REGION III

70-36

070-00036

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release

POWER SYSTEMS

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September 3, 1982

R. G. Page, Chief
Uranium Fuel Licensing Branch
Division of Fuel Cycle and Material Safety, NMSS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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Docket 70-36

Dear Mr. Page:

Enclosed are proposed revised pages to the Radiological Contingency Plan for the Hematite Plant. These revisions have been made as required by Amendment No. 8 to License SNM-33, and as discussed with Mr. T. R. Decker of your staff.

Very truly yours,

COMBUSTION ENGINEERING, INC.

H. E. Eskridge

H. E. Eskridge
Supervisor, Nuclear Licensing,
Safety and Accountability

/wg
Enclosure

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N-21

FEE EXEMPT

OCT 5 1982

response to LC#24
& RCP. 21239

1.2 Site and Facility Description

1.2.1 Location of Plant

The C-E Hematite site is located in Jefferson County, Missouri, approximately 35 miles south of the City of St. Louis. Figure 1-1 indicates the location of Jefferson County within the state of Missouri. Figure 1-2 illustrates an expanded section of the area within a 5-mile radius of the site and shows the location of small towns and settlements within this area. The plant is located on Highway 21A about 3/4 mile northeast of the unincorporated town of Hematite. Figure 1-3 shows the site boundaries with respect to the town of Hematite.

1.2.2 Regional Demography

Jefferson County is predominately rural and characterized by rolling hills with many sizable woodland tracts. The land area is classified as 51% forrest, 33% agricultural with crops such as grain and hay, and approximately 16% as urban, suburban, commercial and unused or undeveloped.

The county is part of a dynamic, growing urban region of the St. Louis Standard Metropolitan Statistical Area. Although extensive development has resulted from this growth, agricultural land use is still predominant in the site's environs. Some areas, generally 1/2 to 5 miles from the plant site, have been developed as small to moderate-size subdivisions within the past decade.

1.3.1 Process Summary (continued)

into a fluid energy mill, where recycle material may also be added. It is then transferred to blenders and withdrawn for shipment to Windsor or use in the Pellet Plant.

For pelletizing, blended powder is agglomerated using an organic binder and a suitable solvent. The agglomerated powder is then granulated to insure a consistent press feed and pressed into pellets. "Green" pellets are processed through a dewaxing furnace to remove the additives and then passed through a sintering furnace where they densify and achieve the desired characteristics. The sintered pellets are sized using a centerless grinder, dried, inspected and packaged for shipment.

Support operations for the conversion and pelletizing process include material recycle, scrap recovery, cylinder heel recovery, quality control laboratory, maintenance, waste consolidation and disposal, and effluent processing.

Design criteria important to controlling radioactive materials and preventing criticality, as well as alarm and monitoring instrumentation, is discussed in Chapter 2. *

1.3.2 Types of Radiological Effluents and Methods of Treatment and Disposal

1.3.2.1 Radiological Waste Water Effluent

All liquid wastes which contain uranium compounds in Building 255, including the Oxide Plant, are generated as floor mop water, cleanup water, grinder coolant, and water from sinks in the toilet and step-off pad areas.

Liquid wastes in Building 240 which contain uranium compounds are generated as floor mop water, wet recovery filtrate, laundry water, spent scrubber solution, wet chemical analysis

three room air exhausts for the Pellet Plant dewaxing and sintering furnace area. All stacks have single or double absolute filters except for the laboratory fume hoods, the Pellet Plant furnace area and Oxide Building room air exhaust, and the Oxide Building offgas exhaust which has other filtration and scrubbers as discussed above.

Stack Identification		Flow Rate (CFM)	
Oxide Main Exhaust	(106)	9,773	*
Oxide Powder Unloading	(103)	4,909	
Oxide Roof Exhaust	(117)	7,068	
Bldg. 255 Roof Exhaust	(017)	9,032	
Bldg. 255 West Manifold	(050)	12,020	
Bldg. 255 East Manifold	(051)	9,773	
Bldg. 255 Dry Recycle	(228)	3,657	
Bldg. 240 Wet Recovery	(230)	5,807	

Equipment and areas ventilated by the exhaust stacks are:

Stack No.	Equipment/Area
103	Filter cleanout hood Milling hood Powder unloading hoods Blender exhausts
106	3rd floor utility hood UO_2 cooler Backup filter hopper vents Various spot-ventilation hoses 1st floor utility hood

1.3.2.2 Radiological Airborne Waste Effluent (continued)

Stack No.	Equipment/Area
114	Dry scrubbers
117	Oxide Building room air
017	Pellet Plant room air
050	Milling hood Utility hood Office vent Consolidation hood Evaporation hood and drying ovens House central vacuum system Silo filter exhausts
051	Press fines hood Central vacuum systems Agglomeration station Grinder and centrifuge hoods
228	Pyrohydrolysis furnaces Furnace box coolers Load-unload hood Lid removal plenum Weigh and sample hood Filtrate and scrubber solution tanks
230	Solution make-up tank UO_4 filter hood Centrifuge UO_4 dryer and discharge hood UO_4 precipitation and overflow tanks UO_4 dryer scrubber Blend tank Utility hoods Dissolution vessels Slurry make-up hood ADU precipitation tank and filter press hood Acid insolubles filter press hood Filter cut-up hood Incinerator scrubber and central vacuum

Exhaust stack locations are shown in Figure 1-6.

There are no alarms associated with the exhaust stacks.

1.3.2.3 Radiological Solid Waste Effluent

Solid wastes which are potentially contaminated are generated throughout the controlled area. These wastes consist mostly of rags, papers, packaging materials, worn-out shop clothing, equipment parts, and other miscellaneous materials that result from plant operations. After passive assay (gamma-counting) to determine the U-235 content, wastes are compacted in 55-gallon drums, or packaged in plastic-lined wooden crates for shipment to a licensed low-level burial site. Bulky items with only low levels of surface contamination are placed directly in the lined wooden crates.

A gas-fired incinerator has been installed to reduce the volume of combustible contaminated wastes for shipment to licensed burial. This incinerator also supplements the oxidation/reduction furnaces used to reduce wastes containing recoverable quantities of uranium. The incinerator is equipped with a wet scrubber system to clean offgases prior to routing to the wet recovery stack.

Calcium fluoride and limestone from the conversion process dry scrubbers are used as fill materials on site. These materials, referred to as spent limestone, do not contain detectable contamination and are not considered to be radiological solid waste.

Non-radioactive solid waste is disposed of by a commercial waste disposal firm. Old items of non-contaminated equipment may be disposed of to commercial scrap dealers.

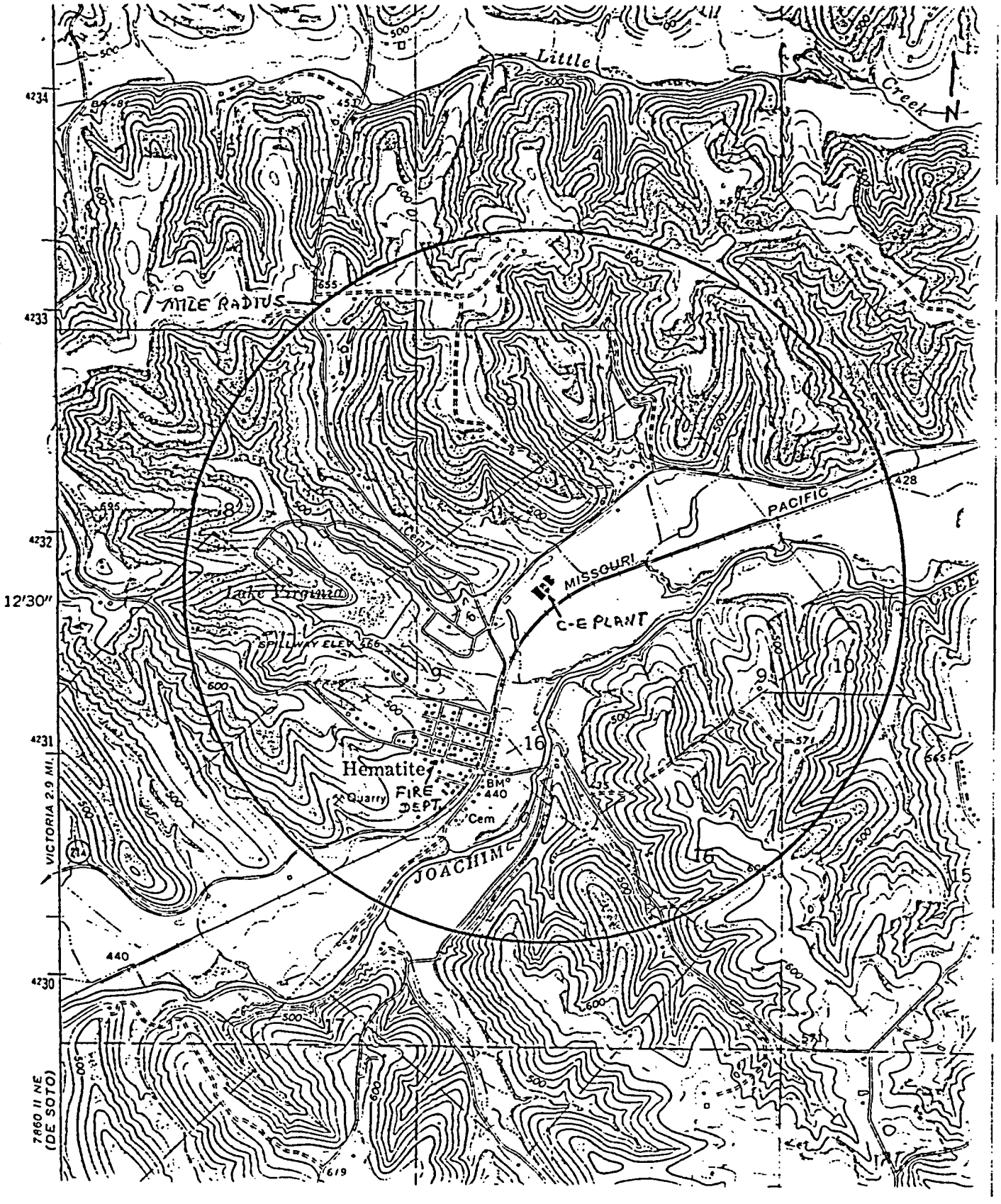

Figure 1-7

Area Within 1 Mile Radius of C-E Plant Site

2.1.2 Alarm Systems and Release Prevention

2.1.2.1 Nuclear Alarm System

The nuclear alarm system consists of gamma sensitive[1] detectors, audible alarms and a remote indicator panel at the guard station. The requirements for this alarm system are:

1) Detector units shall have a pre-set alarm level of not less than 5 mR/hr or greater than 20 mR/hr.
2) Detector units shall also have a response time no greater than 3 seconds at a radiation level of 20 MR/hr.
3) Detectors shall be located so as to be capable of detecting and operating the alarm from an incident of the magnitude that would result in a gamma flux of 3×10^5 mR/hr one (1) foot from the source of radiation.
4) Detectors shall be installed within 120 feet of every location where 500 grams or more of Special Nuclear Material is handled, used, or stored.
5) Whenever possible, the location and spacing of the detectors is chosen to avoid the effect of shielding by massive equipment or materials. Low density materials of construction such as 2 x 4 stud construction walls, plaster or metal corrugated panels, asbestos panels, doors, panel walls and steel office partitions are disregarded in determining the spacing. The spacing is reduced where high density building materials such as brick, concrete, or cinder blocks shield a potential accident area from the detector.

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[1] Scintillation detectors are used to avoid saturation. A relay assures that the alarm is continued at the maximum dose rates anticipated. *

2.2.2.1 Nuclear Alarm System (continued)

6) The detector and alarm circuits shall be equipped with an auxiliary self starting diesel generator which will automatically supply power to the system in the event of disruption of primary power. This backup power system shall be checked at least quarterly.
7) The system shall be tested by sounding the alarm at least monthly and at the time of each practice evacuation drill.
8) Automatic monitors shall give warning in case of any malfunction which renders the system inoperable. All process operations and material movements in the affected area are ceased until the inoperable unit is repaired or replaced. *
9) The alarm shall be clearly audible in all portions of areas in which Special Nuclear Materials are handled, used, or stored and in all adjacent areas where significant exposure to radiation may result from an incident.

2.1.2.2 <u>UF_6 Vaporizer Condensate Alarm System</u>

In the event of a UF_6 leak, steam condensing in the vaporizer will take SNM to the condensate drain line. When the conductivity cell in the drain line senses increased conductivity from the SNM present, the system will close the automatic shut-off valve, start the UF_6 scrubber and shut off the steam supply. There are both visible and audible alarms in the control room. The system may also be operated manually.

The conductivity cells are very sensitive. Alarm setpoints correspond to the release of only a few grams (<10 microcuries) of UF_6. *

2.1.3 Support Systems

2.1.3.1 Structural Performance vs. Site Environmental Factors

Severe Natural Phenomena

The consequences of severe natural phenomena on site structures were examined. In all cases, the probability of release of radioactive materials was found to be extremely low.

A postulated 100-year flood would be expected to result in only minimal water velocities of less than 0.1 ft/sec. These velocities are not expected to be able to tip material storage containers or transport any loose material. No structural damage would be expected.

Although some structural damage would occur in the event of a tornado or earthquake, the radiological impact would be minor. Nearly all uranium on the site is contained in UF_6 cylinders, sealed metal cans, pellet trays, or silos with sound structural characteristics.

2.1.3.2 Accidents at Neighboring Activities

There are no neighboring facilities at which accidents could have adverse effect on C-E Hematite structural elements. However, an accident on the neighboring Missouri-Pacific railroad could require evacuation on the site if toxic chemicals were involved. This would be similar to the evacuation in case of a criticality accident. *

2.1.3.4 Access and Egress of Operating Personnel and Emergency Response Teams

See Sections 3.0 and 4.0

2.1.3.5 Fire and Explosion Resistance and Suppression

Evaluation of proposed changes in facilities, equipment or operations includes consideration of fire and explosion hazards. All equipment and operations are designed, and materials selected, to minimize fire and explosion hazards.

Engineered safeguards include equipment features and control systems, use of non-combustible and fire resistant materials, and strict control of flammable liquids and combustible materials.

No significant release of radioactive materials to the environs would be caused by a fire or explosion. Respiratory protection would be used as required within the facilities. *

Routine inspections and audits are conducted to check for fire hazards. Fire extinguishers and the fire alarm (non-nuclear alarm) are routinely checked. There are no sprinkler systems or hose stations in the buildings. *

2.1.3.6 Shielding

Shielding as such is not used. However, personnel dosimeters are worn by employees to determine actual exposure.

2.1.4 Control Operations

The criteria for maintaining the response capabilities of plant engineered systems is to reduce employee and environmental exposure levels to as low as reasonably achievable.

There are no significant sources for release of radioactive materials, other than a criticality or UF_6 release, that would exceed the PAG dose outside. Respiratory protection will be used to protect employees inside of the plant. *

Proper performance of criticality and UF_6 release alarm systems is assured through monitoring, testing and appropriate maintenance operations.

2.2.2 Alarm System and Release Prevention Capability (continued)

Breathing Zone Monitoring

Breathing zone monitoring of personnel will be conducted as necessary to insure compliance with regulatory requirements.

Effluent Monitors

The only accidents which could cause a PAG dose are a criticality or a major UF_6 release. Alarm systems for these accidents have been described. *

3.2 Classification Scheme

Section 3.1 of this plan evaluates the consequences of all credible accidents. In all cases examined, the probability of a major accident was found to be extremely low. This low probability is derived from the fact that: 1) all process equipment is designed to incorporate permanently engineered safeguards; 2) strict administrative control of production processes is maintained; 3) adherence to the double contingency principle in the preparation of safety evaluations; and 4) the inclusion of generous safety factors in all facility limits.

A classification system has been employed, however, which covers the entire spectrum of possible emergency situations, regardless of the probability of occurrence.

This section of the emergency plan describes how the spectrum of postulated accidents are encompassed within the emergency characterization classes. Each class defined is associated with a particular set of immediate actions to be taken to cope with the situation.

It should be noted that various classes of accidents require a graded scale of responses, which form the basis for the classification system. Also a small problem, such as a fire, may increase in severity and therefore move up from one class of accident to another.

The Emergency Director determines the initial emergency classification and escalates or de-escalates the classification in accordance with the classification system. Equivalent classification categories (if any) specified in Section IV of Appendix E of 10 CFR Part 50 are shown in parantheses. *

Onsite Emergency Alert *

This class involves specific situations that can be recognized as creating a hazard potential that was previously nonexistent or latent. The situation may not yet have caused damage to the facility or harm to personnel and does not necessarily require an immediate change in facility operating status. Inherently, however, this is a situation in which time is available to take precautionary and constructive steps to prevent an accident and to mitigate the consequences should it occur. An Emergency Alert situation may be the result of either man-made or natural phenomena and can reasonably be expected to occur during the life of the plant.

Emergency Alert conditions imply a rapid transition to a state of readiness by the facility personnel and possibly by off-site emergency support organizations, the possible cessation of certain routine functions or activities within the facility that are not immediately essential, and possible precautionary actions that a specific situation may require.

Example of situations which fall in the emergency alert classification are:

- Bomb threats
- Civil disturbances
- Tornado warning or sighting
- Earthquake tremor or warning of seismic activity
- Forest fire
- Release of toxic or noxious gas nearby which could affect the site

The Emergency Director is responsible for determining when an emergency alert condition exists. Note that no situation associated with in-plant events involving radioactive materials has been identified as belonging in the emergency alert classification.

Plant Emergency (Notification of Unusual Event) *

This class includes accidents within the plant requiring staff emergency organization response. The initial assessment of situations in this class should indicate that it is unlikely that an offsite hazard will be created. However, substantial modification of plant operating status is a highly probable corrective action if it has not already taken place by automatic protective systems. This class is normally associated with a judgment that the emergency situation can be corrected and controlled by the facility staff.

Protective evacuations or isolation of certain plant areas may be necessary. This class of emergency can also reasonably be expected to occur during the life of the plant.

Accidents which fall into this class are those accidents analyzed in the Environmental Impact Information as events that are predicted to have insufficient consequences outside the plant to warrant taking protective measures.

Criteria for declaring Plant Emergencies should be based on (1) the recognition of an immediate need to implement in-plant emergency measures to protect or provide aid to affected persons in the facility or to mitigate the consequences of damage to plant equipment; (2) a positive observation that radiation monitors do not indicate the possibility of a criticality; (3) the recognition by personnel in the area involved that the situation is beyond their capability to resolve.

The non-nuclear alarm may be sounded by any person cognizant of the situation. Declaring and classifying the emergency is the responsibility of the Emergency Director.

Site Emergency (Alert) *

Emergency situations more severe than plant emergencies are not expected to occur during the life of a plant because of design features and other measures taken to guard against their occurrence.

Nevertheless, it is necessary and prudent to make provisions for a class that involves an uncontrolled release of radioactive materials or chemicals into the site environs, outside the fenced manufacturing area. Notification of offsite emergency organizations will be made as necessary. Protective actions include evacuation of all facility areas other than the emergency control center. Associated assessment actions include appropriate provisions for monitoring the environment.

A site emergency is declared by (1) automatic sounding of the nuclear (criticality) alarm or (2) sounding of the non-nuclear alarm. The non-nuclear alarm may be sounded by any person cognizant of the situation. Declaring and classifying the emergency is the responsibility of the Emergency Director.

Examples of site emergencies are:

- Criticality accident
- Substantial UF_6 release
- Major fire or explosion
- Major anhydrous ammonia release
- Substantial release of airborne radioactive particulates (a substantial release is defined as the release of 300 microcuries within a 24-hour period).

Site Area Emergency and General Emergency *

Accidents that have the potential for serious radiological consequences to the public health and safety have been analyzed previously and were found not to be credible for the C-E Hematite facility (NRC Environmental Impact Appraisal, March 1977).

3.3 Range of Postulated Accidents
Spectrum of Postulated Accidents

Offsite impact of the spectrum of accidents analyzed in the Environmental Impact Appraisal is shown in the following table:

Accident	Classification	Offsite Impact
Injured employee	personnel emergency	none
Contaminated employee	personnel emergency	none
Train derailment	emergency alert	none (from plant)
Process leak or spill	plant emergency	none
Fire	plant emergency	none
Substantial UF_6 release	site emergency	Site boundary concentration: 30% of 8-hr. TLV 4% of single exposure TLV
Criticality	site emergency	Site boundary dose: whole body - 0.5 Rem thyroid - 1.5 Rem
Substantial release of airborne particate uranium	site emergency	Unrestricted Area MPC

Equivalent 10 CFR Part 50 Appendix E Classifications are: *

On-site Classification	10 CFR 50 Classification
Personnel emergency	None
Emergency alert	None
Plant emergency	Notification of unusual event
Site emergency	Alert

5.1.4 Plant Emergency (Notification of Unusual Event) *

An emergency which has no effect on the Hematite site environs outside of the fenced manufacturing area.

Examples: Fire not controllable by personnel in the immediate vicinity; Explosion contained within the building; Major process leak or spill (toxic or radioactive) contained within the building.

Initiated by: Manual activation of the non-nuclear alarm: Continuously ringing bell. Alarm buttons are strategically located throughout the plant and office areas.

Action:

1) All personnel except for production area monitors must evacuate to Emergency Assembly Area promptly. (Driveway by site water tank).
2) The Emergency Director will then request medical assistance, fire brigade, and/or site security as needed.
3) All personnel will assemble with their immediate supervisor and inform him of any information pertaining to the emergency. Escorts are responsible for their visitors.
4) The Supervisors will account for all of their personnel and report to the Emergency Director. All personnel who are unaccounted for are assumed to be in the affected area.
5) Site Security guards will prevent unauthorized entry into the fenced area.
6) The Emergency Director determines final classification of the emergency (plant or site), the need for additional assistance, and initiates the call in of appropriate off-site agencies as needed, (i.e., Hematite Fire Department, Joachim-Plattin Ambulance District, etc.
7) The Emergency Director assures that C-E management is notified of the emergency.

5.1.5 Site Emergency (Alert) *

An emergency having the potential for off-site impact.

Examples: Criticality accident, major fire or explosion, major UF_6 release, major anhydrous ammonia release.

Initiated by:

1) Automatic sounding of the nuclear criticality alarm (radiation levels of 10 mr/hr or greater at any area radiation monitor) or
2) Sounding of the non-nuclear alarm initiated by any person cognizant of the emergency situation. (Alarm buttons are strategically located throughout the plant and office areas).
3) A release of 300 μCi of airborne radioactive particulates averaged over a 24-hour period to the Hematite site environs.

NUCLEAR ALARM

Action:

1) All personnel must evacuate to Emergency Assembly Area in the Emergency Control Center promptly (Tile Barn).
   DO NOT ATTEMPT RECOVERY OPERATIONS
2) The Emergency Director will request medical assistance, fire brigade, and/or site security as needed.
3) All personnel will assemble with their immediate supervisor and inform him of any information pertaining to the emergency. Escorts are responsible for their visitors.
4) Supervisors will account for all of their personnel and report to the Emergency Director. All personnel who are unaccounted for are assumed to be in the affected area.
5) Site Security Guards will prevent unauthorized entry into the fenced area.
6) The Emergency Director instructs the re-entry team to confirm criticality accident.

6.3.1 Onsite Systems and Equipment (continued)

Radiation monitors and alarms - Radiation monitors are installed in various areas of plant manufacturing and storage areas so that all Special Nuclear Material located in or about the facility is observed by a detector.

The radiation intensity is shown on a meter mounted on the front panel of the monitor. There is an alarm which serves as a local and general audible radiation evacuation alarm. A visual alarm for each of the above units is also located near the NIS office and at the guard station.

An externally mounted light and control panel buzzer serve as a power failure indicator.

Loss of power indicators are also provided at the readout location for each detector. These monitors are connected to the emergency power system.

Portable monitors - several portable air samplers, radiation survey instrumentation, and radiation dosimeters - located in NIS office and/or Emergency Control Center.

Process control monitors are the same as normally found in any chemical plant - temperature, pressure, flow rate, etc. Only the UF_6 leak detector is related to a potential emergency situation. *