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Effective Date: _____
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<b>TECHNICAL REVIEW</b>	
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## **1.0 PURPOSE**

- (1) This section describes the protective actions to be taken for emergency workers and the public based upon the event classification and resulting assessment of plant status and radiological conditions. Guidelines for the choice of protective actions to be implemented are presented, as well as the methods to be used to notify the population at risk of emergency conditions.
- (2) The Nuclear Management Company is assigned operational responsibility for the DAEC. However, IES maintains corporate accountability for activities at the DAEC and will participate when necessary in activities at the DAEC. The reference "IES/NMC" will be used throughout this procedure to signify this relationship. Further details regarding this relationship can be found in the "Nuclear Power Plant Operating Services Agreement" (NPPOSA) between IES and the NMC.

## **2.0 REQUIREMENTS**

### **2.1 NOTIFICATION OF ONSITE PERSONNEL**

- (1) Personnel on site within the Protected Area boundary, and personnel on site outside the Protected Area located in the Training Center, the Badging Center and the Plant Support Center will be notified of an emergency condition by a distinctive tone-alarm over the public address system, followed by an announcement over the plant page system.
- (2) Security force personnel will be dispatched, as appropriate, to warn any individuals who may be on IES/NMC property in the vicinity of the plant.

### **2.2 SITE EVACUATION**

- (1) Non-essential personnel will be evacuated from the DAEC to an offsite reassembly area during a SITE AREA or GENERAL EMERGENCY. Evacuation from the site will be by the routes shown in Figure J-1, using personal transportation. The south route will normally be used, unless radiological conditions dictate use of the north route. Security personnel will provide traffic control on site. The detailed provisions for evacuation, relocation, radiological monitoring and decontamination of site personnel is provided in the EIPs.

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- (2) Evacuated personnel will proceed to the Palo Community Center, located in Palo, Iowa, and reassemble for an accountability check and personnel radiological monitoring, if not already accomplished at the DAEC. If the Palo Community Center is not habitable due to plume effects, the alternate reassembly area will be the Offsite Radiological and Analytical Laboratory/Offsite Decontamination Facility (ORAL/ODEF), located at 1017 12th Avenue SW in Cedar Rapids.

### **2.3 CONTAMINATION CONTROL OF SITE EVACUEES**

- (1) Security force personnel will ensure that any individuals who may be on company property but outside of the fenced area are advised of the event and escorted off the property. Access will be permitted only to those individuals who are required at the site. If radiological releases have occurred or are in progress, individuals escorted offsite will be surveyed for any radiological contamination prior to being released from company property. In the event that evidence of contamination is found or suspected, the individual will be decontaminated onsite or taken to the Offsite Decontamination Facility (ODEF) or Mercy Medical Center or University of Iowa Hospitals and Clinics for subsequent decontamination and release.
- (2) Where possible, plant employees will be decontaminated in onsite facilities. A limited capability exists to conduct decontamination at the Palo Community Center through the use of waterless hand cleanser, etc. If decontamination at the DAEC or Palo Community Center is not possible, personnel determined to be contaminated will be routed to the Offsite Decontamination Facility (ODEF) where personnel decontamination will be conducted.

### **2.4 ACCOUNTABILITY OF ONSITE PERSONNEL**

- (1) For all events that result in activation of the Emergency Response Organization except those classified as NOTIFICATION OF UNUSUAL EVENT, personnel onsite will proceed to their pre-assigned assembly point. In those situations where the number of personnel at the site is significantly in excess of the normal plant staff, information will be disseminated to those additional personnel identifying alternate assembly and accountability locations.
- (2) An accountability check for all personnel who are within the Protected Area will be conducted. The methods used will enable accounting for all individuals

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onsite at the time of the emergency, ascertain the names of missing individuals within approximately thirty minutes of the start of an emergency, and continuously account for all onsite individuals thereafter.

## **2.5 RADIOLOGICAL PROTECTION OF ONSITE PERSONNEL**

- (1) Protective measures associated with the use of protective clothing and the use of respiratory protection equipment shall be taken in accordance with existing radiation protection requirements.
- (2) Respiratory protection devices may be required in any situation arising from plant operations where airborne radiological contamination exists. In such cases, the air will be monitored and the need for and type of protective devices will be specified according to the concentration and type of airborne contaminants present. This decision will be made to optimize the total effective dose equivalent. Periodic air samples are routinely taken in selected areas of operations or work activity during normal operations. Air samples will be taken in the OSC, Control Room and TSC, as appropriate, to ensure continued habitability of those areas and to alert the Emergency Coordinator to any changes in the airborne status.
- (3) Protective clothing and respiratory protection equipment are maintained at several locations within the plant. Personnel in the OSC will be dispatched to distribute additional equipment as necessary to the Control Room, TSC, or other plant areas where personnel may be stationed. In the event that sufficient equipment is not available, personnel will be relocated to plant areas where contamination hazards do not exist.
- (4) Where the potential exists for significant exposure to radioiodine, an initial dosage of potassium iodide will be administered. A sufficient quantity of potassium iodide will be kept onsite for this purpose. The use of potassium iodide will be in accordance with EIPs.

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## 2.6 OFFSITE PROTECTIVE ACTION RECOMMENDATIONS

- (1) Upon identification and classification of the event, notifications will be made as delineated in Section E. Decisions with respect to sheltering or evacuation of the population at risk, as well as the means of notification, are as prescribed in the Linn County and Benton County Radiological Emergency Response Plans and Emergency Plan Implementing Procedures. Recommendations for protective actions for the public are based upon ensuring that personnel exposures are maintained at or below those identified in the EPA Protective Action Guides, as described in Table K-1.
  
- (2) In addition to specific identification and classification of an event, other plant conditions may exist that make releases of large amounts of radioactivity in a short time possible. In this case, precautionary protective actions will be recommended and communicated to the appropriate offsite agencies. The plant conditions which could combine to create the potential for releases include the following:
  - Core melt event sequences where releases from containment are not yet taking place, and large amounts of fission products are not yet in the containment atmosphere.
  
  - Core melt event sequences where large amounts of fission products are in the containment atmosphere.
  
  - Core melt event sequences where releases from containment are not yet taking place, but containment failure is likely with large amounts of fission products in addition to noble gases in the containment atmosphere.
  
- (3) Communication systems are available to ensure that the population at risk is notified of protective measures to be taken. These are discussed in Section E.

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## 2.7 PLUME EPZ PROTECTIVE ACTIONS

- (1) Offsite protective actions, including sheltering, evacuation and contamination control, will be taken in accordance with the action criteria established in the EPA Protective Action Guides (PAGs) described in Table K-1. The responsibilities associated with implementation of such protective actions are specified in the Linn County and Benton County Radiological Emergency Response Plans. In addition to Table K-1, the following factors will determine the basis for choosing between alternate recommended protective actions:
- Potential for release based on plant conditions
  - Type of release, (i.e., constant or puff, elevated or ground), filtered or unfiltered
  - Length of release
  - Time required for the plume to reach the population at risk
  - Prevailing meteorological conditions
  - Population distribution (Table 2.1, Table 5.2)
  - Special population distributions, (i.e., schools, hospitals)
  - Evacuation time estimates (Appendix 3)
  - Radiological monitoring and environmental sampling results
  - Residential unit protection factors (Table J-2)
  - Alternate local sheltering facilities
- (2) The Linn County and Benton County Radiological Emergency Response Plans and the State of Iowa Radiological Emergency Response Plan include maps identifying evacuation routes, evacuation subareas, and relocation centers in host counties.

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## 2.8 PLUME EPZ EVACUATION TIME ESTIMATES

- (1) The DAEC Evacuation Time Estimate for Linn and Benton Counties identifies population distributions, evacuation time estimates, and evacuation routes and is included as Appendix 3. EPZ evacuation routes are as delineated in the Linn County and Benton County Radiological Emergency Response Plans and the State of Iowa Radiological Emergency Response Plan. The permanent population within the DAEC EPZ subareas are reflected in Table 2-1 (Page 13) in Appendix 3. The permanent population within the plume exposure EPZ of DAEC is reflected in Table 5.2 (Page 79) in Appendix 3. The county plans contain the EPZ evacuation plans.

## 2.9 INGESTION PATHWAY PROTECTIVE ACTIONS

- (1) Protective action recommendations provided to offsite authorities with regards to the ingestion exposure pathway (50 mile EPZ) will be based upon a number of factors including:
- Type of release
  - Release source
  - Time frame (or accident phase)
  - The results of environmental monitoring and sampling efforts undertaken
- (2) Initial recommendations provided will typically be conservative and based primarily upon projected impacts as opposed to analytical results. Table J-1 provides a summary of the recommended protective actions that may be appropriate for an event at the DAEC. As is evident, these recommendations generally entail restriction of food stuffs and surface drinking water and placing milk animals on stored (non-contaminated) feed. The implementation of protective response options for the ingestion exposure pathway is the responsibility of the State of Iowa and is described in the Iowa Radiological Emergency Response Plan.

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### **3.0 ATTACHMENTS**

- (1) TABLE J-1, "SUMMARY OF POSSIBLE OFF-SITE PROTECTIVE ACTIONS TO BE RECOMMENDED OR IMPLEMENTED DURING AN EMERGENCY"
- (2) TABLE J-2, "REPRESENTATIVE SHIELDING FACTORS FROM GAMMA CLOUD SOURCE"
- (3) FIGURE J-1, "SITE EVACUATION ROUTES"
- (4) FIGURE J-2, "DAEC EPZ EVACUATION ROUTES"

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TABLE J-1  
SUMMARY OF POSSIBLE OFFSITE PROTECTIVE ACTIONS  
TO BE RECOMMENDED OR IMPLEMENTED DURING AN EMERGENCY†

ACCIDENT PHASE	EXPOSURE PATHWAY	EXAMPLES OF ACTION TO BE RECOMMENDED
<sup>1</sup> EARLY PHASE (0.5 TO 30 hours)*	Inhalation of gases, radioiodines, or particulates	Evacuation, shelter, access control, respiratory protection, prophylaxis (thyroid protection)
	Direct whole body exposure	Evacuation, shelter, access control
<sup>2</sup> INTERMEDIATE PHASE (30 hours to 30 days)*	Ingestion of milk	Take cows off pasture, prevent cows from drinking surface water, discard contaminated milk or divert it to stored products such as cheese
	Ingestion of fruits and vegetables	Wash all produce, or impound produce, delay harvest until approved, substitute uncontaminated produce
	Ingestion of water	Cut off contaminated supplies, substitute from other sources, filter, demineralize
	Whole body exposure and inhalation	Relocation, decontamination, access control
<sup>3</sup> LATE PHASE (over 30 days)*	Ingestion of food and water contaminated from the soil either by resuspension or uptake through roots	Decontamination, condemnation, or destruction of food; deep plowing condemnation, or alternate use of land
	Whole body exposure from deposition of material or inhalation of resuspended material	Relocation, access control, decontamination, fixing of contamination, deep plowing

<sup>1</sup> Emergency Phase - Time period of major release and subsequent plume exposure.

<sup>2</sup> Intermediate Phase - Time period of moderate continuous releases with plume exposure and contamination of the environment

<sup>3</sup> Long Term Phase - Recovery period.

\* "Typical" Post-Accident time periods.

† Reference: USEPA "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents," (EPA 400-R-92-001) dated October 1991 with 2nd printing May 1992.

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TABLE J-2  
REPRESENTATIVE SHIELDING FACTORS FROM GAMMA CLOUD SOURCE\*

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

- (a) The ratio of the interior dose to the exterior dose
- (b) A wood frame house with brick or stone veneer is approximately equivalent to a masonry house for shielding purposes.
- (c) This range is due mainly to different wall materials and different geometrics.
- (d) The reduction factor depends on where the persons are located within the building (e.g., the basement or an inside room).

NOTE:

- (1) Consideration is limited to gamma radiation since beta and alpha particles cannot penetrate the walls of structures.

\* Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (EPA 400-R-92-001) dated October 1991 with 2nd printing May 1992.

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FIGURE J-1  
SITE EVACUATION ROUTES



