for the public through offsite authorities.

Licensee Actions

1. Promptly inform State and/or local offsite authorities of site area emergency status and reason for emergency as soon as discovered
2. Augment resources by activating on-site Technical Support Center, on-site operational support center and near-site Emergency Operations Facility (EOF)
3. Assess and respond
4. Dispatch on-site and offsite monitoring teams and associated communications
5. Dedicate an individual for plant status updates to offsite authorities and periodic pressure briefings (perhaps joint with offsite authorities)
6. Make senior technical and management staff onsite available for consultation with NRC and State on a periodic basis
7. Provide meteorological and dose estimates to offsite authorities for actual releases via a dedicated individual or automated data transmission
8. Provide release and dose projections based on available plant condition information and foreseeable contingencies
9. Escalate to general emergency class, if appropriate

   or

10. Close out or recommend reduction in emergency class by briefing of offsite authorities at EOF and by phone followed by written summary within 8 hours of closeout or class reduction

State and/or Local Offsite Authority Actions

1. Provide any assistance requested
2. If sheltering near the site is desirable, activate public notification system within at least two miles of the plant
3. Provide public within at least about 10 miles periodic updates on emergency status
4. Augment resources by activating primary response centers
5. Dispatch key emergency personnel including monitoring teams and associated communications
6. Alert to standby status other emergency personnel (e.g., those needed for evacuation) and dispatch personnel to near-site duty stations
7. Provide offsite monitoring results to licensee, DOE and others and jointly assess them
8. Continuously assess information from licensee and offsite monitoring with regard to changes to protective actions already initiated for public and mobilizing evacuation resources
9. Recommend placing milk animals within 2 miles on stored feed and assess need to extend distance
10. Provide press briefings, perhaps with licensee
11. Escalate to general emergency class, if appropriate
12. Maintain site area emergency status until closeout or reduction of emergency class

EXAMPLE INITIATING CONDITIONS: SITE AREA EMERGENCY

1. Known loss of coolant accident greater than makeup pump capacity

2. Degraded core with possible loss of coolable geometry (indicators should include instrumentation to detect inadequate core cooling, coolant activity and/or containment radioactivity levels)

3. Rapid failure of steam generator tubes (several hundred gpm leakage) with loss of offsite power

4. BWR steam line break outside containment without isolation

5. PWR steam line break with greater than 50 gpm primary to secondary leakage and indication of fuel damage

6. Loss of offsite power and loss of onsite AC power for more than 15 minutes

7. Loss of all vital onsite DC power for more than 15 minutes

8. Complete loss of any function needed for plant hot shutdown

9. Transient requiring operation of shutdown systems with failure to scram (continued power generation but no core damage immediately evident)

10. Major damage to spent fuel in containment or fuel handling building (e.g., large object damages fuel or water loss below fuel level)

11. Fire compromising the functions of safety systems

12. Most or all alarms (annunciators) lost and plant transient initiated or in progress

13. a. Effluent monitors detect levels corresponding to greater than 50 mr/hr for 1/2 hour or greater than 500 mr/hr W.B. for two minutes (or five times these levels to the thyroid) at the site boundary for adverse meteorology

    b. These dose rates are projected based on other plant parameters (e.g., radiation level in containment with leak rate appropriate for existing containment pressure) or are measured in the environs

    c. EPA Protective Action Guidelines are projected to be exceeded outside the site boundary

14. Imminent loss of physical control of the plant

15. Severe natural phenomena being experienced or projected with plant not in cold shutdown

    a. Earthquake greater than SSE levels

b. Flood, low water, tsunami, hurricane surge, seiche greater than design levels or failure of protection of vital equipment at lower levels

c. Sustained winds or tornadoes in excess of design levels

16. Other hazards being experienced or projected with plant not in cold shutdown

a. Aircraft crash affecting vital structures by impact or fire

b. Severe damage to safe shutdown equipment from missiles or explosion

c. Entry of uncontrolled flammable gases into vital areas. Entry of uncontrolled toxic gases into vital areas where lack of access to the area constitutes a safety problem

17. Other plant conditions exist that warrant activation of emergency centers and monitoring teams or a precautionary notification to the public near the site

18. Evacuation of control room and control of shutdown systems not established from local stations in 15 minutes

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Class	Licensee Actions	State and/or Local Offsite Authority Actions
GENERAL EMERGENCY Class Description Events are in process or have occurred which involve actual or imminent substantial core degradation or melting with potential for loss of containment integrity. Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area. Purpose Purpose of the general emergency declaration is to (1) initiate predetermined protective actions for the public, (2) provide continuous assessment of information from licensee and offsite organization measurements, (3) initiate additional measures as indicated by actual or potential releases, (4) provide consultation with offsite authorities and (5) provide updates for the public through offsite authorities.	1. Promptly inform State and local offsite aut orities of general emergency status and reason for emergency as soon as discovered (Parallel notification of State/local) 2. Augment resources by activating on-site Technical Support Center, on-site operational support center and near-site Emergency Operations Facility (EOF) 3. Assess and respond 4. Dispatch on-site and offsite monitoring teams and associated communications 5. Dedicate an individual for plant status updates to offsite authorities and periodic press briefings (perhaps joint with offsite authorities) 6. Make senior technical and management staff onsite available for consultation with NRC and State on a periodic basis 7. Provide meteorological and dose estimates to offsite authorities for actual releases via a dedicated individual or automated data transmission 8. Provide release and dose projections based on available plant condition information and foreseeable contingencies 9. Close out or recommend reduction of emergency class by briefing of offsite authorities at EOF and by phone followed by written summary within 8 hours of closeout or class reduction	1. Provide any assistance requested 2. Activate immediate public notification of emergency status and provide public periodic updates 3. Recommend sheltering for 2 mile radius and 5 miles downwind and assess need to extend distances. Consider advisability of evacuation (projected time available vs. estimated evacuation times) 4. Augment resources by activating primary response centers 5. Dispatch key emergency personnel including monitoring teams and associated communications 6. Dispatch other emergency personnel to duty stations within 5 mile radius and alert all others to standby status 7. Provide offsite monitoring results to licensee, DOE and others and jointly assess them 8. Continuously assess information from licensee and offsite monitoring with regard to changes to protective actions already initiated for public and mobilizing evacuation resources 9. Recommend placing milk animals within 10 miles on stored feed and assess need to extend distance 10. Provide press briefings, perhaps with licensee 11. Maintain general emergency status until closeout or reduction of emergency class

EXAMPLE INITIATING CONDITIONS: GENERAL EMERGENCY

1. a. Effluent monitors detect levels corresponding to 1 rem/hr W.B. or 5 rem/hr thyroid at the site boundary under actual meteorological conditions

   b. These dose rates are projected based on other plant parameters (e.g., radiation levels in containment with leak rate appropriate for existing containment pressure with some confirmation from effluent monitors) or are measured in the environs

   Note: Consider evacuation only within about 2 miles of the site boundary unless these site boundary levels are exceeded by a factor of 10 or projected to continue for 10 hours or EPA Protective Action Guideline exposure levels are predicted to be exceeded at longer distances

2. Loss of 2 of 3 fission product barriers with a potential loss of 3rd barrier, (e.g., loss of primary coolant boundary, clad failure, and high potential for loss of containment)

3. Loss of physical control of the facility

   Note: Consider 2 mile precautionary evacuation

4. Other plant conditions exist, from whatever source, that make release of large amounts of radioactivity in a short time period possible, e.g., any core melt situation. See the specific PWR and BWR sequences below.

   Notes: a. For core melt sequences where significant releases from containment are not yet taking place and large amounts of fission products are not yet in the containment atmosphere, consider 2 mile precautionary evacuation. Consider 5 mile downwind evacuation (45° to 90° sector) if large amounts of fission products (greater than gap activity) are in the containment atmosphere. Recommend sheltering in other parts of the plume exposure Emergency Planning Zone under this circumstance.

   b. For core melt sequences where significant releases from containment are not yet taking place and containment failure leading to a direct atmospheric release is likely in the sequence but not imminent and large amounts of fission products in addition to noble gases are in the containment atmosphere, consider precautionary evacuation to 5 miles and 10 mile downwind evacuation (45° to 90° sector).

   c. For core melt sequences where large amounts of fission products other than noble gases are in the containment atmosphere and containment failure is judged imminent, recommend shelter for those areas where evacuation cannot be completed before transport of activity to that location.

d. As release information becomes available adjust these actions in accordance with dose projections, time available to evacuate and estimated evacuation times given current conditions.

5. Example PWR Sequences

a. Small and large LOCA's with failure of ECCS to perform leading to severe core degradation or melt in from minutes to hours. Ultimate failure of containment likely for melt sequences. (Several hours likely to be available to complete protective actions unless containment is not isolated)

b. Transient initiated by loss of feedwater and condensate systems (principal heat removal system) followed by failure of emergency feedwater system for extended period. Core melting possible in several hours. Ultimate failure of containment likely if core melts.

c. Transient requiring operation of shutdown systems with failure to scram which results in core damage or additional failure of core cooling and makeup systems (which could lead to core melt)

d. Failure of offsite and onsite power along with total loss of emergency feedwater makeup capability for several hours. Would lead to eventual core melt and likely failure of containment.

e. Small LOCA and initially successful ECCS. Subsequent failure of containment heat removal systems over several hours could lead to core melt and likely failure of containment.

NOTE: Most likely containment failure mode is melt-through with release of gases only for dry containment; quicker and larger releases likely for ice condenser containment for melt sequences. Quicker releases expected for failure of containment isolation system for any PWR.

6. Example BWR Sequences

a. Transient (e.g., loss of offsite power) plus failure of requisite core shut down systems (e.g., scram). Could lead to core melt in several hours with containment failure likely. More severe consequences if pumps trip does not function.

b. Small or large LOCA's with failure of ECCS to perform leading to core melt degradation or melt in minutes to hours. Loss of containment integrity may be imminent.

c. Small or large LOCA occurs and containment performance is unsuccessful affecting longer term success of the ECCS. Could lead to core degradation or melt in several hours without containment boundary.

d. Shutdown occurs but requisite decay heat removal systems (e.g., RHR) or non-safety systems heat removal means are rendered unavailable. Core degradation or melt could occur in about ten hours with subsequent containment failure.

7. Any major internal or external events (e.g., fires, earthquakes, substantially beyond design basis) which could cause massive common damage to plant systems resulting in any of the above.

APPENDIX C

ACRONYMS AND ABBREVIATIONS AS USED IN THIS PLAN

ARAC	Atmospheric Release Advisory Capability
CFA	Cognizant Federal Agency
CFR	Code of Federal Regulations
DCM	Dose Calculational Methodology
DOD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency
EPZ	Emergency Planning Zone
FEMA	Federal Emergency Management Agency
FRMAP	Federal Radiological Monitoring and Assessment Plan
ICMSSR	Interdepartmental Committee for Meteorological Services and Supporting Research
MSD	Meteorological Services Division
NAWAS	National Warning System
NMC	National Meteorological Center
NOAA	National Oceanic and Atmospheric Administration
NRC	Nuclear Regulatory Commission
NUREG	Nuclear Regulatory Commission Regulation
NWS	National Weather Service
OD	Operations Division
OM&O	Office of Meteorology and Oceanography
OMB	Office of Management and Budget
PIBAL	System for Determining Winds Aloft by Visually Tracking Balloon
RAWINSONDE	System for Determining Wind, Temperature, Pressure, Humidity Aloft by Electronically Tracking Special Transmitter Attached to Balloon
RFC	Research Flight Center
TG-MPRER	Task Group on Meteorological Plans for Radiological Emergency Responses
WSFO	Weather Service Forecast Office
WSO	Weather Service Office

FEDERAL COMMITTEE FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (FCMSSR)

FEDERAL COORDINATOR FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

INTERDEPARTMENTAL COMMITTEE FOR
METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH (ICMSSR)

SUBCOMMITTEES

AVIATION SERVICES

SPACE ENVIRONMENT FORECASTING

SYSTEMS DEVELOPMENT

Working Groups

- o Automated Surface Observations
- o Automated Weather Information
- o Radiological, Gaseous and Particulate Transport Models
- o Weather Radar Systems

OPERATIONAL ENVIRONMENTAL SATELLITES

BASIC SERVICES

Working Groups

- o Agricultural Meteorological Services
- o Cooperative Backup Among Operational Processing Centers
- o Dissemination of NMC Products
- o Hurricane Operations
- o Marine Environmental Predictions
- o Meteorological Codes
- o Metric Implementation
- o Operational Processing Centers
- o Severe Local Storms Operations
- o Surface Observations
- o Upper Air Observations
- o Weather Radar Observations
- o Winter Storms Operations
- o World Weather Program

ICMSSR TASK GROUP ON
METEOROLOGICAL PLANS FOR RADIOLOGICAL EMERGENCY RESPONSES

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