Emergency Planning

R504B – Chapter 4.12

Objectives

1. State the purpose of an emergency plan.

2. Identify the 4 classes of emergency events, including their order of severity.

3. Identify the amount of time allowed for event classification and off site notifications.

Objectives

4. Identify the 4 facilities used in a site emergency plan response.

5. Given the Emergency Classification Procedure (EPIP-01) and a specific set of plant conditions, classify the event.

6. Identify the 3 NRC response modes to an emergency event.

Purpose

- The overall objective of Emergency Preparedness (EP) is to ensure that the nuclear power plant operator is capable of implementing adequate measures to protect public health and safety in the event of a radiological emergency.

Purpose

- 10 CFR 50.34 requires licensee's to include their plans for coping with emergencies in their PSAR and FSAR.
- 10 CFR 50.54(q) includes Emergency Plans as a condition of license.
  - Changes to a station's emergency plan can be made without NRC approval if evaluation shows no "reduction in effectiveness" of the plan.

Purpose

- 10 CFR Appendix E, Emergency Planning and Preparedness, describes the requirements for:
  - PSAR
  - FSAR
  - Content of Emergency Plans
  - Implementing Procedures
  - Emergency Response Data System

Purpose

- 10 CFR 50.47, Emergency Plans, describes the required standards for both on-site and off-site emergency plans:
  - Responsibilities for emergency response
  - On-shift facility responsibilities (e.g., response times for augmented staffing)
  - Arrangement for requesting assistance from State and Local Authorities
  - Standard Emergency Classification and Action Level Scheme
  - Procedures for notification of State and Local Authorities
  - Education of the public on Emergency Response

Purpose

- 10 CFR 50.47, Emergency Plans, describes the required standards for both on-site and off-site emergency plans:
  - Adequate facilities and equipment to respond to and to assess radiological emergencies
  - Protective actions for responding to an emergency, including evacuation routes, KI distribution, etc…
  - Arrangements with local hospitals to handle contaminated personnel
  - Training requirements, including drills, for both on-site and off-site personnel.

Purpose

Emergency Plan actions are directed toward providing the following:

- Correct classification of the event based upon plant conditions.
- Timely communications of plant, radiological and meteorological conditions to offsite emergency response authorities and federal agencies.
- Technical support for the operations staff to assist in accident mitigation.
- Recommendations to the state(s) and county(s) on the need to evacuate or shelter the Emergency Planning Zone (EPZ).
- Coordination of off site agency (NRC, FEMA, DHS etc.) support for accident mitigation.

Emergency Action Levels

The purpose of the EALs is to trigger the declaration of an emergency classification level based on specific criteria.

- Industry standards developed or endorsed by NRC
  - NEI 99-01
  - NUMARC/NESP-007
  - NUREG-0654/FEMA-REP-1
- Each plant has Administrative Procedure or Emergency Plan Implementing Procedure (EPIP)
- Four Emergency Actions Levels based on the severity of the emergency
- Four major recognition categories (varies)

Event classes

UNUSUAL EVENT:

Events are in progress or have occurred indicating **a potential degradation of the level of safety of the plant.**

- No radioactive material releases requiring offsite response or monitoring are expected.

ALERT:

Events are in progress or have occurred indicating **an actual or potential substantial degradation of the plant level of safety** .

- Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

Event classes

SITE AREA EMERGENCY:

Events are in progress or have occurred involving **actual or likely major failures of plant functions needed for protection of the public.**

- Releases are not expected to result in exposure exceeding the EPA Protective Action Guideline levels beyond the site boundary.

GENERAL EMERGENCY:

Events are in progress or have occurred involving **actual or imminent substantial core degradation or melting with potential for loss of containment integrity.**

- Releases can be expected to exceed EPA Protective Action Guideline levels for more than the immediate site area.

Recognition Categories

Radiological (R):

- Abnormal Radiological Conditions / Abnormal Radiological Effluent Releases

Fission Product Barrier Degradation (F):

- Loss or potential loss on one or more fission product barriers (cladding, RCS or containment)

System Malfunctions (S):

- Loss of systems needed to mitigate accident including:
  - AC or DC power, RPS, decay heat removal, annunciators, communication systems.

Hazards (H):

- Conditions that pose a hazards to the plant including
  - Security events, natural phenomenon, fire and explosion, toxic gas and Emergency Director judgment.

EPIP-01

- Each category listed in a Table.
- Applicable MODES for each are listed
- Thresholds for each declaration listed from most severe (GE) to least severe (NOUE) from left to right (left blank if no action level).
- Declaration made by standard EAL number:
  - First letter is category (R, F, S or H)
  - Second letter is level (G, S, A or U)
  - Third letter is sequential number in Table
- Fission Product Barrier lists loss/potential loss for each barrier individually

With the 102 diesel inoperable, a loss of off-site power occurs and the 103 diesel fails to start. The plant scrams and the only 4160 volt AC power available is the 101 diesel for 30 minutes when the gas turbine is started and aligned to the 102 vital bus. Classify the emergency.

A leak in the reactor coolant system of 60 gpm develops and the reactor scrams on high drywell pressure. Drywell pressure reached a maximum value of 12 psig and the core remained covered during the event. Classify the emergency.

What if the leakage to the DW floor drain sump was 10 gpm and the high drywell pressure RPS setpoint was not reached?

Following a reactor scram, several control rods do not insert fully into the core and power stabilizes at 10% RTP. SLC is injected and the reactor is shutdown 15 minutes later. Throughout the event, pressure is controlled at 920 psig on the turbine bypass valves and level is maintained above Level 1 by RCIC. Classify the event.

EPIP-01

- Initial declaration made by Shift Manager
  - Cannot be delegated
- Once TSC is staffed, responsibility transferred to Emergency Director
- Declaration based on the Site in multi-unit plants: highest level in any unit declared
- Notification to State and Local Agencies on standardized form
- Most utilities have a EAL Bases Document to help clarify the requirements

Initiating Condition:
Prolonged loss of all offsite power and prolonged loss of all onsite AC power to Division 1 and Division 2 essential busses.

Operating Mode Applicability:
1, 2, 3

EAL Threshold Values:
1. Loss of power to NSST and RSST.
   AND
2. Failure of DG 101, 102 and 103 emergency diesel generators to supply power to unit ECCS busses.
   AND
3. a. Restoration of any unit ECCS bus within 4 hours is **not likely.**
   OR
   b. RPV level **cannot be determined to be > - 158 in.**

Basis:
Loss of all AC power to ECCS busses compromises the availability of all plant safety systems. Prolonged loss of all AC power may lead to loss of Fuel Cladding, RCS and Primary Containment barriers. The four-hour interval to restore AC power to any unit ECCS bus is based on the blackout coping analysis performed in conformance with 10 CFR 50.63 and Regulatory Guide 1.155, "Station Blackout."

The likelihood of restoring at least one ECCS bus should be based on a realistic appraisal of the situation since a delay in an upgrade decision based on only a chance of mitigating the event could result in a loss of valuable time in preparing and implementing public protective actions.

Notifications

- Timing requirements (applies to initial and any escalation of EAL):
  - Declaration within 15 minutes of indications of emergency available to the on-shift crew.
  - State and Local Agencies within 15 minutes of declaration.
  - NRC as soon as practical, but no later than 60 minutes from declaration (can ask for open line).
- SM (or ED) responsible for content of notification, but they do not necessarily have to conduct the notification.

Emergency facilities

- **Control Room**;
  - The shift manager is the Emergency Director (ED) until TSC becomes activated.
  - Always the first emergency facility.
  - On-shift operators report to CR for direction.
- **Technical Support Center (TSC);**
  - Activates at the UE or ALERT stage.
  - Provides technical expertise and control of site emergency response.

Emergency facilities

- **Operations Support Center (OSC);**
  - Staffed when the TSC is activated.
  - Provides skilled workers to support emergency repairs. Includes off-shift operators, RADCON and Maintenance Departments
- **Emergency Operations Facility (EOF);**
  - Activates at the ALERT or SAE stage.
  - Coordinates with State and Local Agencies, Utility Corporate structure, and NRC.
  - Located remotely from the site.
  - Includes State representatives, NRC, radcon, corporate officers, public information officials

Other facilities

- State Emergency Operations Center (EOC)
- County EOCs
- State Department of Radiological Controls (Health Department)
- Media Center or Joint Information Center (coordinate press releases with the media)

Protective Action Recommendations (PARs)

- PARs are required at General Emergency:
  - Default
  - Calculated from rad levels and environmental factors (wind direction, speed, stability class)
- PARs are recommendations to either shelter or evacuate specific sectors or zones within the EPZ (typically 10 mile radius from the plant).
- Utilities recommend PARs.
- Local government(s) order the actions.

NRC Guidance

- MD 8.2 NRC Incident Response guidelines.
  - Designates responsibilities within the NRC.
  - Designates responsibilities of other agencies.
  - Provides response modes for incidents.
  - Provides guidance on incident response team makeup.

NRC Response modes

Monitoring: a heightened state of readiness for information acquisition and assessment.

- The regional IRC is staffed (may be limited staffing).
- NRC headquarters provides support as needed.

Activation:

- Led by the Executive Team,
- Reactor safety, protective measures, fuel cycle safety, and liaison personnel staff the HOC.
- Regional IRC fully staffed.

Expanded Activation:

- The Chairman assumes the emergency response lead.
- NRC fully staffs the HOC.
- The region dispatches a site team.

Headquarters

- The Headquarters Operations Center (HOC) is the focal point for communications, analysis, and response in emergencies.
  - The HOC is staffed continuously by the Headquarters Operations Officer (HOO).
  - The HOO informs NRC staff members allowing determination of the NRC response modes.
  - If required the Headquarters Emergency Response Officer (HERO) is established.
- When the HOC is activated, teams of specialists and directors are assembled to;
  - obtain and evaluate incident information
  - to assess the impact of the emergency.

Regions

- The resident inspectors monitor the sites immediate response.
- Depending on the incident the region staffs its IRC.
  - The IRC coordinates activities with Headquarters.
  - For severe emergencies the region may dispatch a site team.

NRC Role

- NRC is the Coordinating Agency
  - Has technical leadership for the Federal Government's response to the incident.
- A GE or terrorist-related event, DHS can declare an Incident of National Significance.
  - DHS takes responsibility for overall federal response.
  - NRC retains the Federal technical leadership role.

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Questions?