Intermediate & Ingestion Phases

REP Program Overview

On December 7, 1979, following the Three Mile Island nuclear power plant accident in Pennsylvania, President Carter transferred the federal lead role in offsite radiological emergency planning and preparedness activities from the U.S. Nuclear Regulatory Commission (NRC) to the Federal Emergency Management Agency (FEMA).

FEMA established the radiological emergency preparedness (REP) program to:

- Ensure that the health and safety of people living around commercial nuclear power plants would be adequately protected in the event of a nuclear power plant accident.
- Inform and educate the public about REP.

REP program responsibilities encompass only off-site activities. The program includes state, tribal and local government emergency planning and preparedness activities that take place beyond the nuclear power plant boundaries. On-site activities continue to be the responsibility of the NRC.

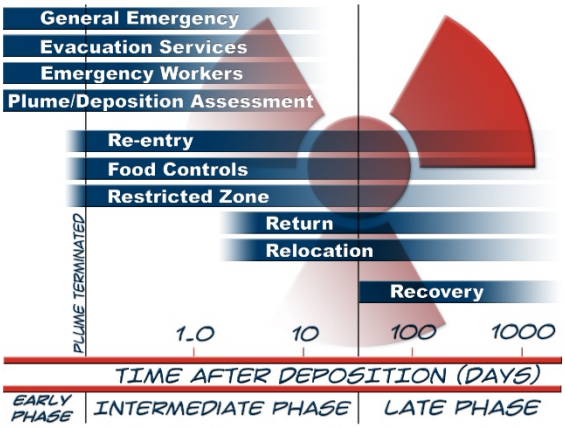
The Minnesota REP Program

The mission of Minnesota Department of Public Safety Division of Homeland Security and Emergency Management's (HSEM) REP program is to ensure that the health and safety of the public is protected in the event of a radiological incident at the Monticello or Prairie Island nuclear generating plant.

This is a comprehensive program that includes annual training, exercises and emergency plan reviews to ensure state agencies, local jurisdictions and the utility are ready to respond should an incident occur.

Three Phases of a Nuclear Power Plant Accident

Planning for a nuclear generating plant accident is divided into three operational phases:



1. **Early/Plume Phase**
   - The plant has a release in progress and the plume is in the air.
   - Protective action decisions (PAD) are initially based on computer models and subsequently confirmed by field team data.
   - Each nuclear generating plant exercises this phase every other year.
2. **Intermediate/Ingestion Phase**
   - The release has stopped.
   - PADs are based primarily on data coming from the field and the lab.
   - This phase is exercised once every eight years.
3. **Late/Recovery Phase**
   - Long-term recovery
   - Decontamination
   - Permanent relocation

What is the difference between a plume phase and ingestion phase exercise?

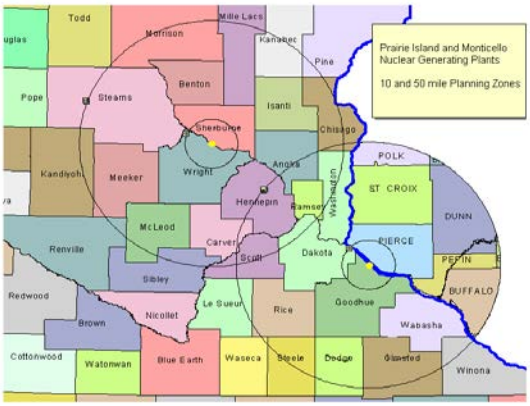
Plume phase exercises do not involve the ingestion exposure pathway and relocation, restricted zones, reentry, and return functions. The state of Minnesota and local governments in the area surrounding the Monticello and Prairie Island nuclear generating plants fully participate in a plume phase exercise at each site every two years.

Ingestion phase exercise involves ingestion exposure pathway protective action decision-making and implementation to an area within 50 miles of the plant, specifically in the areas of relocation, restricted zones, re-entry and return.

The state of Minnesota and local governments up to 50 miles from the Monticello and Prairie Island nuclear generating plants fully participate in an ingestion phase exercise at least once every eight years.

The Planning Zones

There are two planning zones surrounding a nuclear power plant that are used to prioritize the health and safety of people in either the direct pathway of a plume or in the ingestion exposure pathway.



10-Mile Emergency Planning Zone (EPZ)

- The area of concern during a plume phase exercise within a 10-mile radius of the plant.
- Planning priority is to move quickly in the early phase to protect the public from direct exposure to radiation from the plume from a nuclear power plant release by sheltering in place or evacuation.

Minnesota counties within the 10-mile EPZ:

Monticello Nuclear Generating Plant:

Wright, Sherburne

Prairie Island Nuclear Generating Plant:

Goodhue, Dakota

50-mile Ingestion Planning Zone (IPZ)

- Additional area of concern during an ingestion phase exercise that includes a 50-mile radius surrounding the plant.
- Planning priority is to implement protective actions from any radioactive materials in the release that could potentially contaminate water supplies, food crops and livestock above FDA guidelines, or result in ground contamination above EPA guidelines.

Minnesota Counties within the 50-mile IPZ:

Monticello Nuclear Generating Plant:

Anoka, Benton, Carver, Chisago, Dakota, Hennepin, Isanti, Kanabec, Kandiyohi, McLeod, Meeker, Mille Lacs, Morrison, Pine, Ramsey, Renville, Scott, Sherburne, Sibley, Stearns, Washington, Wright

Prairie Island Nuclear Generating Plant:

Anoka, Carver, Chisago, Dakota, Dodge, Goodhue, Hennepin, Le Sueur, Olmstead, Ramsey, Rice, Scott, Steele, Wabasha, Waseca, Washington, Winona

Special Intermediate/Ingestion Phase Concerns

In comparison with a plume phase exercise, new issues are introduced during the intermediate phase:

Relocation

- The removal or continued exclusion of people from contaminated areas to avoid chronic radiation exposure.
- Relocation from an area is indicated when soil samples exceed EPA protective action guidelines. (First year: 2 rem total effective dose [TEDE] or higher; any subsequent year: 0.5 rem TEDE or higher.)
- Relocation may be necessary both inside and outside the 10-mile EPZ.

Restricted Zones

- Restricted zones are established to protect residents from the potential effects of chronic exposure to low-level radiation.
- These are areas with controlled access from which the population has been evacuated or relocated.
- Re-entry into the restricted zone is limited to essential personnel only.
- An area remains restricted until a combination of remediation efforts and the natural decay of radiation allow for safe long-term residency.

Re-entry

- Temporary return of emergency workers and others authorized for:
  - Protection of valuable infrastructure
  - Law enforcement
  - Fire fighting
  - Securing or removing property
  - Tending livestock
  - Control of industrial processes and public utilities
  - Animal rescue and control

Return

- The reoccupation of areas cleared for unrestricted residence or use.
- Early return, following verification and correction of restricted zone boundaries, may still include contaminated areas and require ingestion pathway controls.

Recovery

- Recovery will involve continued and extensive field sampling, damage and impact assessments, and the coordination of federal assistance and nuclear insurance benefits.
- It will require the coordinated remediation of contamination and restoration to pre-event conditions and activities.

Food Protections

- Food protections begin in the early/plume phase:
  - Minnesota Department of Agriculture (MDA) issues a livestock advisory during the site area emergency classification level for the entire 50-mile EPZ.
  - An agricultural control zone is issued during the General Emergency for all areas where protective action recommendations (evacuate or shelter) have been mandated. If a release occurs, the control zone will include all counties 50 miles downwind from the plant.
  - Additional controls may be put in place beyond this, depending upon the results of sampling during the intermediate phase.
- Food control decisions emphasize public protection and balance the long- and short-term implications for economic damage to the state.

Decision-Making Entities

Two groups in the state EOC focus on the issues of the intermediate phase:

The Planning and Assessment Center (PAC)

The PAC is made up of trained personnel from HSEM, the Minnesota Department of Health (MDH), and the University of Minnesota. The PAC:

- Makes technical calculations and translates data into recommendations.
- Uses data from field team sampling as the basis for developing protective action recommendations (PAR) based on federal guidelines.

- Plots maps to describe these conclusions and presents findings to the intermediate phase task force (IPTF).
- Coordinates and tracks daily sample plans and priorities.

Intermediate Phase Task Force (IPTF)

The IPTF is composed of representatives from HSEM, MDH, MDA, Department of Natural Resources (DNR) and Minnesota Pollution Control Agency. Other agencies fill key supporting roles as the situation and priorities dictate. The IPTF:

- Translates PAC recommendations into tactics for implementation.
- Reviews PARs and gives input on impacting concerns, clarifying data, and prioritization of the recommendation.
- Develops a list of items for counties to consider when developing implementation plans before the PAR is approved.
- Sets daily priorities and sample plans.

The Eight-Year REP Exercise Schedule

The REP exercise process involves many organizations in an interrelated set of activities. It is based on an eight-year cycle, framed by various evaluation criteria; planning standards are outlined in NUREG-0654.

Each criterion relates to a specific off-site response organization (ORO) and its capacity to perform emergency functions as outlined in the plan. Examples include communication, dose assessment, public information and notification of the public.

These criteria are demonstrated at varying frequencies. Some must be demonstrated at each exercise, others are dependent on the scenario, but all must be demonstrated by the OROs at least once during the eight-year period.

Certain core activities are demonstrated by all organizations in every exercise and some are demonstrated less frequently. Others focus on specific emergency response or preparedness capabilities demonstrated only by certain OROs.

The specific participating organizations are determined by scenario events, exercise play and the eight-year exercise schedule.

The Evaluated Ingestion Phase Exercise

The in-sequence events of the exercise itself last two full days. The full-scale drill is scheduled first, followed by the evaluated exercise:

Day 1

- Plume phase exercise
- Field team evaluations
- Advanced party conference call
- Sample plan development

Day 2

- A combination of table top and functional exercises
- Data processed by the PAC and field team samples analyzed by the MDH lab will determine:
  - Relocation
  - Restricted zones
  - Re-entry
  - Return
  - Food controls
- Implementation of the PARs by the IPTF through communication with the risk and ingestion counties

Out-of-Sequence Events

- Medical services (ambulance and hospital)
- School evacuations
- Emergency worker decontamination
- Reception centers
- MDH Public Health Lab

This fact sheet is designed to augment planning for an emergency response to an incident at a nuclear generating plant; it does not supersede any plans, procedures or guidelines currently in use.