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AC45

**CLASSIFICATION OF EMERGENCIES**

**Revision Summary**

- 1) Updated position titles of Nuclear Shift Supervisor and Nuclear Assistant Shift Supervisor to Shift Manager and Control Room Supervisor respectively.
- 2) Deleted a portion of the commitments before step 4.2.1.
- 3) Deleted incorrect reference in step 4.4.2.2.
- 4) Clarified wording of unisolable reactor coolant leak outside primary containment in two EALS in Tab F.
- 5) Added note to Primary Containment Barrier EALs in Tab F stating that Potential Loss EALs 1 – 5 are indicative of conditions warranting a General Emergency declaration.
- 6) Added information regarding use of maximum core uncover time limit to note on page F-4.
- 7) Deleted EAL #5 from IC SU4 on page S – 13.
- 8) Added note to ICs HU3 and HA3 that fire suppression gases are not considered toxic.
- 9) Reflected changes to Tab F on Enclosure B. No revision bars used in Enclosure B.
- 10) Added note referencing HAZWOPER Plan to HU3 and HA3.

**Implementation Plan**

- 1) This revision goes into effect upon issuance and upon completion of all implementation requirements for LCR 00-144-REP.

**Attachments - None**

**Enclosures**

- |          |        |  |
|----------|--------|--|
| <b>A</b> |        | <b>Emergency Action Levels</b>   |
|          | 032196 | Tab A Recognition Category A - Abnormal Rad Levels/Radiological Effluent           |
|          | 120100 | Tab F Recognition Category F - Fission Product Barrier Degradation                 |
|          | 120100 | Tab H Recognition Category H - Hazards and Other Conditions Affecting Plant Safety |
|          | 120100 | Tab S Recognition Category S - System Malfunctions                                 |
| <b>B</b> |        | <b>Initiating Condition Matrix</b>   |
|          | 120100 | Tab A Abnormal Rad Levels/Radiological Effluent                                    |
|          | 120100 | Tab F Fission Product Barrier Degradation  |
|          | 120100 | Tab H Hazards and other Conditions Affecting Plant Safety                          |
|          | 120100 | Tab S System Malfunction   |

CONTROLLED

<i>Information and Procedures</i>				
<b>DSN</b> EP-101	<b>Revision</b> 26	<b>DCR #</b> 00-1978	<b>DTC</b> TPEPT	<b>File #</b> 1703.10
<b>IP Code</b> I	<b>Date Approved</b> 12-19-00	<b>Released By</b> D. Adams/s/	<b>Date Issued</b> 1-10-01	<b>Recipient</b> 935

## 1.0 PURPOSE

To provide a guide for identifying initiating conditions for proper classification of emergencies.

## 2.0 USE REFERENCES

2.1 29.100.01, Sheet 1, RPV Control

29.100.01, Sheet 1A, RPV Control - ATWS

2.2 29.100.01, Sheet 2, Primary Containment Control

2.3 29.100.01, Sheet 3, Emergency Depressurization, Steam Cooling, RPV and PC Flooding

29.100.01, Sheet 3A, Emergency Depressurization, Steam Cooling, RPV and PC Flooding - ATWS

2.4 29.100.01, Sheet 4, Primary Containment H<sub>2</sub>/O<sub>2</sub> Control

2.5 29.100.01, Sheet 5, Secondary Containment and Rad Release

2.6 29.100.01, Sheet 6, Curves, Cautions, and Tables

## 3.0 ENTRY CONDITIONS

3.1 Conditions exist that require use of Abnormal Operating Procedures, Emergency Operating Procedures, or entry into a Technical Specification Limiting Condition for Operation.

**and**

3.2 Conditions exist that may require classification in accordance with the emergency action levels in Enclosure A.

## 4.0 GENERAL INFORMATION

CM

4.1 Detailed emergency action levels are listed for each initiating condition under each category of events in Enclosure A. Categories and conditions are summarized in a matrix format in Enclosure B.

4.2 The following is a list of event categories by tab in Enclosure A

CM

4.2.1 Tab A Abnormal Rad Levels/Radiological Effluent

4.2.2 Tab F Fission Product Barrier Degradation

CM

4.2.3 Tab H Hazards and Other Conditions Affecting Plant Safety

CM

4.2.4 Tab S System Malfunctions

### 4.3 Control Room Chain of Command

4.3.1 The **Shift Manager** shall:

1. Perform initial evaluation of any abnormal or emergency situation.
2. Ensure the appropriate actions of applicable Abnormal and Emergency Operating Procedures are performed.
3. Ensure a determination is made of:
  - a. Magnitude of the emergency conditions
  - b. Whether or not a potential hazard exists to the health and safety of site personnel or the general public
4. Classify the emergency condition using the initiating conditions and emergency action levels of Enclosure A.
5. Assume the position of Emergency Director until properly relieved or until the emergency is terminated.

6. Continue to evaluate the emergency condition and make classification recommendations to the Emergency Director in the Technical Support Center (TSC) when the TSC is functional.

4.3.2 The **Control Room Supervisor** shall assume the responsibilities of the Shift Manager if the he/she is absent or incapacitated.

4.4 The **Emergency Director (Plant Manager/alternate)** shall:

4.4.1 Evaluate and assess the emergency condition.

4.4.2 Perform the following actions:

1. Classify/reclassify the emergency.
2. Authorize emergency response personnel to exceed radiation exposure limits delineated in 10 CFR 20, if required.
3. Augment the Emergency Response Organization as appropriate for the severity of the emergency
4. Recommend protective actions to offsite authorities when appropriate

4.5 **Emergency Class Definitions**

4.5.1 Unusual Event - Events are in process or have occurred that indicate a potential degradation of the level of safety of the plant. No release of radioactive material requiring offsite response or monitoring is expected.

4.5.2 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) Protection Action Guidelines exposure levels.

4.5.3 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 Environmental Protection Agency (EPA) Protection Action Guidelines exposure levels except at or near the site boundary.

- 4.5.4 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 Environmental Protection Agency (EPA) Protection Action Guidelines exposure levels offsite for more than the immediate site area.

## 5.0 IMMEDIATE ACTIONS - None

## 6.0 PROCEDURE

### 6.1 The **Emergency Director** shall:

- 6.1.1 Verify initial emergency indications (such as an alarm or surveillance report) by such means as:
1. Comparison with redundant instrument channels
  2. Comparison with other related plant parameters
  3. Physical observations
  4. Field measurements
- 6.1.2 Determine appropriate emergency classification by comparing verified plant conditions with the initiating conditions identified in Enclosure A or B, and the emergency action levels in Enclosure A.
- 6.1.3 Take actions in accordance with:
1. EP-102, "Unusual Event"
  2. EP-103, "Alert"
  3. EP-104, "Site Are Emergency"
  4. EP-105, "General Emergency"

## **7.0 FOLLOW-UP ACTIONS**

7.1 Continually assess the emergency situation. As necessary, upgrade, de-escalate, or terminate the emergency classification as more definitive information becomes available, and/or if plant conditions change.

7.1.1 Eliminating one or more of the conditions constituting an event classification does not necessarily ensure the event can be de-escalated or terminated.

7.1.2 Use EP-102, EP-103, EP-104, and EP-105 for criteria on de-escalation and termination of the emergency.

7.2 Continue to perform this procedure until event is terminated.

## **8.0 RECORDS**

There are no required records generated through the performance of this procedure.

**END OF TEXT**

## ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

### UNUSUAL EVENT

**AU1 Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds Two Times the Values of ODCM Control 3.11.2.1 or 3.11.1.1 for 60 Minutes or Longer**

**OPERATING MODE APPLICABILITY:** All

#### Emergency Action Levels:

1. Note: If a valid monitor reading indicates a release of radioactivity that may be in excess of 2 times the ODCM Control value for greater than 60 minutes, and it is not confirmed by sample analysis within that time, then the declaration must be based on the valid monitor reading. Confirmatory sample and analysis in response to reaching AU1 monitor EAL value is done for the purpose of both confirming the existence of the uncontrolled condition (AU1/AA1) and also to verify that there is no radiological hazard (AS1/AG1).

A valid monitor reading from the table below which exceeds the corresponding value may indicate a release in excess of 2 times the ODCM Control 3.11.2.1 or 3.11.1.1 value, and warrants immediate confirmation by sampling and analysis in accordance with ODCM methodology or by performing dose assessment using nuclide analysis method.

Effluent Monitor	Channel	Reading
RB SPING	5	4.6E-3 $\mu\text{Ci/cc}$
SGTS I SPING	7	5.3E-2 $\mu\text{Ci/cc}$
SGTS II SPING	7	4.6E-2 $\mu\text{Ci/cc}$
RW SPING	5	4.9E-3 $\mu\text{Ci/cc}$
TB SPING	5	3.3E-4 $\mu\text{Ci/cc}$
CW Decant	N/A	2600 cpm

2. Valid projection of Actual Dose indicates a dose rate in excess of 0.1 mRem/hr TEDE at the site boundary using computerized dose assessment by nuclide analysis method, with the condition sustained for a duration of 60 minutes or greater
3. Valid sample analysis of gaseous or liquid effluent release using ODCM methodology indicates a release rate or concentration in excess of 2 times the ODCM Control 3.11.2.1 or 3.11.1.1 value, with the condition sustained for a duration of 60 minutes or greater

## ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

### ALERT

**AA1 Any Unplanned Release of Gaseous or Liquid Radioactivity to the Environment that Exceeds 200 Times the Values of ODCM Control 3.11.2.1 or 3.11.1.1 for 15 Minutes or Longer**

**OPERATING MODE APPLICABILITY:** All

### Emergency Action Levels:

1. **Note:** If a valid monitor reading indicates a release of radioactivity that may be in excess of 200 times the ODCM Control value for greater than 15 minutes, and it is not confirmed by **sample analysis** within that time, then the declaration must be based on the valid monitor reading. Confirmatory sample and analysis in response to reaching AA1 monitor EAL value is done for the purpose of both confirming the existence of the **uncontrolled condition** (AU1/AA1) and also to verify that there is no **radiological hazard** (AS1/AG1).

A valid monitor reading from the table below which exceeds the corresponding value may indicate a release in excess of 200 times the ODCM Control 3.11.2.1 or 3.11.1.1 value, and warrants immediate confirmation by sampling and analysis in accordance with ODCM methodology or by performing dose assessment.

Effluent Monitor	Channel	Reading
Div I AXM	4	5.3 $\mu\text{Ci/cc}$
Div II AXM	4	4.6 $\mu\text{Ci/cc}$
CW Decant	N/A	2.6E5 cpm

2. Valid projection of Actual Dose indicates a dose rate in excess of 10 mRem/hr TEDE at the site boundary using computerized dose assessment by nuclide analysis method, with the condition sustained for a duration of 15 minutes or greater
3. Valid sample analysis of gaseous or liquid effluent release using ODCM methodology indicates a release rate or concentration in excess of 200 times the ODCM Control 3.11.2.1 or 3.11.1.1 value, with the condition sustained for a duration of 15 minutes or greater

## ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

### SITE AREA EMERGENCY

**AS1 Site Boundary Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 100 mrem TEDE or 500 mrem Adult Thyroid for the Actual or Projected Duration of the Release**

**OPERATING MODE APPLICABILITY:** All

#### Emergency Action Levels:

1. **Note:** If a valid monitor reading indicates a release of radioactivity that may result in a Site Boundary Doses in excess of 100 mrem TEDE or 500 mrem Adult Thyroid for greater than 15 minutes, and it is not confirmed by sample analysis or dose projection within that time, then the declaration must be based on the valid monitor reading.

A valid monitor reading of greater than 80  $\mu\text{Ci/cc}$  on SGTS DIV I/II AXM, Channel 3, may indicate a release resulting in Site Boundary Dose Rates in excess of 100 mrem/hr TEDE or 500 mrem/hr Adult Thyroid, and warrants immediate confirmation by sampling and analysis in accordance with ODCM methodology or by performing dose assessment.

2. Valid projection of Actual or Potential Dose indicates a dose in excess of 100 mrem TEDE or 500 mrem Adult Thyroid at the Site Boundary for the projected duration of the release
3. Site Boundary Dose Rate measurements in excess of 100 mrem/hr expected to continue for more than one hour; or a sample analysis indicating a combined radioiodine concentration in excess of 20 DAC expected to continue for more than one hour

## ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

### GENERAL EMERGENCY

**AG1 Site Boundary Dose Resulting from an Actual or Imminent Release of Gaseous Radioactivity Exceeds 1000 mrem TEDE or 5000 mrem Adult Thyroid for the Actual or Projected Duration of the Release Using Actual Meteorology**

**OPERATING MODE APPLICABILITY:** All

#### Emergency Action Levels:

1. **Note:** If a valid monitor reading indicates a release of radioactivity that may result in Site Boundary Doses in excess of 1000 mrem TEDE or 5000 mrem Adult Thyroid for greater than 15 minutes, and it is not confirmed by dose projection within that time, then the declaration must be based on the valid monitor reading.

A valid monitor reading of greater than 800  $\mu\text{Ci/cc}$  on SGTS DIV I/II AXM, Channel 3, may indicate a release resulting in Site Boundary Dose Rates in excess of 1000 mRem/hr TEDE or 5000 mRem/hr Adult Thyroid, and warrants immediate confirmation by sampling and analysis in accordance with ODCM methodology or by performing dose assessment.

2. Valid projection of Actual **or** Potential Dose indicates a dose in excess of 1000 mrem TEDE or 5000 mrem Adult Thyroid for the projected duration of the release
3. Site Boundary Dose Rate measurements in excess of 1000 mrem/hr expected to continue for more than one hour; **or** a sample analysis indicating a combined radioiodine concentration in excess of 200 DAC expected to continue for more than one hour

## ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

### UNUSUAL EVENT

#### AU2 Unexpected Increase of Plant Radiation Levels

**OPERATING MODE APPLICABILITY:** All

#### Emergency Action Levels:

1. **Uncontrolled** water level decrease in the reactor refueling cavity with level at 619 inches and lowering by Floodup Level Indicator **or** 20 feet and lowering by visual indication, with all irradiated fuel assemblies remaining covered by water
2. **Uncontrolled** water level decrease in the spent fuel storage pool with level at 21.5 feet and lowering by visual indication, **with** all irradiated fuel assemblies remaining covered by water
3. Valid direct Area Radiation Monitor readings which exceed the Maximum Normal Operating Level of 29.100.01, Sheet 5, Table 14, inside secondary containment, **or** which have increased by a factor of 1000 over normal\* levels in other areas of the plant

\* Normal levels can be considered as the highest reading in the past twenty-four hours excluding the current peak value

## ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT

### ALERT

**AA2 Major Damage to Irradiated Fuel or Loss of Water Level That Has or Will Result in the Uncovering of Irradiated Fuel Outside the Reactor Vessel**

**OPERATING MODE APPLICABILITY:** All

#### Emergency Action Levels:

1. An unplanned valid alarm of ARM Channel 18, Refuel Area High Radiation Monitor, reading  $\geq 1000$  mR/hr
2. An unplanned valid alarm of ARM Channels 15 and 17, Fuel Storage Pool and Refuel Area Low Range Radiation Monitors, **and** a valid trip of the Fuel Pool Area Ventilation Exhaust Radiation Monitor indicated by Annunciator 3D35, DIV I/II FP VENT EXH RADN MONITOR UPSCALE TRIP
3. Report of visual indication of irradiated fuel uncovered
4. Spent Fuel Pool Water Level below the bottom of the Spent Fuel Pool Gates and lowering indicating a loss of inventory which will result in uncovering irradiated fuel

**ABNORMAL RAD LEVELS/RADIOLOGICAL EFFLUENT**

**ALERT**

**AA3 Releases of Radioactive Material or Increases in Radiation Levels Within the Facility That Impede Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown**

**OPERATING MODE APPLICABILITY:** All

**Emergency Action Levels:**

1. Valid reading on ARM Channel 6, Control Room Direct Area Radiation Monitor, GREATER THAN 15 mR/hr
2. Valid, unplanned, direct Area Radiation Monitor readings which exceed the Maximum Safe Operating Level of 29.100.01, Sheet 5, Table 14

## **FISSION PRODUCT BARRIER DEGRADATION**

**OPERATING MODE APPLICABILITY: 1, 2, 3**

### **UNUSUAL EVENT**

**FU1** Any Loss **or** Any Potential Loss of **Primary Containment**

### **ALERT**

**FA1** Any Loss **or** Any Potential Loss of **Either Fuel Clad or Reactor Coolant System**

### **SITE AREA EMERGENCY**

**FS1** Loss **or** Potential Loss of **Any Two Barriers**

### **GENERAL EMERGENCY**

**FG1** Loss of **Any Two Barriers and Potential Loss of Third Barrier**

## FUEL CLAD BARRIER EALS

LOSS	POTENTIAL LOSS
1. <b>RPV Water Level</b>  RPV Water Level less than -40 inches	1. <b>RPV Water Level</b>  RPV Water Level less than 0 inches
2. <b>Containment Radiation</b>  CHRRM reading greater than 2,500 R/hr	
3. <b>Primary Coolant Activity Level</b>  Primary coolant activity level greater than 300 $\mu\text{Ci/gm}$ DE I-131 (see SU4 also)	
4. <b>Determination of release of at Least 5% of the Gap Activity from the Fuel</b>	
5. <b>Emergency Director Judgment</b>  Any condition in the judgment of the Emergency Director that indicates Loss of the Fuel Clad Barrier	5. <b>Emergency Director Judgment</b>  Any condition in the judgment of the Emergency Director that indicates a Potential Loss of the Fuel Clad Barrier

## REACTOR COOLANT BARRIER EALS

LOSS	POTENTIAL LOSS
1. <b>RPV Water Level</b>  RPV Water Level less than 0 inches	2. <b>Reactor Coolant Leak Rate*</b>  Reactor Coolant unidentified leakage greater than 50 gpm inside the Drywell, <b>or</b> Unisolable Primary System leakage outside Drywell as indicated by isolation mimic, <b>or</b> exceeding a maximum safe operating Secondary Containment temperature or radiation level of 29.100.01, Sheet 5, Table 12 <b>or</b> 14 (see SU5 and SA6 also)
3. <b>Drywell Pressure</b>  Drywell pressure greater than 1.68 psig	
4. <b>Containment Radiation</b>  CHRRM reading greater than 5 R/hr two minutes after reactor shutdown or beyond	
5. <b>Emergency Director Judgment</b>  Any condition in the judgment of the Emergency Director that indicates Loss of the Reactor Coolant Barrier	5. <b>Emergency Director Judgment</b>  Any condition in the judgment of the Emergency Director that indicates a Potential Loss of the Reactor Coolant Barrier

\* Stuck open SRV is not a Reactor Coolant Barrier loss or potential loss unless there is a concurrent loss of the Fuel Clad Barrier, in which case the stuck open SRV constitutes a potential loss of the Reactor Coolant Barrier (FS1 applies).

## PRIMARY CONTAINMENT BARRIER EALS

LOSS	POTENTIAL LOSS**
	1. <b>RPV Water Level*</b> RPV Water Level less than -40 inches or unknown <b>AND</b> Maximum Core Uncovery Time Limit (MCUTL) of 29.100.01, Sheet 6, is exceeded
2. <b>Containment Isolation Valve Status After Containment Isolation</b>  Failure of both valves in any one line to close <b>and</b> downstream pathway to the environment exists, <b>or</b>  Containment venting requiring trip defeat per EOPs, <b>or</b>  Unisolable Primary System leakage outside Drywell as indicated by isolation mimic, <b>or</b> exceeding a Secondary Containment maximum safe operating temperature <b>or</b> radiation level of 29.100.01, Sheet 5, Table 12 <b>or</b> 14 (see SA6 also)	
3. <b>Drywell Pressure</b>  Rapid unexplained decrease following initial increase, <b>or</b>  Drywell Pressure response not consistent with LOCA conditions	3. <b>Containment Pressure or Gas Mix</b>  Torus Pressure cannot be maintained below the Primary Containment Pressure Limit, <b>or</b>  Drywell or Torus Hydrogen concentration $\geq 6\%$ <b>and</b> Drywell or Torus Oxygen concentration > 5%
	4. <b>Containment Radiation</b>  CHRRM reading greater than 10.000R/hr
	5. <b>Determination of release of at least 20% Gap activity from the fuel</b>
6. <b>Emergency Director Judgment</b>  Any condition in the judgment of the Emergency Director that indicates Loss of the Containment Barrier	6. <b>Emergency Director Judgment</b>  Any condition in the judgment of the Emergency Director that indicates a Potential Loss of the Containment Barrier

\* It is not a prerequisite to be in the section of the EOPs where MCUTL is tracked (RPV Flooding) to apply this EAL. The intent is based on the assurance of adequate core cooling and therefore MCUTL must be calculated for the EAL, possibly independent of EOP use. For the EAL, MCUTL starts when RPV level is less than -40 inches or unknown. Also, the MCUTL curve can be extrapolated to a value of 2.35 minutes at 10 minutes after shutdown.

\*\* Primary Containment Barrier Potential Loss EALs 1 – 5 are indicative of conditions warranting a General Emergency declaration.

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **UNUSUAL EVENT**

#### **HU1 Natural and Destructive Phenomena Affecting the Protected Area**

#### **OPERATING MODE APPLICABILITY: All**

#### **Emergency Action Levels:**

1. Seismic monitor indicates earthquake greater than 0.01g
2. Report by plant personnel of tornado striking within protected area boundary
3. Vehicle crash into plant structures or systems within protected area boundary
4. Report by plant personnel of an unanticipated explosion within protected area boundary resulting in visible damage to permanent structure or equipment
5. Report of turbine failure resulting in casing penetration or damage to turbine or generator seals
6. Sustained winds greater than 75 mph as measured at the 10 m or 60 m elevations on the meteorological tower
7. External flooding indicated by wave crests exceeding the top of the shore barrier
8. Internal flooding in the Auxiliary Building, Reactor Building, or RHR Complex that has the potential to affect the operation of safe shutdown equipment
9. Assessment by the Control Room that a destructive event affecting the protected area has occurred

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **ALERT**

#### **HA1 Natural and Destructive Phenomena Affecting the Plant Vital Area**

#### **OPERATING MODE APPLICABILITY: All**

#### **Emergency Action Levels:**

1. Seismic monitor indicates seismic event greater than 0.08 g
2. Report by plant personnel of tornado striking Reactor Building, Auxiliary Building, or RHR Complex
3. Any occurrence that results in visible damage to the Reactor Building, Auxiliary Building, or RHR Complex
4. Control Room indications which in the judgment of Control Room personnel reflect damage to the Reactor Building, Auxiliary Building, or RHR Complex
5. Vehicle crash affecting the Reactor Building, Auxiliary Building, or RHR Complex
6. Turbine failure generated missiles result in any visible structural damage to or penetration of the Reactor Building, Auxiliary Building, or RHR Complex
7. Sustained winds greater than 90 mph as measured at the 10 m or 60 m elevations on the meteorological tower
8. Flooding from internal or external sources that has affected the operation of safe shutdown equipment in the Reactor Building, Auxiliary Building, or RHR Complex

## HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

### UNUSUAL EVENT

#### **HU2 Fire Within Protected Area Boundary Not Extinguished Within 15 Minutes of Detection**

#### **OPERATING MODE APPLICABILITY: All**

#### **Emergency Action Level:**

1. Fire in the Auxiliary Building, Reactor Building, Control Center, Turbine Building, Radwaste Building, or RHR Complex not extinguished within 15 minutes of Control Room notification or verification of a control room alarm

**NOTE:** If a Control Room Fire Alarm is verified, the 15 minute period starts at the time that the Control Room Fire Alarm was received.

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **ALERT**

#### **HA2 Fire or Explosion Affecting the Operability of Plant Safety Systems Required to Establish or Maintain Safe Shutdown**

#### **OPERATING MODE APPLICABILITY: All**

#### **Emergency Action Level:**

1. Fire or explosion in any of the following areas:

- Reactor Building
- Auxiliary Building
- Control Center
- RHR Complex

**and**

Affected system parameter indications show degraded performance or plant personnel report visible damage to permanent structures or equipment within the specified area

## HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

### UNUSUAL EVENT

#### **HU3 Release of Toxic or Flammable Gases Deemed Detrimental to Safe Operation of the Plant**

#### **OPERATING MODE APPLICABILITY: All**

**NOTE (1):** Potential sources of offsite toxic releases include, but are not limited to:

- 1 Berlin Water Treatment Plant  
1.5 miles North Northwest (Sector R, 330°)  
600 pounds of chlorine gas
2. Meijer Distribution Center  
3.8 miles Northwest (Sector Q, 315°)  
22,000 pounds of anhydrous ammonia

**NOTE (2):** Fire suppression gases are not considered toxic for the purpose of this EAL.

**NOTE (3):** The HAZWOPER Plan may be used for additional reference.

#### **Emergency Action Levels:**

1. Report or detection of toxic or flammable gases that could enter within the site area boundary in amounts that can affect normal operation of the plant
2. Report by Local, County or State Officials for potential evacuation of site personnel based on offsite event

## HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY

### ALERT

**HA3 Release of Toxic or Flammable Gases Within a Facility Structure Which Jeopardizes Operation of Systems Required to Maintain Safe Operations or to Establish or Maintain Cold Shutdown**

**OPERATING MODE APPLICABILITY: All**

**NOTE (1):** Fire suppression gases are not considered toxic for the purpose of this EAL.

**NOTE (2):** The HAZWOPER Plan may be used for additional reference.

#### **Emergency Action Levels:**

1. Report or detection of toxic gases within a facility structure in concentrations that will be life threatening to plant personnel
2. Report or detection of flammable gases within a facility structure in concentrations that will affect the safe operation of the plant

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **UNUSUAL EVENT**

**HU4 Confirmed Security Event Which Indicates a Potential Degradation in the Level of Safety of the Plant**

**OPERATING MODE APPLICABILITY: All**

#### **Emergency Action Levels:**

1. Attempted unauthorized entry into the protected area
2. Attempted sabotage within the protected area
3. Internal disturbance within the protected area not brought under immediate control or presenting an unknown threat

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **ALERT**

#### **HA4 Security Event in a Plant Protected Area**

**OPERATING MODE APPLICABILITY:** All

#### **Emergency Action Levels:**

1. Explosive device discovered within the plant protected area but outside the plant vital areas
2. Intrusion into plant protected area by a hostile force
3. Confirmed act of sabotage within the plant protected area

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **SITE AREA EMERGENCY**

#### **HS1 Security Event in a Plant Vital Area**

**OPERATING MODE APPLICABILITY:** All

#### **Emergency Action Levels:**

1. Explosive device discovered in a plant vital area
2. Intrusion into a plant vital area by a hostile force
3. Confirmed act of sabotage within a plant vital area

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **GENERAL EMERGENCY**

#### **HG1 Security Event Resulting in Loss of Ability to Reach and Maintain Cold Shutdown**

#### **OPERATING MODE APPLICABILITY: All**

#### **Emergency Action Levels:**

1. Loss of physical control of the Control Room due to security event
2. Loss of physical control of remote shutdown capability due to security event

**HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

**ALERT**

**HA5 Control Room Evacuation has been Initiated**

**OPERATING MODE APPLICABILITY: All**

**Emergency Action Level:**

1. Evacuation of the Control Room ordered by the Nuclear Shift Supervisor

**HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

**SITE AREA EMERGENCY**

**HS2 Control Room Evacuation has been Initiated and Plant Control Cannot be Established**

**OPERATING MODE APPLICABILITY: All**

**Emergency Action Level:**

1. Control Room evacuation has been initiated

**and**

Control of RPV level and pressure cannot be established per 20.000.18 or 20.000.19 within 15 minutes

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **UNUSUAL EVENT**

#### **HU5 Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of an Unusual Event**

#### **OPERATING MODE APPLICABILITY: All**

#### **Example Emergency Action Level:**

1. Other conditions exist which in the judgment of the Emergency Director indicate a potential degradation of the level of safety of the plant. No release of radioactive material requiring offsite response or monitoring is expected.

**HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

**ALERT**

**HA6 Other Conditions Existing Which in the Judgment of the Emergency Director  
Warrant Declaration of an Alert**

**OPERATING MODE APPLICABILITY: All**

**Emergency Action Level:**

1. Other conditions exist which in the judgment of the Emergency Director indicate that 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 EPA Protective Action Guidelines (PAG) exposure levels.

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **SITE AREA EMERGENCY**

#### **HS3 Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of a Site Area Emergency**

**OPERATING MODE APPLICABILITY:** All

#### **Emergency Action Level:**

1. Other conditions exist which in the judgment of the Emergency Director indicate actual or likely major failures of plant functions needed for protection of the public. Any releases are not expected to exceed EPA Protective Action Guidelines (PAG) exposure levels except near the site boundary.

## **HAZARDS AND OTHER CONDITIONS AFFECTING PLANT SAFETY**

### **GENERAL EMERGENCY**

#### **HG2 Other Conditions Existing Which in the Judgment of the Emergency Director Warrant Declaration of General Emergency**

#### **OPERATING MODE APPLICABILITY: All**

#### **Emergency Action Level:**

1. Other conditions exist which in the judgment of the Emergency Director indicate: actual or imminent substantial core degradation or melting with potential for loss of containment, **or** potential for uncontrolled radionuclide releases which can reasonably be expected to exceed EPA PAG plume exposure levels outside the site boundary

## **SYSTEM MALFUNCTIONS**

### **UNUSUAL EVENT**

#### **SU1 Loss of All Offsite Power to Essential Busses for Greater Than 15 Minutes**

#### **OPERATING MODE APPLICABILITY: All**

#### **Emergency Action Level:**

1. Loss of power to System Service Transformers 64 and 65 for greater than 15 minutes

**and**

Emergency Diesel Generators are supplying power to all Div. 1 and Div. 2 emergency busses

## SYSTEM MALFUNCTIONS

### ALERT

#### **SA1 Loss of all Offsite Power and Loss of all Onsite AC Power to Essential Busses During Cold Shutdown or Refueling Mode**

**OPERATING MODE APPLICABILITY:** 4, 5, defueled

#### **Emergency Action Level:**

1. The following conditions exist for the **required** AC Power Distribution Source:
  - a. Loss of power to System Service Transformers 64 or 65
  - and**
  - b. Failure of Emergency Diesel Generators to supply power to the required division of emergency busses
  - and**
  - c. Failure to restore power to at least one required division of busses within 15 minutes from the time of loss of both offsite and onsite AC power sources

## SYSTEM MALFUNCTIONS

### ALERT

**SA5 AC Power Capability to Essential Busses Reduced to a Single Power Source for Greater Than 15 Minutes Such That Any Additional Single Failure Would Result in Station Blackout**

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### Emergency Action Levels:

1. Loss of Power to System Service 64 and 65 transformers for greater than 15 minutes

**and**

Onsite ESF power capability has been degraded to one full division of emergency busses

2. Loss of ability to power Div. 1 and Div. 2 emergency busses from Emergency Diesel Generators for greater than 15 minutes

**and**

Loss of power to System Service Transformer 64 or 65

## SYSTEM MALFUNCTIONS

### SITE AREA EMERGENCY

#### SS1 Loss of all Offsite Power and Loss of all Onsite AC Power to Essential Busses

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### Emergency Action Levels:

1. Loss of power to System Service Transformers 64 and 65

**and**

Failure of Emergency Diesel Generators to supply power to one full division of emergency busses

**and**

Failure to restore power to at least one division of emergency busses within 15 minutes from the time of loss of both offsite and onsite AC power

## SYSTEM MALFUNCTIONS

### GENERAL EMERGENCY

#### SG1 Prolonged Loss of all Offsite Power and Prolonged Loss of all Onsite AC Power

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### Emergency Action Level:

1. Loss of power to System Service Transformers 64 and 65

**and**

Failure of Emergency Diesel Generators to supply power to one full division of emergency busses

**and**

Restoration of at least one full division of emergency busses within 4 hours is **NOT** likely, **or** RPV water level less than 0 inches

## SYSTEM MALFUNCTIONS

### ALERT

**SA2 Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Scram Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Scram Was Successful**

**OPERATING MODE APPLICABILITY:** 1, 2

#### **Emergency Action Level:**

1. A valid initiating scram signal received, **but** no automatic scram occurred

**and**

Manual actions taken at COP H11-P603 were successful in scram of control rods to achieve reactor power < 3%

## SYSTEM MALFUNCTIONS

### SITE AREA EMERGENCY

**SS2 Failure of Reactor Protection System Instrumentation to Complete or Initiate an Automatic Reactor Scram Once a Reactor Protection System Setpoint Has Been Exceeded and Manual Scram Was NOT Successful**

**OPERATING MODE APPLICABILITY:** 1, 2

#### **Emergency Action Level:**

1. A valid initiating scram signal received, **but** no automatic scram occurred

**and**

Manual actions taken at COP H11-P603 were **not** successful in scram of control rods to achieve reactor power < 3%

## SYSTEM MALFUNCTIONS

### GENERAL EMERGENCY

**SG2 Failure of the Reactor Protection System to Complete an Automatic Scram and Manual Scram was NOT Successful and there is Indication of an Extreme Challenge to the Ability to Cool the Core**

**OPERATING MODE APPLICABILITY:** 1, 2

#### **Emergency Action Level:**

1. A valid initiating scram signal received, **but** no automatic scram occurred

**and**

Manual actions taken at COP H11-P603 were **not** successful in scram of control rods to achieve reactor power < 3%

**and**

Emergency depressurization is **required** by any Emergency Operating Procedure

## **SYSTEM MALFUNCTIONS**

### **UNUSUAL EVENT**

#### **SU2 Inability to Reach Required Shutdown within Technical Specification Limits**

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### **Emergency Action Level:**

1. Plant is not brought to required operating mode within Technical Specifications LCO Action Statement Time

## SYSTEM MALFUNCTIONS

### UNUSUAL EVENT

#### **SU3 Unplanned Loss of most or all Safety System Annunciation in the Control Room for Greater than 15 Minutes**

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### **Emergency Action Level:**

1. Loss of most or all (greater than approximately 75%) annunciators on H11-P601, P602, and P603 for greater than 15 minutes

**and**

Compensatory non-alarming indications are available

**and**

In the opinion of the Nuclear Shift Supervisor, the loss of the annunciators requires increased surveillance to safely operate the plant

**and**

Annunciator loss does not result from planned action

## SYSTEM MALFUNCTIONS

### ALERT

**SA4 Unplanned Loss of most or all Safety System Annunciation in Control Room with Either (1) a Significant Transient in Progress, or (2) Compensatory Non-Alarming Indicators Unavailable**

**OPERATING MODE APPLICABILITY:** 1, 2, 3

**Emergency Action Level:**

1. Loss of most or all (greater than approximately 75%) annunciators on H11-P601, P602, and P603 for greater than 15 minutes

**and**

In the opinion of the Shift Supervisor, the loss of the annunciators requires increased surveillance to safely operate the plant

**and**

Annunciator loss does not result from planned action

**and**

A significant plant transient is in progress, **or**

Compensatory non-alarming indications are unavailable

**NOTE:** Significant transients include:

1. Manual or automatic scrams
2. Runbacks involving greater than 25% thermal power change
3. ECCS injections
4. Thermal power oscillations of 10% or greater

## SYSTEM MALFUNCTIONS

### SITE AREA EMERGENCY

#### SS6 Inability to Monitor a Significant Transient in Progress

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### **Emergency Action Level:**

1. Loss of most or all (greater than approximately 75%) annunciators associated with H11-P601, P602, and P603

**and**

Compensatory non-alarming indications unavailable

**and**

Indications needed to monitor safety functions associated with lost annunciators unavailable

**and**

Significant transient in progress

**NOTE:** Significant transients include:

1. Manual or automatic scrams
2. Runbacks involving greater than 25% thermal power change
3. ECCS injections
4. Thermal power oscillations of 10% or greater

## SYSTEM MALFUNCTIONS

### UNUSUAL EVENT

#### SU4 Fuel Clad Degradation

**OPERATING MODE APPLICABILITY:** All

#### **Emergency Action Levels:**

1. Gross radioactivity rate of noble gases measured at the discharge of the 2.2 minute delay piping greater than 340 millicuries/sec after 30 minute delay
2. Reactor scram due to main steam line radiation greater than three times full power value as may be indicated by Annunciator 3D82
3. Dose Equivalent I-131 greater than 0.2  $\mu\text{Ci/gm}$  for more than 48 hours
4. Dose equivalent I-131 greater than 4.0  $\mu\text{Ci/gm}$

## SYSTEM MALFUNCTIONS

### UNUSUAL EVENT

#### SU5 RCS Leakage

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### **Emergency Action Levels:**

1. Unidentified or pressure boundary leakage greater than 10 gpm
2. Identified leakage greater than 25 gpm

## **SYSTEM MALFUNCTIONS**

### **ALERT**

#### **SA6 Main Steam Line Break**

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### **Emergency Action Level:**

1. Indication of Main Steam Line Break on Isolation Mimic

## SYSTEM MALFUNCTIONS

### UNUSUAL EVENT

#### **SU6 Unplanned Loss of All Onsite or Offsite Communications Capabilities**

**OPERATING MODE APPLICABILITY:** All

#### **Emergency Action Levels:**

1. Loss of **all** the following onsite communications capabilities affecting the ability to perform routine operations:

Administrative Telephones  
Hi-Com  
Plant radios

2. Loss of **all** the following offsite communications capabilities:

Administrative Telephones  
Emergency Telephones

## SYSTEM MALFUNCTIONS

### UNUSUAL EVENT

#### **SU7 Unplanned Loss of Required DC Power During Cold Shutdown or Refueling Mode for Greater than 15 Minutes**

**OPERATING MODE APPLICABILITY:** 4, 5

#### **Emergency Action Level:**

1. Loss of both Div. 1 **and** Div. 2 130V DC Systems as indicated by DC bus voltage less than:

Div 1: 112.2V DC

Div 2: 107.4V DC

**and**

Inability to restore voltage on either Div. 1 or Div. 2 130V DC bus within 15 minutes from discovery of loss

## SYSTEM MALFUNCTIONS

### SITE AREA EMERGENCY

#### SS3 Loss of All Vital DC Power

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### **Emergency Action Level:**

1. Loss of both Div. 1 **and** Div. 2 130V DC Systems as indicated by DC bus voltage less than:

Div 1: 112.2V DC

Div 2: 107.4V DC

**and**

Inability to restore voltage on either Div. 1 or Div. 2 130V DC bus within 15 minutes from discovery of loss

## SYSTEM MALFUNCTIONS

### ALERT

#### SA3 Inability to Maintain Plant in Cold Shutdown

**OPERATING MODE APPLICABILITY:** 4, 5

#### **Emergency Action Level:**

1. Div. 1 and Div. 2 of the RHR System are not effective in Decay Heat Removal

**and**

Reactor coolant temperature exceeds 200°F, **or**

Results in uncontrolled temperature rise approaching 200°F

## SYSTEM MALFUNCTIONS

### SITE AREA EMERGENCY

**SS5 Loss of Water Level in the Reactor Vessel that has or will Uncover Fuel in the Reactor Vessel**

**OPERATING MODE APPLICABILITY:** 4, 5

#### **Emergency Action Level:**

1. RPV water level cannot be kept above 0 inches

## SYSTEM MALFUNCTIONS

### SITE AREA EMERGENCY

#### SS4 Complete Loss of Function Needed to Achieve or Maintain Hot Shutdown

**OPERATING MODE APPLICABILITY:** 1, 2, 3

#### **Emergency Action Level:**

1. Any combination of events which would require the plant to be shutdown from normal operating pressure and temperature

**and**

Torus water temperature and RPV pressure cannot be kept below the Heat Capacity Limit (HCL)

**INITIATING CONDITION MATRIX**

**TAB A**

		TAB A Abnormal Rad Levels/Radiological Effluent		
<b>GENERAL EMERGENCY</b>	AG1  Site boundary dose resulting from an actual or imminent release of gaseous radioactivity that exceeds 1000 mrem TEDE or 5000 mrem Adult Thyroid for the actual or projected duration of the release using actual meteorology			
		All	Pg A-4	
<b>SITE AREA EMERGENCY</b>	AS1  Site boundary dose resulting from an actual or imminent release of gaseous radioactivity that exceeds 100 mrem TEDE or 500 mrem Adult Thyroid for the actual or projected duration of the release			
		All	Pg A-3	
<b>ALERT</b>	AA1  Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds 200 times the values of ODCM control 3.11.2.1 or 3.11.1.1 for 15 minutes or longer	AA2  Major damage to irradiated fuel or loss of water level that has or will result in the uncovering of irradiated fuel outside the reactor vessel	AA3  Releases of radioactive material or increases in radiation levels within the facility that impede operation of systems required to maintain safe operations or to establish or maintain cold shutdown	
		All	Pg A-2	Pg A-6
		All		Pg A-7
<b>UNUSUAL EVENT</b>	AU1  Any unplanned release of gaseous or liquid radioactivity to the environment that exceeds two times the values of ODCM control 3.11.2.1 or 3.11.1.1 for 60 minutes or longer			AU2  Unexpected increase of plant radiation levels
		All	Pg A-1	Pg A-5

INITIATING CONDITION MATRIX

TAB F

		TAB F Fission Product Barrier Degradation					
	FG1	Fuel Clad Barrier EALS		Reactor Coolant Barrier EALS		Primary Containment Barrier EALS	
		Loss	Potential Loss	Loss	Potential Loss	Loss	Potential Loss (Note 3)
GENERAL EMERGENCY	Loss of any two barriers and potential loss of third barrier	1. RPV Water Level RPV water level less than - 40"	1. RPV Water Level RPV water level less than 0"	1. RPV Water Level RPV water level less than 0"			1. RPV Water Level (see note 2) RPV water level less than - 40", or unknown and Maximum Core Uncovery Time Limit (MCUTL) of 29.100.01, sheet 6 is exceeded
SITE AREA EMERGENCY	1, 2, 3 FS1 Loss or potential loss of any two barriers				2. Reactor Coolant Leak Rate (see note 1) Reactor coolant unidentified leakage greater than 50 gpm inside the Drywell or Unisolable Primary System leakage outside Drywell as indicated by isolation mimic, or exceeding a maximum safe operating Secondary Containment temperature or radiation level of 29.100.01, Sheet 5, Table 12 or 14 (see SU5 and SA6 also)	2. Containment Isolation Valve Status After Containment Isolation Failure of both valves in any one line to close and downstream pathway to the environment exists, or Containment venting requiring trip defeat per EOPs, or Unisolable Primary System leakage outside Drywell as indicated by isolation mimic, or exceeding a Secondary Containment maximum safe operating temperature or radiation level of 29.100.01, Sheet 5, Table 12 or 14 (see SA6 also)	
	1, 2, 3 FA1 Any loss or any potential loss of either fuel clad or reactor coolant system			3. Drywell Pressure Drywell pressure greater than 1.68 psig		3. Drywell Pressure Rapid unexplained decrease following initial increase, or Drywell pressure response not consistent with LOCA conditions	3. Containment Pressure or Gas Mix Torus pressure cannot be maintained below the primary containment pressure limit, or Drywell or Torus hydrogen concentration > 6% and Drywell or Torus oxygen concentration > 5%
ALERT		2. Containment Radiation CHRRM reading greater than 2,500 R/hr		4. Containment Radiation CHRRM reading greater than 5 R/hr 2 minutes after reactor shutdown or beyond			4. Containment Radiation CHRRM reading greater than 10,000 R/hr
UNUSUAL EVENT	1, 2, 3 FU1 Any loss or any potential loss of primary containment	3. Primary Coolant Activity Level Primary coolant activity level greater than 300 µCi/gm DE1-131 (see SU4 also)					5. Determination of release of at least 20% Gap activity from the fuel
		4. Determination of release of at least 5% of the Gap activity from the fuel	5. Emergency Director Judgement Any condition in the judgement of the Emergency Director that indicates loss of the fuel clad barrier.	5. Emergency Director Judgement Any condition in the judgement of the Emergency Director that indicates loss of the fuel clad barrier	5. Emergency Director Judgement Any condition in the judgement of the Emergency Director that indicates loss of the reactor coolant barrier	5. Emergency Director Judgement Any condition in the judgement of the Emergency Director that indicates potential loss of the reactor coolant barrier	6. Emergency Director Judgement Any condition in the judgement of the Emergency Director that indicates loss of the containment barrier
	1, 2, 3					6. Emergency Director Judgement Any condition in the judgement of the Emergency Director that indicates potential loss of the containment barrier	

**NOTE 1:** Stuck open SRV is not a reactor coolant barrier loss or potential loss unless there is a concurrent loss of the fuel clad barrier, in which case the stuck open SRV constitutes a potential loss of the reactor coolant barrier (FS1 applies).

**NOTE 2:** It is not a prerequisite to be in the section of the EOPs where MCUTL is tracked (RPV flooding) to apply this EAL. The intent is based on the assurance of adequate core cooling and therefore MCUTL must be calculated for the EAL, possibly independent of EOP use. For the EAL, MCUTL starts when RPV level is less than - 40" or unknown. Also, the MCUTL curve can be extrapolated to a value of 2.35 minutes at 10 minutes after shutdown.

**NOTE 3:** Primary Containment Barrier Potential Loss EALS 1 - 5 are indicative of conditions warranting a General Emergency declaration.

**INITIATING CONDITION MATRIX**

**TAB H**

TAB H Hazards and Other Conditions Affecting Plant Safety						
GENERAL EMERGENCY				HG1 Security event resulting in loss of ability to reach and maintain cold shutdown		HG2 Other conditions existing which in the judgement of the Emergency Director warrant declaration of General Emergency
				All Pg H-10		All Pg H-16
SITE AREA EMERGENCY				HS1 Security event in a Plant Vital Area		HS2 Control Room evacuation has been initiated and Plant control cannot be established
				All Pg H-9		All Pg H-12
ALERT	HA1 Natural and destructive phenomena affecting the Plant Vital Area	HA2 Fire or explosion affecting the operability of Plant safety systems required to establish or maintain safe shutdown	HA3 Release of toxic or flammable gasses within a facility structure which jeopardizes operation of systems required to maintain safe operations or to establish or maintain cold shutdown	HA4 Security event in a Plant Protected Area	HA5 Control Room evacuation has been initiated	HA6 Other conditions existing which in the judgement of the Emergency Director warrant declaration of an Alert
	All Pg H-2	All Pg H-4	All Pg H-6	All Pg H-8	All Pg H-11	All Pg H-14
UNUSUAL EVENT	HU1 Natural and destructive phenomena affecting the Protected Area	HU2 Fire within Protected Area boundary not extinguished within 15 minutes of detection	HU3 Release of toxic or flammable gases deemed detrimental to safe operation of the Plant	HU4 Confirmed security event which indicates a potential degradation in the level of safety of the Plant		HU5 Other conditions existing which in the judgement of the Emergency Director warrant declaration of an Unusual Event
	All Pg H-1	All Pg H-3	All Pg H-5	All Pg H-7		All Pg H-13

INITIATING CONDITION MATRIX

TAB S

TAB S System Malfunction											
GENERAL EMERGENCY	SG1		SG2								
	Prolonged loss of all offsite power and prolonged loss of all onsite AC power		Failure of the reactor protection system to complete an automatic scram and manual scram was NOT successful and there is indication of an extreme challenge to the ability to cool the core								
	1, 2, 3 Pg S-5		1, 2 Pg S-8								
SITE AREA EMERGENCY	SS1		SS2		SS6				SS3	SS5	SS4
	Loss of all offsite power and loss of all onsite AC power to essential busses		Failure of reactor protection system instrumentation to complete or initiate an automatic reactor scram once a reactor protection system setpoint has been exceeded and manual scram was NOT successful		Inability to monitor a significant transient in progress			Loss of all vital DC power	Loss of water level in the reactor vessel that has or will uncover fuel in the reactor vessel	Complete loss of function needed to achieve or maintain hot shutdown	
	1, 2, 3 Pg S-4		1, 2 Pg S-7		1, 2, 3 Pg S-12			1, 2, 3 Pg S-18	4, 5 Pg S-20	1, 2, 3 Pg S-21	
ALERT	SA1	SA5	SA2		SA4		SA6			SA3	
	Loss of all offsite power and loss of all onsite AC power to essential busses during cold shutdown or refueling mode	AC power capability to essential busses reduced to a single power source for greater than 15 minutes such that any additional single failure would result in station blackout	Failure of reactor protection system instrumentation to complete or initiate an automatic reactor scram once a reactor protection system setpoint has been exceeded and manual scram was successful		Unplanned loss of most or all safety system annunciation in Control Room with either (1) a significant transient in progress, or (2) compensatory non-alarming indicators unavailable		Main steam line break			Inability to maintain plant in cold shutdown	
	4, 5, defueled Pg S-2	1, 2, 3 Pg S-3	1, 2 Pg S-6		1, 2, 3 Pg S-11		1, 2, 3 Pg S-15			4, 5 Pg S-19	
UNUSUAL EVENT	SU1			SU2	SU3	SU4	SU5	SU6	SU7		
	Loss of all offsite power to essential busses for greater than 15 minutes			Inability to reach required shutdown within Technical Specification limits	Unplanned loss of most or all safety system annunciation in the Control Room for greater than 15 minutes	Fuel clad degradation	RCS Leakage	Unplanned loss of all onsite or offsite communication capabilities	Unplanned loss of required DC power during cold shutdown or refueling mode for greater than 15 minutes		
	All Pg S-1			1, 2, 3 Pg S-9	1, 2, 3 Pg S-10	All Pg S-13	1, 2, 3 Pg S-14	All Pg S-16	4, 5 Pg S-17		

END

C04

**PROTECTIVE ACTION RECOMMENDATIONS**

**Revision Summary**

- 1) Deleted EP-542 from Section 2.0, Use References.
- 2) Rewrote Section 4.0 to better explain the process of Protective Action Recommendation (PAR) formulation.
- 3) Rewrote Enclosure A, PAR Flowchart.
- 4) Rewrote Enclosure B, Downwind Affected Sector to Area Conversion Table.
- 5) Updated titles in Enclosures F, G, and H.
- 6) Made editorial changes throughout text. This is a total rewrite. No revision bars have been used.

**Implementation Plan**

- 1) This procedure goes into effect upon issuance.

**Attachments - None**

CM

**Enclosures**

- |   |          |   |
|---|----------|---|
| A | 11/13/00 | PAR Flowchart   |
| B | 11/13/00 | Downwind Affected Sector to Area Conversion Table                                   |
| C | 01/27/98 | Protective Action Areas   |
| D | 01/27/98 | EF 2 10-Mile EPZ Evacuation Time Estimates Summary                                  |
| E | 01/27/98 | EF 2 10-Mile EPZ Population Analysis  |
| F | 11/13/00 | Schools Within the 10-Mile EPZ  |
| G | 11/13/00 | Special Facilities Within the 10-Mile EPZ   |
| H | 11/13/00 | Recreation Areas, Motels, and Miscellaneous Facilities Within the 10-Mile EPZ       |
| I | 01/27/98 | Representative Shielding Factors From a Gamma Cloud Source                          |
| J | 01/27/98 | Inhalation Shielding Factors for a Wood House, Snug Doors, Closed Windows (Thyroid) |

**CONTROLLED**

<i>Information and Procedures</i>				
DSN EP-545	Revision 14	DCR # 00-2057	DTC TPEPT	File # 1703.10
IP Code I	Date Approved 12-27-00	Released By D. Adams/s/	Date Issued 1-10-01	Recipient 935

## 1.0 PURPOSE

To provide guidelines for formulating and recommending appropriate protective actions for the general public in the event of a General Emergency.

## 2.0 USE REFERENCES

2.1 EP-290, Emergency Notifications

## 3.0 ENTRY CONDITIONS

3.1 A Site Area Emergency or General Emergency is declared.

## 4.0 GENERAL INFORMATION

4.1 Protective actions (evacuation and/or sheltering) are required for the affected areas of the general public at the General Emergency declaration, and are recommended to local and/or state authorities as appropriate.

4.2 Protective Action Recommendation (PAR) formulation involves an assessment of risk to the general public. Appropriate recommendations are determined using Enclosure A, PAR Flowchart, which considers risk assessment based on two primary indicators.

### 4.2.1 Dose Projections

1. Dose projections are classified as “Actual” or “Potential”.
  - a. **Actual** doses are based on radioactivity actually being released from the plant. They are calculated using either effluent radiation monitor readings (normal), grab sample results, or actual field measurements.
  - b. **Potential** doses are based on radioactivity in primary containment available for release. They are calculated using Containment High Range Radiation Monitors (CHRRMs) or containment atmosphere grab sample results.

2. PAR decision making may be based on an estimate of radiation exposure an individual might receive over an eight hour period in comparison to a Protective Action Guideline (PAG).
  - a. A PAG is that level of exposure that an individual might receive that warrants a specific protective action to be implemented.
  - b. PAG values are expressed in units of dose and represent the risk of health effects to the exposed population.
  - c. PAG values are as follows:

• TEDE	1R	5R
• Adult Thyroid	5R	25R
  - d. A projected dose greater than the lower PAG values but less than the upper PAG values is used to initiate PAR decision-making and **normally** requires an evacuation.
  - e. A projected dose greater than the upper PAG value represents the greatest risk to the public and normally requires an evacuation under all circumstances. This trigger point is not used by facility personnel.
3. The risk associated with a projected dose that exceeds a PAG value is generally higher than the risk associated from an evacuation.
4. When projected doses exceed the PAG values at a distance greater than 10 miles, manual dose calculations may be used to determine the exact affected areas and distances.
5. Enclosure A reflects analysis of dose projections in comparison to the PAGs at 5 miles. This is because the minimum PAR due to dose projections extends to the downwind affected areas out to 5 miles.

#### 4.2.2 Plant Status

1. PAR decision-making may also include an assessment of plant conditions, specifically core damage estimates.
2. The plant conditions described on the "Plant Status" side of Enclosure A represent the greatest risk to the general public and indicate a "severe accident" is in progress or projected (>20% gap release).
3. The risk due to the potential radiation exposure from a severe accident is reduced by the implementation of protective actions.
4. PAR decision-making based on plant status represents the desired proactive approach to the protection of the public. It focuses the decision-maker on the likelihood of radiation exposure thereby offering the greatest risk savings.
5. Careful evaluation of plant conditions are needed to properly determine if a severe accident is in progress or projected. These may include:
  - a. Status of injection capabilities
  - b. Reactor water level
  - c. CHRRMs
  - d. Core damage estimates such as EP-547, "Rapid Estimate of Core/Fuel Damage Based on Containment High Range Radiation Monitor," or dose assessment program
6. Severe accidents (>20% gap release) reflect an amount of radioactivity that may present an unacceptable risk to the general health of the public and would require protection of those close to the plant and sheltering of further out areas should later evacuations be needed.
7. Analysis of potential primary containment failure during a severe accident may prove to be extremely difficult or impossible to predict due to plant conditions outside of plant design and therefore are not considered for PAR development.

8. Core melt sequences represent the greatest risk to the health of the general public. Activity produced from these sequences, if released, can produce severe early health effects and necessitates immediate protection of the public.

4.2.3 PARs must be continually evaluated for effectiveness as conditions change or more information becomes available.

1. If substantial core damage is projected or detected after a PAR based on dose projections has been made, full consideration must be given to the plant status PAR determination in order to assure PAR effectiveness.
2. If dose projections become available after a PAR based on plant status has been made, full merit must be given to the impact of dose calculations and the corresponding PAR in order to assure PAR effectiveness.
3. When differing PARs are formulated between using dose projections and plant status, the more stringent PAR is normally communicated.
4. Meteorological data and the Offsite Radiological Emergency Team (RET) survey also provide useful information for PAR development. Each provides information on exact plume position.
5. Current offsite hazards may also exist that might impact protective actions. The presence of ice storms, environmental releases and road hazards may be present and are normally communicated to offsite authorities.
6. The current status of emergency response efforts can provide insight to future PARs. Successful (or failed) efforts can provide decision makers with data to help determine likelihood of further core damage.

4.3 Other considerations may be involved when evaluating the effectiveness of a PAR and are normally used by state decision-makers.

**NOTE:** Enclosures F, G, and H represent information maintained and used by offsite authorities. Data contained in these enclosures may not reflect current status (i.e., student population, school name, etc.). The applicable offsite authority may be contacted for the most current information.

4.3.1 Certain members of the general public may be at a greater risk from an evacuation or evacuation efforts may take much longer. These members are identified in the following:

1. Enclosure F, Schools Within the 10-Mile EPZ
2. Enclosure G, Special Facilities Within the 10-Mile EPZ
3. Enclosure H, Recreation Areas, Motels, and Miscellaneous Facilities Within the 10-Mile EPZ

4.3.2 Evacuations are most effective if completed before plume arrival.

1. Enclosures D and E identify evacuation time estimates and total population which may be useful to evaluate evacuation effectiveness.

4.3.3 Dose received before PAR implementation is normally not used for evaluations.

4.3.4 In cases where evacuations are not prudent, sheltering may be appropriate.

1. Enclosure I, Representative Shielding Factors From a Gamma Cloud Source, and Enclosure J, Inhalation Shielding Factors for a Wood House, Snug Doors, Closed Windows (Thyroid), may be used to evaluate sheltering effectiveness by multiplying projected Total Effective Dose Equivalent (TEDE) and adult thyroid dose respectively by the Enclosure's shielding factors.

4.4 Protective actions for the early phase of a General Emergency are prescribed for the 10-Mile Emergency Planning Zone (EPZ) surrounding the site.

4.4.1 For planning purposes, the EPZ is divided into concentric rings of 2, 5, and 10 miles.

- 4.4.2 The EPZ is also divided into sixteen 22.5° sectors.
- 4.4.3 The EPZ is further divided into five Protective Action Areas (PAAs) as shown in Enclosure C.
- 4.4.4 When making PARs, the minimum area considered is the PAAs located in the 2-mile radius, and the projected plume's centerline sector, and two adjacent sectors out to five miles.
1. When developing PARs for "Loss of Physical Control of the Plant" (HG1), the minimum area considered is the PAAs located in the 2-mile radius (Area 1).
  2. If the projected dose exceeds a PAG value >10 miles away, adhoc protective actions would be developed in conjunction with offsite authorities.
- 4.4.5 More stringent recommendations may be necessary as more information is known, such as better understood accident sequence, presence of significant particulate fission products, or the presence of an unmonitored or unfiltered release path.
- 4.4.6 Once a PAR has been determined and communicated, less stringent recommendations are normally not considered or used.

#### 4.5 Responsibility for PARs

- 4.5.1 Detroit Edison decision-makers only **recommend** protective actions. State decision-makers make the final decision on what protective action to implement.
- 4.5.2 If the Technical Support Center (TSC) and Emergency Operations Facility (EOF) are **not** functional:
1. The Shift Technical Advisor evaluates available information and advises the Emergency Director in matters related to protective actions.
  2. The Emergency Director is responsible for making final recommendation to local and/or state authorities as appropriate.

4.5.3 If the TSC is functional and the EOF is **not** functional:

1. The Radiation Protection Advisor and/or Technical Engineer, as appropriate, evaluate available information and advise the Emergency Director in matters related to protective actions.
2. The Emergency Director is responsible for making a final recommendation to local and/or state authorities as appropriate.

4.5.4 If the EOF is functional:

1. The Radiation Protection Coordinator evaluates available information and advises the Emergency Officer in matters related to protective actions. The Nuclear Operations Advisor should assist as appropriate.
2. The Emergency Officer is responsible for making a final recommendation to local and/or state authorities as appropriate.

4.5.5 PARs are made to the State Emergency Operations Center (SEOC) if the SEOC is functional.

1. Recommendations will be discussed with the State Emergency Director before issuance, when time permits.
2. The State Emergency Director will consider recommendations and issue a Protective Action Order, when appropriate, acting with the delegated authority of the Governor.

4.5.6 PARs are made directly to Wayne and Monroe Counties when the SEOC is **not** functional.

1. Recommendations will be discussed with county officials before issuance, when time permits.
2. When deemed appropriate, recommendations will be passed on to the public by county officials.

## 5.0 IMMEDIATE ACTIONS

5.1 When a Site Area Emergency is declared:

**NOTE:** Do **not** make any PAR until a General Emergency has been declared.

5.1.1 Initiate formulation of PARs using Enclosure A and/or Section 6.0 when possible before declaration of a General Emergency.

5.2 When a General Emergency is declared:

**NOTE:** A PAR shall be made to appropriate offsite authorities concurrent with the initial notification of General Emergency declaration using a Michigan Notification Form.

5.2.1 **If** no PAR has been formulated:

1. **Then** immediately recommend the following **default** protective action to appropriate offsite authorities:
  - a. Evacuate Area 1
  - b. Evacuate to 5 miles - downwind affected area(s)
2. GO TO Section 6.0.

5.2.2 **If** a PAR has been formulated using Enclosure A and/or Section 6.0:

1. **Then** immediately recommend that protective action recommendation to appropriate offsite authorities.

5.2.3 GO TO Section 7.0.

## **6.0 PROCEDURE**

### **6.1 PAR formulation**

6.1.1 Determine appropriate PAR based on available indications using Enclosures A and B.

1. If available, review dose projections of TEDE and Adult Thyroid dose for the expected duration of the release (Use 8-hour projections unless duration is expected to be less).
2. Determine plant status relative to potential for core damage.
3. Follow PAR Flowchart (Enclosure A) to determine most appropriate PAR based on dose projections and/or plant status.
4. Review other considerations listed on Enclosure A to formulate final PAR.

**NOTE:** When time permits, all relevant conditions and additional considerations exercised should be discussed with appropriate offsite officials before making a PAR.

6.1.2 Make PAR to appropriate offsite officials in accordance with EP-290, "Emergency Notifications."

## **7.0 FOLLOW-UP ACTIONS**

7.1 Continue to evaluate dose projections and plant status to ensure effectiveness of current protective actions implemented in accordance with Section 6.0.

7.2 Keep offsite authorities informed of most current dose projections and plant status.

## **8.0 RECORDS**

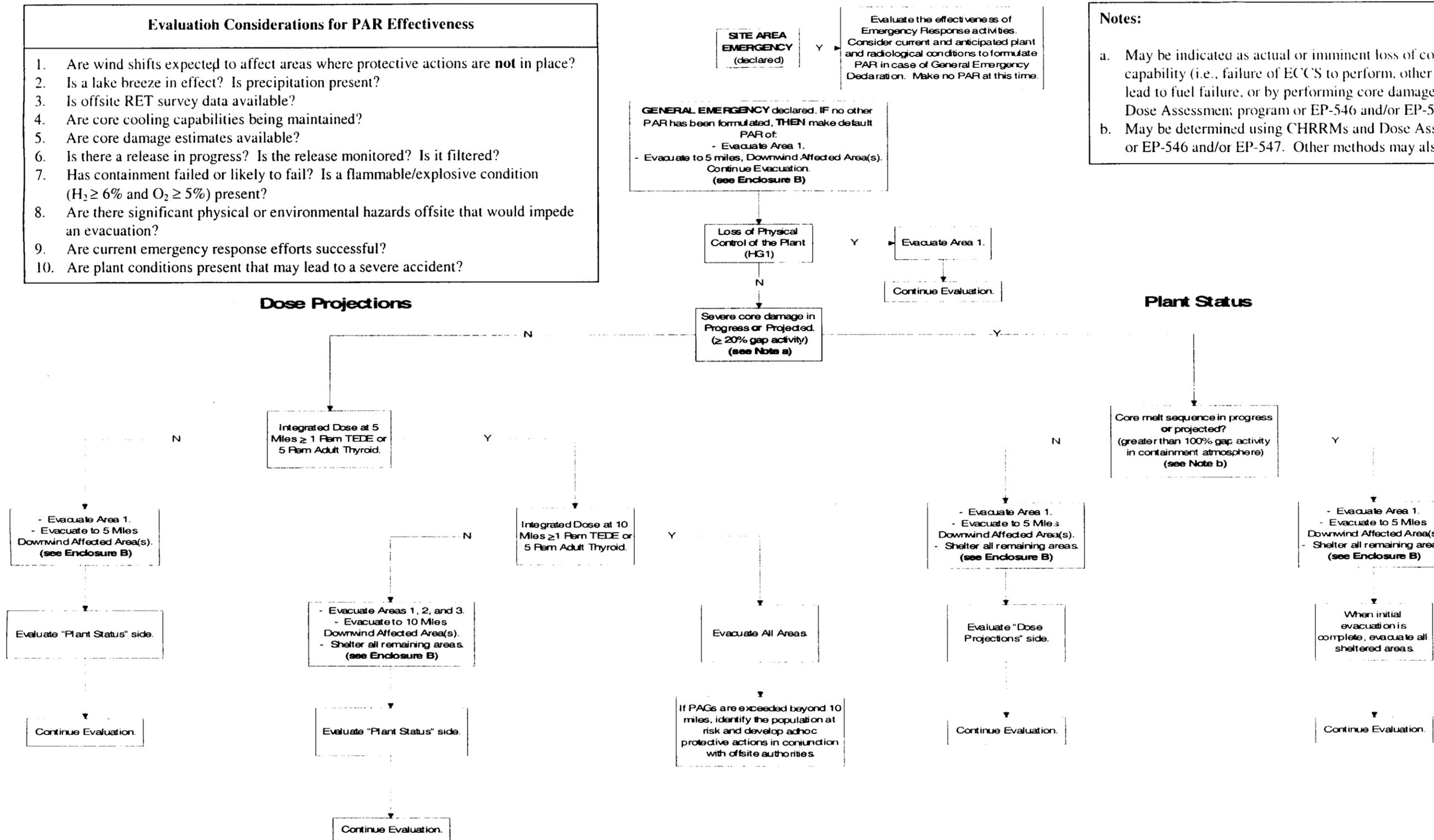
8.1 There are no required records generated through this procedure.

**END OF TEXT**

### PAR FLOWCHART

- Evaluation Considerations for PAR Effectiveness**
1. Are wind shifts expected to affect areas where protective actions are **not** in place?
  2. Is a lake breeze in effect? Is precipitation present?
  3. Is offsite RET survey data available?
  4. Are core cooling capabilities being maintained?
  5. Are core damage estimates available?
  6. Is there a release in progress? Is the release monitored? Is it filtered?
  7. Has containment failed or likely to fail? Is a flammable/explosive condition ( $H_2 \geq 6\%$  and  $O_2 \geq 5\%$ ) present?
  8. Are there significant physical or environmental hazards offsite that would impede an evacuation?
  9. Are current emergency response efforts successful?
  10. Are plant conditions present that may lead to a severe accident?

- Notes:**
- a. May be indicated as actual or imminent loss of core cooling capability (i.e., failure of ECCS to perform, other sequences likely to lead to fuel failure, or by performing core damage estimates using Dose Assessment program or EP-546 and/or EP-547).
  - b. May be determined using CHRRMs and Dose Assessment program or EP-546 and/or EP-547. Other methods may also be acceptable.



### DOWNWIND AFFECTED SECTOR TO AREA CONVERSION TABLE

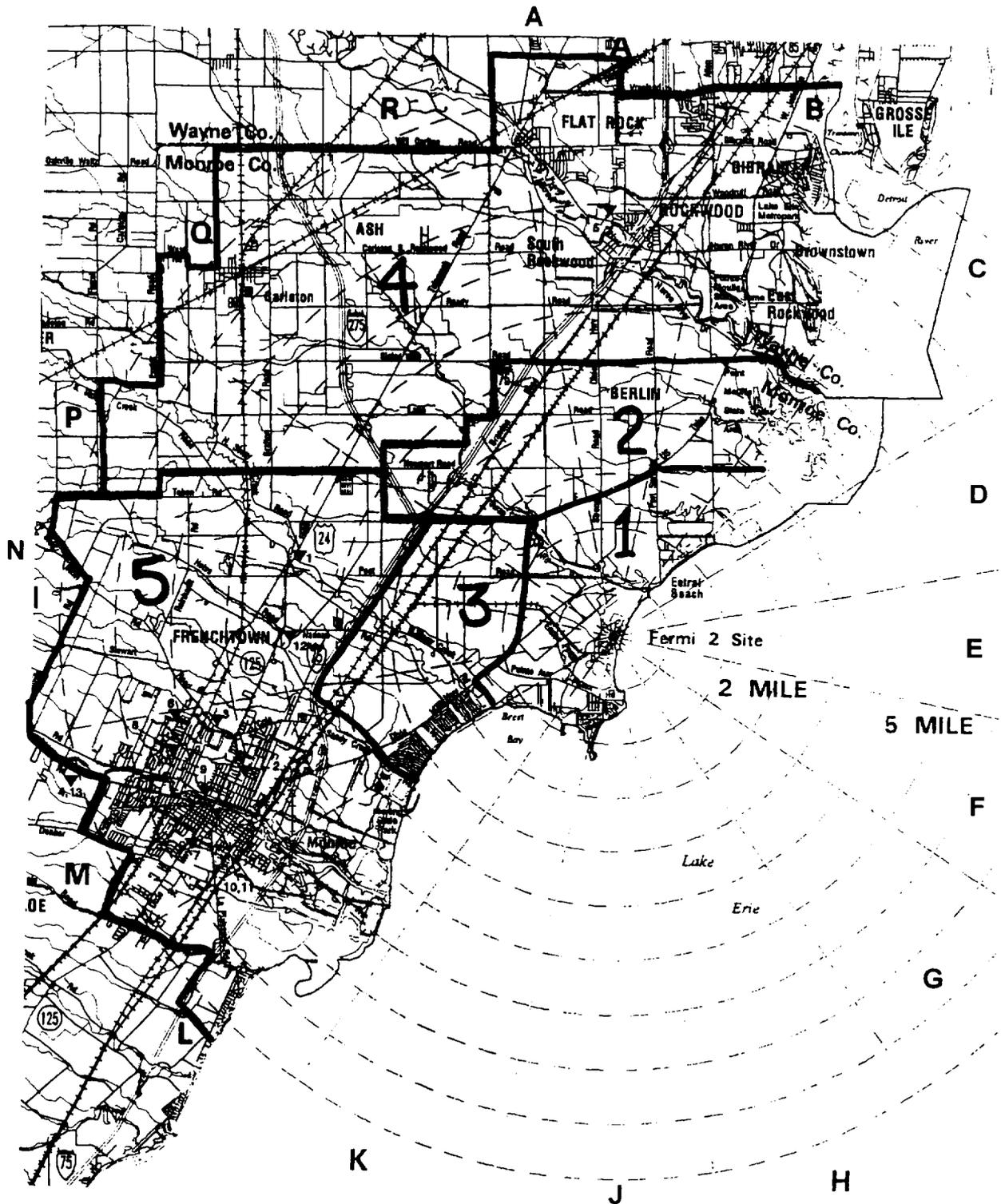
**NOTE:** The Centerline Sector can be identified on:

- the ERIS “Straight Line” plume plot display
- dose reports indicated as “Affected Sector”

<b>When evacuating to 5 miles “Downwind Affected Areas”</b>	<b>The Downwind Affected Area is:</b>
If Downwind Centerline Sector is E, F, G, H, or J	Area 1
If Downwind Centerline Sector is A, B, C, or D	Areas 1 <b>and</b> 2
If Downwind Centerline Sector is K, L, or M	Areas 1 <b>and</b> 3
If Downwind Centerline Sector is N, P, Q, or R	Areas 1, 2, <b>and</b> 3

<b>When evacuating to 10 miles “Downwind Affected Areas”</b>	<b>The Downwind Affected Area is:</b>
If Downwind Centerline Sector is R, A, B, C, or D	Areas 1, 2, 3, <b>and</b> 4
If Downwind Centerline Sector is E, F, G, H, or J	Areas 1, 2, <b>and</b> 3
If Downwind Centerline Sector is K, L, or M	Areas 1, 2, 3, <b>and</b> 5
If Downwind Centerline Sector is N, P, or Q	Areas 1, 2, 3, 4, <b>and</b> 5

### PROTECTIVE ACTION AREAS



**EF2 10-MILE EPZ EVACUATION TIME ESTIMATES SUMMARY\***

Area	Description	Summer Day Normal	Summer Day Adverse <sup>b</sup>	Summer Night Normal	Summer Night Adverse <sup>b</sup>	Winter Day Normal	Winter Day Adverse <sup>b</sup>	Winter Night Normal	Winter Night Adverse <sup>b</sup>
1	All Sectors to 2 miles	2:55	3:25	1:55	2:05	2:55	3:30	1:55	2:15
1 & 2	All Sectors to 2 miles Northwest sectors to 5 miles	2:55	3:25	1:55	2:05	2:55	3:30	1:55	2:15
1 & 3	All Sectors to 2 miles Southwest sectors to 5 miles	2:55	3:25	1:55	2:05	2:55	3:30	1:55	2:15
1, 2, & 3	All sectors to 5 miles	2:55	3:25	1:55	2:05	2:55	3:30	1:55	2:15
1, 2, 3, & 4	All Sectors to 5 miles Northwest sectors to 10 miles	3:10	3:35	2:20	2:35	3:10	3:45	2:20	2:50
1, 2, 3, & 5 <sup>a.</sup>	All Sectors to 5 miles Southwest sectors to 10 miles	3:10	3:35	2:20	2:35	3:10	3:45	2:20	2:50
1, 2, 3, 4, & 5 <sup>a.</sup>	All sectors to 10 miles	3:15	3:45	2:25	2:40	3:15	3:55	2:25	2:55

\* These are comparative times based on data drawn from the Evacuation Time Estimates Analyses for the Enrico Fermi Atomic Power Plant Unit No. 2 Plume Exposure Pathway Emergency Planning Zone, Rev. 2, May, 1994, prepared by JB/A, Inc. **Times are given in hours : minutes.**

a. When evaluating an evacuation PAR for distances greater than 5 miles, and including Area 5, consideration should be given to the special needs of Mercy Memorial Hospital and Mercy Memorial Nursing Center. These facilities are located approximately 7 miles from the site and require approximately 6 hours - 20 minutes to complete an evaluation.

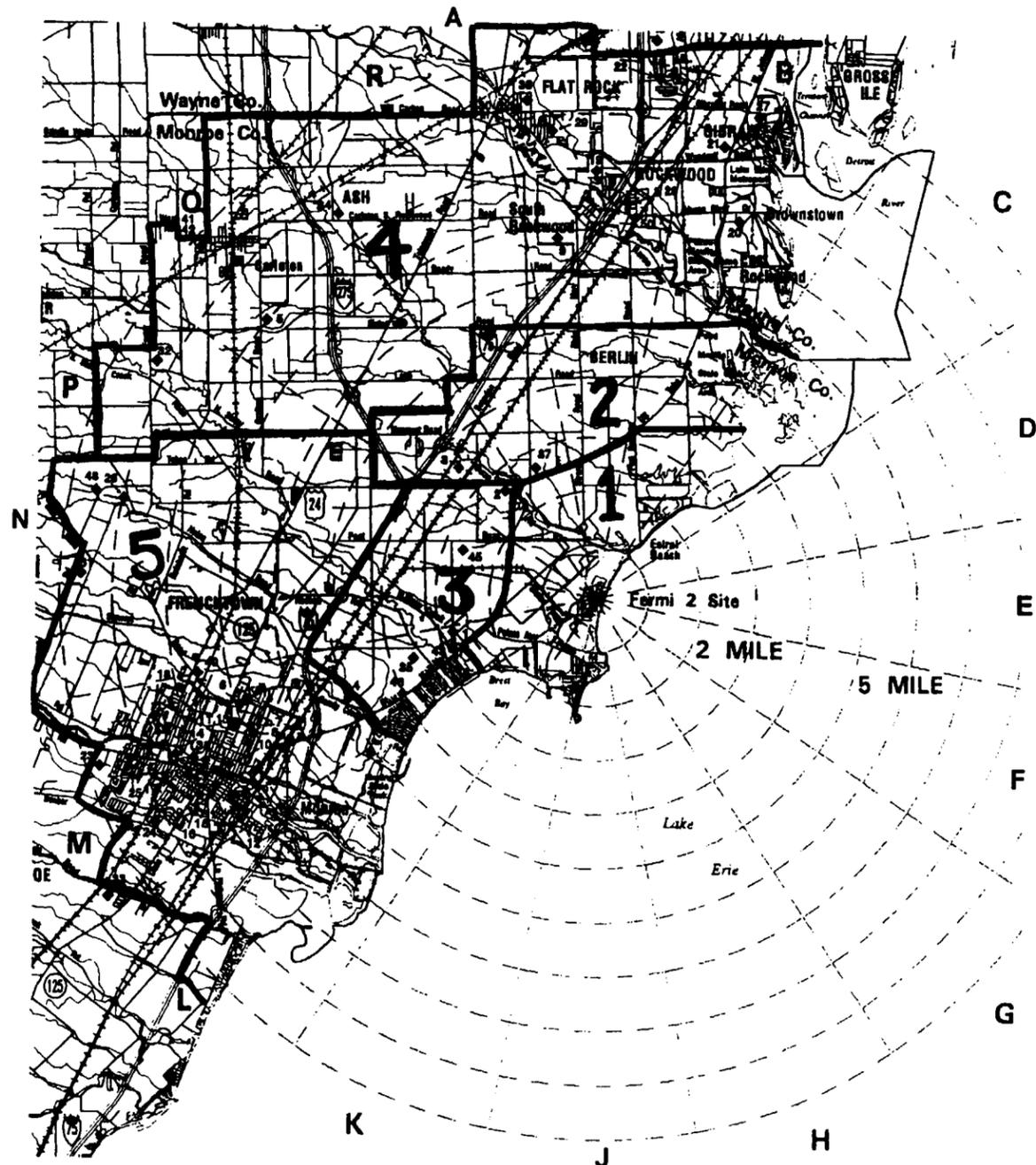
b. "Adverse" weather conditions are those which may impair visibility and/or traction, such as light snow, ice, rain, or fog.

**EF2 10-MILE EPZ POPULATION ANALYSIS\***

<b>Area</b>	<b>Description</b>	<b>Summer Day</b>	<b>Summer Night</b>	<b>Winter Day</b>	<b>Winter Night</b>
1	All Sectors to 2 miles	4419	3598	4398	3598
1 & 2	All Sectors to 2 miles Northwest sectors to 5 miles	7053	5571	7656	5571
1 & 3	All Sectors to 2 miles Southwest sectors to 5 miles	15466	10413	13097	9633
1, 2, & 3	All sectors to 5 miles	18102	12388	16354	11608
1, 2, 3, & 4	All sectors to 5 miles Northwest sectors to 10 miles	53888	45029	57547	44174
1, 2, 3, & 5	All sectors to 5 miles Southwest sectors to 10 miles	65861	55516	71296	53334
1, 2, 3, 4, & 5	All sectors to 10 miles	109937	96038	121367	93581

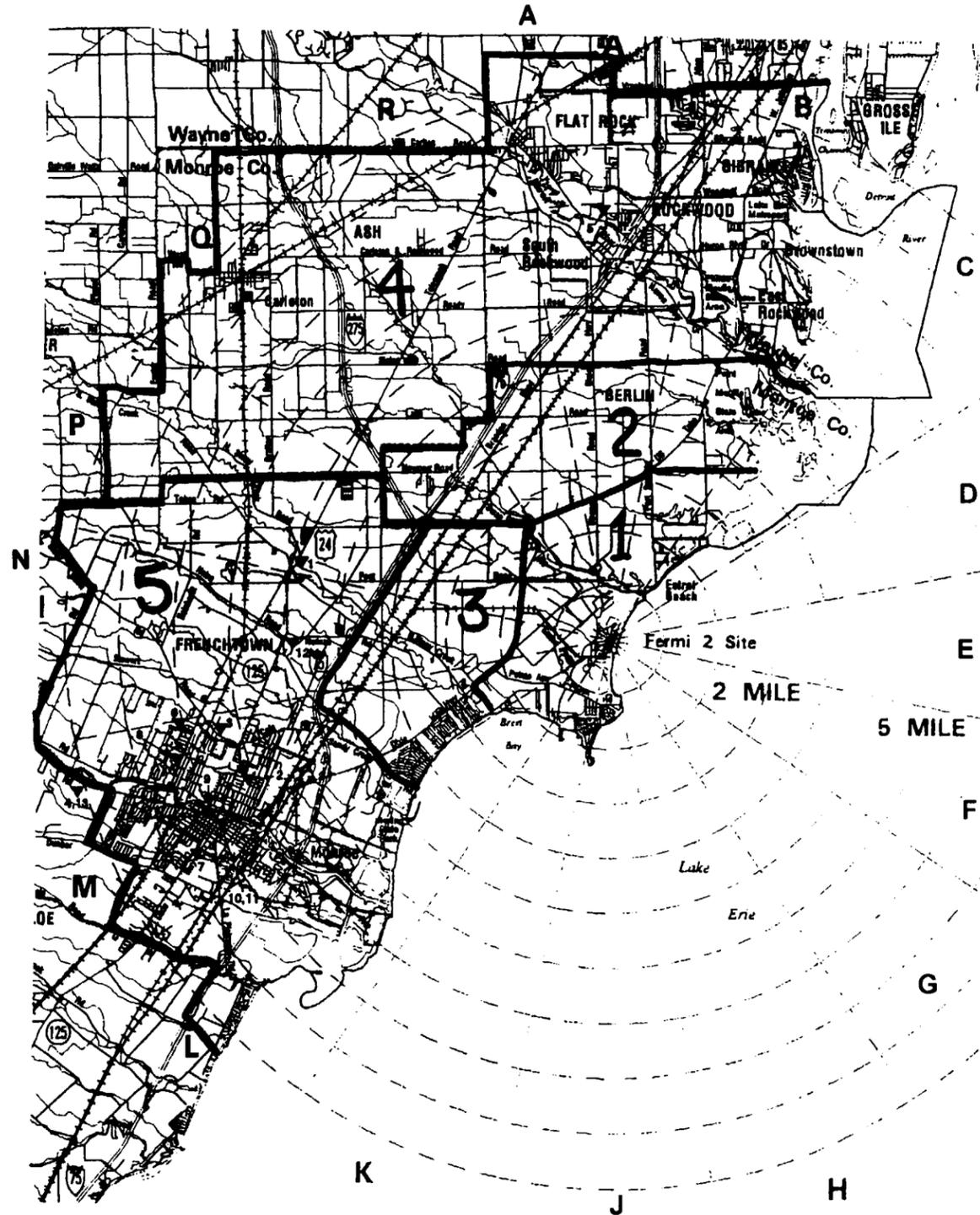
\* EPZ population data extracted from the Evacuation Time Estimates Analyses for the Enrico Fermi Atomic Power Plant Unit No. 2 Plume Exposure Pathway Emergency Planning Zone, Rev. 2, May, 1994, prepared by JB/A, Inc. Additional population data provided by local planning agencies using U.S. Census data.

SCHOOLS WITHIN THE 10-MILE EPZ



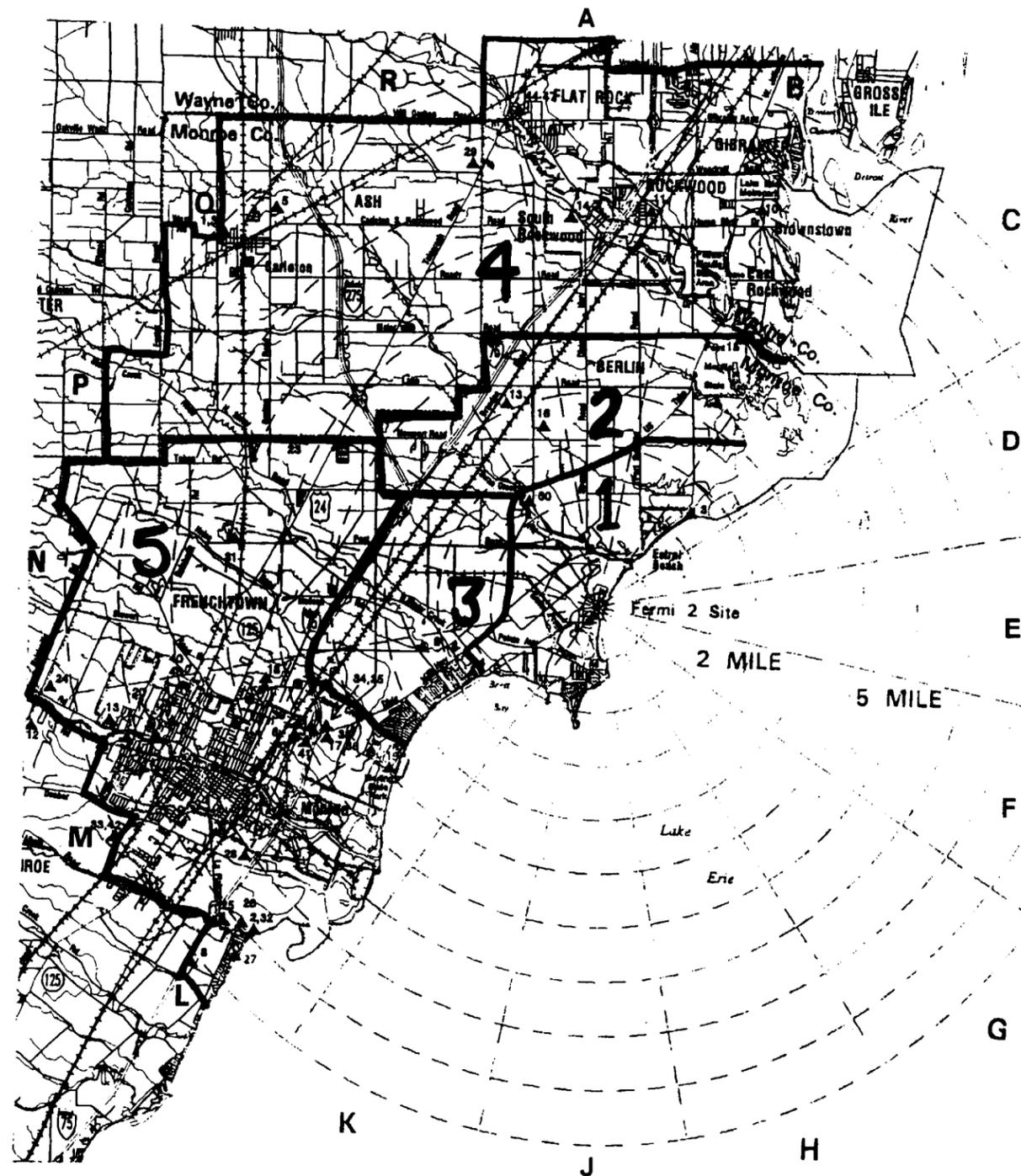
Facility No.	Township	Name of School	Compass Direction	Distance (miles)	Period(s) of Operation	Transportation Resources	Mobilization Time	Facility Population		
								Student	Staff	Total
<b>Monroe County</b>										
1	Frenchtown	Jefferson High	WSW	2.8	Winter Day	District buses	60-90 minutes	758	58	816
1	Frenchtown	Jefferson Jr. High	WSW	2.8	Winter Day	District buses	60-90 minutes	634	44	678
2	Berlin	St. Charles	NW	2.7	Winter Day	District buses	60-90 minutes	185	10	1195
3	Berlin	Neidermeier Elementary	NW	3.6	Winter Day	District buses	60-90 minutes	244	11	255
4	Frenchtown	Hurd Road Elementary	WSW	5	Winter Day	District buses	60-90 minutes	432	24	456
5	Ash	Airport Senior High	NW	8	Winter Day	District buses	15 minutes	731	38	769
5	Ash	Wagar Jr. High	NW	8	Winter Day	District buses	15 minutes	606	33	639
5	Ash	Sterling Elementary	NW	8	Winter Day	District buses	60-90 minutes	325	19	344
6	Monroe	Zion Lutheran Elementary	WSW	6.9	Winter Day	District buses	60-90 minutes	98	5	103
7	Monroe	Canrick Jr. High	WSW	6.8	Winter Day	District buses	60-90 minutes	568	32	600
8	Monroe	Hollywood Elementary	WSW	6.8	Winter Day	District buses	60-90 minutes	275	23	298
9	S. Rockwood	Ritter Elementary	N	6.8	Winter Day	District buses	60-90 minutes	385	15	400
10	Monroe	Christiarcy Elementary	WSW	7.5	Winter Day	District buses	60-90 minutes	342	22	364
11	Monroe	St. Mary's Elementary	WSW	7.8	Winter Day	District buses	60-90 minutes	280	14	294
12	Monroe	Lincoln Elementary	WSW	7.7	Winter Day	District buses	60-90 minutes	428	33	461
13	Monroe	St. Mary's Catholic Central High	WSW	7.8	Winter Day	District buses	60-90 minutes	411	29	440
14	Monroe	Riverside Elementary	WSW	8.3	Winter Day	District buses	60-90 minutes	289	18	307
15	Monroe	Trinity Lutheran School	WSW	7.9	Winter Day	District buses	60-90 minutes	299	11	310
16	Monroe	Monroe Jr. High	WSW	8.1	Winter Day	District buses	60-90 minutes	1126	63	1189
16	Monroe	St. John's Catholic School	WSW	8.1	Winter Day	District buses	60-90 minutes	210	13	223
17	Monroe	St. Michael's Elementary	WSW	8.2	Winter Day	District buses	60-90 minutes	168	12	180
18	Monroe	Manor Elementary	WSW	8.5	Winter Day	District buses	60-90 minutes	434	23	457
23	Monroe	Monroe Sr. High	WSW	9.8	Winter Day	District buses	60-90 minutes	1573	100	1673
24	Monroe	S. Monroe Townsite Elementary	WSW	9.2	Winter Day	District buses	60-90 minutes	238	16	254
25	Monroe	Waterloo Elementary	WSW	9.1	Winter Day	District buses	60-90 minutes	378	22	400
26	Frenchtown	Holy Ghost Lutheran Elementary	WNW	9	Winter Day	District buses	60-90 minutes	95	5	100
31	Raisinville	Raisinville Elementary	W	9.7	Winter Day	District buses	60-90 minutes	456	29	485
32	Ash	St. Patrick's Elementary	WNW	9.3	Winter Day	District buses	60-90 minutes	196	13	209
33	Monroe Twns	Custer Elementary	WSW	10.5	Winter Day	District buses	60-90 minutes	1221	50	1271
34	Ash	Eyler Elementary	NW	8.6	Winter Day	District buses	60-90 minutes	372	16	388
35	Frenchtown	Sodi Elementary	WSW	3.6	Winter Day	District buses	60-90 minutes	309	17	326
37	Berlin	North Elementary	NW	2.7	Winter Day	District buses	60-90 minutes	415	23	438
-	Monroe Twns	Monroe County Community College	W	11	Year Round	Outside EPZ	na	na	na	na
38	Monroe	Meadow Montessori	WSW	8	Winter Day	Private vehicles or buses	60 minutes	160	20	180
39	Monroe	Monroe Cooperative Pre-School	WSW	7.5	Winter Day	Private vehicles or buses	60 minutes	20	3	23
40	Frenchtown	Pathway Child Care	WSW	7.5	Winter Day	Private vehicles or buses	60 minutes	20	3	23
41	Carleton	Headstart Program	NW	9.5	School Year	Private vehicles or buses	30 minutes	34	5	39
41	Monroe	Headstart Program - Lincoln School	WSW	7.7	School Year	Private vehicles or buses	30 minutes	68	6	74
41	Monroe	Headstart Program - Greenwood	WSW	6.5	School Year	Private vehicles or buses	30 minutes	34	4	38
41	Monroe	Headstart Program - River Raisin	WSW	9.5	School Year	Private vehicles or buses	30 minutes	34	4	38
42	Ash	Carleton Country Day	NW	9.8	Winter Day	Private vehicles or buses	60 minutes	16	2	18
43	Frenchtown	Faith Lutheran Church Childcare	WSW	3	Winter Day	Private vehicles or buses	60 minutes	20	3	23
44	Frenchtown	Kiddie Korner Christian Day Care & Preschool Center	WSW	8.5	Winter Day	Private vehicles or buses	60 minutes	20	3	23
47	Monroe	Small World Christian Child Care Center	WSW	8	Winter Day	Private vehicles or buses	60 minutes	20	3	23
48	Raisinville	Special Little People Child Care	WNW	9.5	Winter Day	Private vehicles or buses	60 minutes	20	3	23
<b>Wayne County</b>										
19	Rockwood	Chapman Elementary	N	7.9	Winter Day	6 buses	60-120 minutes	377	23	400
20	Brownstown	Barrow Elementary	NNE	7.5	Winter Day	4 buses	60-120 minutes	265	16	281
21	Gibraltar	Carlson High	NNE	8.7	Winter Day	14 buses	60-120 minutes	1024	61	1085
21	Gibraltar	Shunata Jr. High	NNE	8.7	Winter Day	10 buses	60-120 minutes	652	39	691
22	Brownstown	Hunter Elementary	N	9.7	Winter Day	9 buses	60-120 minutes	619	37	656
27	Gibraltar	Parsons Elementary	NNE	9.5	Winter Day	6 buses	60-120 minutes	404	24	428
28	Rockwood	St. Mary's	N	7.4	Winter Day	5 buses	60-120 minutes	290	17	307
28	Rockwood	Pooh Corner's Day Care	N	7.4	Winter Day	(see above)	60-120 minutes	20	2	22
29	Flat Rock	Simpson Jr. High	N	8.5	Winter Day	5 buses	60-120 minutes	370	22	392
29	Flat Rock	Barnes Elementary	N	8.5	Winter Day	4 buses	60-120 minutes	300	18	318
30	Flat Rock	Flat Rock Sr. High	N	9.2	Winter Day	7 buses	60-120 minutes	520	31	551
36	Flat Rock	Evergreen (Bobcan) Elementary	N	9.2	Winter Day	7 buses	60-120 minutes	500	30	530
-	Brownstown	Weiss Elementary	N	9.8	-CLOSED-	na	na	na	na	na
49	Brownstown	1 <sup>st</sup> Step Children's Center - Outsize EPZ	N	>10	Winter Day	2 buses	60-120 minutes	120	7	127
50	Rockwood	Allison's Wonderland Day Care	N	7	Winter Day	1 bus	60-120 minutes	60	4	64

SPECIAL FACILITIES WITHIN THE 10-MILE EPZ



Facility No.	Township	Facility Name	Compass Direction	Distance (miles)	Period(s) of Operation	Mobilization Time	Transportation Resources	Facility Population		
								Resident	Staff/Visitors Day	Night
<b>Monroe County</b>										
1	Frenchtown	Frenchtown Nursing Care Center	WNW	5.8	Year round	60 minutes	Available Buses	229	60	40
2	Monroe	Mercy Memorial Hospital	WSW	7.1	Year round	6 Hours	Available Resources	185	400	200
3	Monroe	Mercy Memorial Nursing Center	WSW	7.2	Year round	6 Hours	Available Resources	70	50	30
4	Ash	Fairview Apartments	WSW	10	Year round	60 minutes	Available Buses	36	9	1
6	Monroe	Beach Nursing Home	WSW	8	Year round	60 minutes	Available Buses	189	35	20
7	Monroe	The Lutheran Home	SW	8	Year round	60 minutes	Available Buses	122	70	30
8	Monroe	Greenbrook Manor, Inc.	WSW	8.2	Year round	60 minutes	Available Buses	103	12	4
9	Monroe	IHM Motherhouse	WSW	7	Year round	60 minutes	Available Buses	285	100	40
10	Monroe	Monroe County Jail	WSW	7.9	Year round	60+ minutes	Available Buses	124	45	30
11	Monroe	Monroe Corrections Center	WSW	7.9	Year round	60 minutes	Available Buses	22	3	3
12	Frenchtown	Boysville of Michigan	W	5.8	Year round	60 minutes	Available Buses	52	35	15
13	Monroe	Monroe County Youth Center	WSW	10	Year round	60 minutes	Available Buses	45	15	10
<b>Wayne County</b>										
5	Rockwood	Rockwood Children's Home	N	7.5	Year round	60 minutes	Available Buses	19	4	2

RECREATION AREAS, MOTELS, AND MISCELLANEOUS FACILITIES WITHIN THE 10-MILE EPZ



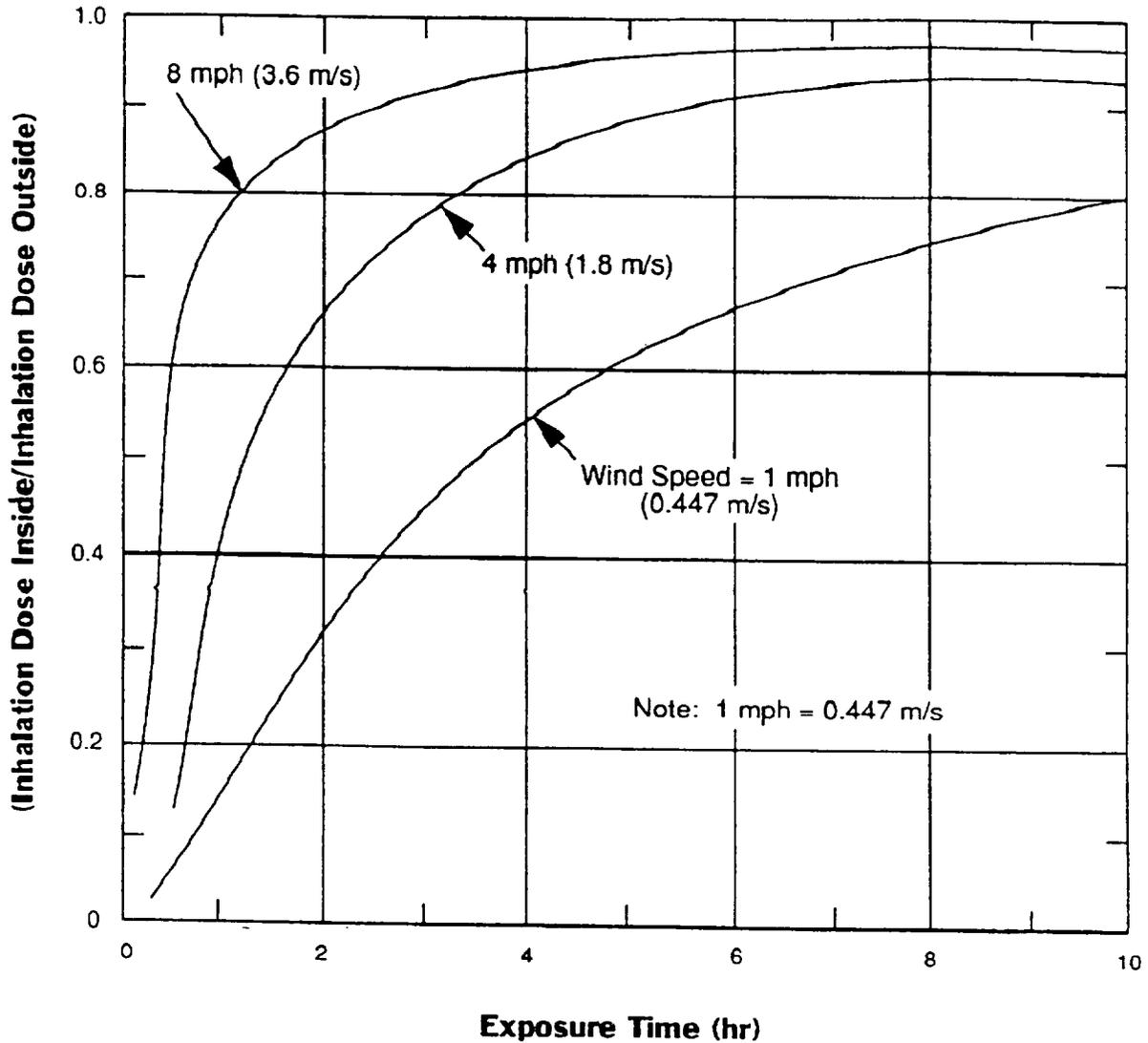
Facility No.	Township	Facility Name	Compass Direction	Distance (miles)	Period(s) of Operation	Mobilization Time	Transient Population			Employee	
							Day	Night	Peak	Day	Night
<b>Monroe County</b>											
1	Ash	Ash-Carleton Park	NW	9.8	Summer	5-45 minutes	100	100	1000	10	5
2	Monroe Twp.	Bolles Harbor	SW	9	Summer	5-45 minutes	30	0	na	2	0
4	Frenchtown	Brest Bay Marina	SW	2.5	Summer	5-45 minutes	40	0	na	2	0
6	Frenchtown	Heck Park	WSW	6.1	Summer	5-45 minutes	20	0	na	1	0
7	Monroe	Hellenberg Park	WSW	7.1	Summer	5-45 minutes	40	0	na	1	0
8	Monroe Twp.	I-75 Rest Area	SW	10	Year Round	5-45 minutes	30	0	na	0	0
9	Frenchtown	Kiwanis Park	WSW	3.5	Summer	5-45 minutes	20	0	na	0	0
12	Monroe Twp.	Monroe County Fairgrounds	WSW	11	Outside EPZ	na	na	na	na	na	na
13	Monroe	Munson Park	WSW	9.5	Summer	5-45 minutes	20	0	na	0	0
15	Berlin	Point Mouille State Game Area	NE	5	Summer	5-45 minutes	350	0	2000	10	0
					Winter	5-45 minutes	200	0	2000	5	0
19	Frenchtown	Sterling State Park	SW	5	Summer	5-45 minutes	5000	850	8500	20	0
					Winter	5-45 minutes	425	70	70	10	0
20	Frenchtown	Veterans Park	WSW	8.6	Summer	5-45 minutes	20	0	0	0	0
22	Frenchtown	Waterloo Park	WSW	9.1	Summer	5-45 minutes	30	0	0	0	0
5	Carleton	Carleton Glen Golf Course	NW	9.5	Summer	5-45 minutes	100	50	na	20	10
16	Berlin	Lilac Brothers Golf Course	NNW	3.5	Summer	5-45 minutes	80	0	na	10	0
17	Monroe	River Raisin Golf Club	WSW	5.5	Summer	5-45 minutes	200	0	na	15	0
18	Monroe	Monroe Golf & Country Club	WSW	6.5	Summer	5-45 minutes	100	0	na	10	0
3	Berlin	Island Marina	NE	2.5	Summer	5-45 minutes	40	0	na	2	0
26	Monroe	Trout's Yacht Basin	SW	9	Summer	5-45 minutes	40	0	na	2	0
14	S. Rockwood	Wesburn Golf Club	N	7.2	Summer	5-45 minutes	80	0	na	10	0
27	Monroe	Harbor Marine	SW	9.5	Summer	5-45 minutes	40	0	na	2	0
28	Monroe	Riverfront Marina	SW	8	Summer	5-45 minutes	40	0	na	2	0
23	Frenchtown	Nike Park	WNW	6.4	Summer	5-45 minutes	20	0	na	0	0
24	Monroe Twp.	Navarre-Anderson Trading Post	W	10	Year Round	5-45 minutes	15	0	na	1	0
29	Ash	Flat Rock Speedway	NNW	8.5	Summer	5-45 minutes	na	na	na	0	0
30	Berlin	Swan Yacht Basin	NNW	2.4	Summer	5-45 minutes	20	0	na	1	0
31	Frenchtown	Camp Lord Willing	W	7	Summer	5-45 minutes	200	200	0	3	0
33	Monroe Twp.	Sunny South Villa	WSW	10	Summer	5-45 minutes	200	200	0	3	0
35	Frenchtown	Hometown Inn	WSW	5.5	Year Round	5-45 minutes	30	30	na	2	1
36	Frenchtown	Cross Country Inn	WSW	5.8	Year Round	5-45 minutes	80	80	na	6	2
37	Carleton	Glee Motel	NW	9	Year Round	5-45 minutes	20	20	na	1	1
38	Monroe	Days Inn	WSW	6	Year Round	5-45 minutes	120	120	na	12	3
39	Frenchtown	Holiday Inn of Monroe	WSW	5.9	Year Round	5-45 minutes	200	200	na	16	4
40	Monroe	Hollywood Motel	WSW	8.5	Year Round	5-45 minutes	40	40	na	2	1
41	Monroe	Knights Inn	WSW	6	Year Round	5-45 minutes	40	40	na	2	1
42	Monroe	Monroe Motel	WSW	10	Year Round	5-45 minutes	40	40	na	2	1
43	Monroe	Sunset Motel	WSW	8	Year Round	5-45 minutes	20	20	na	2	1
<b>Wayne County</b>											
10	Brownstown	Lake Erie Metropark	NNE	8	Summer	5-45 minutes	2000	0	6000	20	0
					Winter	5-45 minutes	20	0	0	5	0
11	Rockwood	Mercure Park	N	7.5	Summer	5-45 minutes	20	0	na	0	0
44	Flat Rock	Smith Flat Rock Hotel	N	9	Year Round	5-45 minutes	30	30	na	3	1
45	Flat Rock	Hillcrest Motor Inn	N	9	Year Round	5-45 minutes	30	30	na	3	1
46	Flat Rock	Maple Grove Motel	N	9	Year Round	5-45 minutes	30	30	na	3	1
47	Flat Rock	Seaway Motel	N	9	Year Round	5-45 minutes	30	30	na	3	1

**REPRESENTATIVE SHIELDING FACTORS FROM GAMMA CLOUD SOURCE(a)**

<b>Structure or Location</b>	<b>Representative Shielding Factor (b)</b>	<b>Representative Range</b>
Outside	1.0	--
Vehicles	1.0	--
Wood frame house <sup>(c)</sup> (no basement)	0.9	0.9
Basement of wood house	0.6	0.1 to 0.7(d)
Masonry house (no basement)	0.6	0.4 to 0.7(d)
Basement of masonry house	0.4	0.1 to 0.5(d)
Large office or industrial building	0.2	0.1 to 0.3(d,e)

- (a) Taken from SAND 77-1725 (Unlimited Release).
- (b) The ratio of the dose received inside the structure to the dose that would be received outside the structure.
- (c) A wood-frame house with brick or stone veneer is approximately equivalent to a masonry house for shielding purposes.
- (d) This range is mainly due to different wall materials and different geometries.
- (e) The shielding factor depends on where the personnel are located within the building (e.g., the basement or an inside room).

**INHALATION SHIELDING FACTORS FOR A WOOD HOUSE,  
SNUG DOORS, CLOSED WINDOWS (THYROID)**



The above curve assumes the house remains closed up for the duration. Actually, the dose inside the house can be further reduced by opening the doors and windows after the cloud has passed and purging the house with fresh air.

"Reactor Safety Study," Appendix VI, Wash-1400, October 1975

**END**