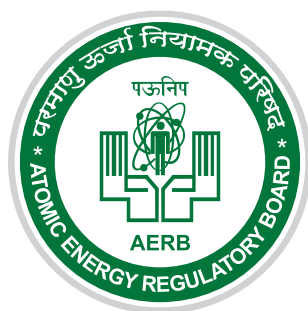


CHAPTER - 05

EMERGENCY PREPAREDNESS



EMERGENCY PREPAREDNESS

Nuclear Power Plants (NPP) in India are designed, constructed, commissioned and operated in conformity with relevant nuclear safety requirements. These requirements ensure an adequate margin of safety so that NPPs can be operated without undue radiological risks to the plant personnel, members of the public and the environment. State of the art safety measures are provided based on principles of defence-in-depth, redundancy (more numbers than required) and diversity (back-up systems operating on different principles). These include failsafe shutdown systems to safely shutdown the reactor, combination of active and passive (systems working based on natural phenomena and not needing motive power or operator action) cooling systems to remove the heat from the reactor core at all times and a robust containment system for confining any release of radioactivity. Notwithstanding these, it is mandatory to develop Emergency Preparedness and Response (EPR) plans and to conduct periodic exercises to test these plans. These plans are prepared in accordance with the national laws and regulations and take into account ICRP & IAEA publications for effective management of any eventuality with a potential to pose an undue radiological risk to the plant personnel and public.

EPR plans are also required for non-nuclear facilities that are under the purview of AERB and handling hazardous chemicals viz. ammonia and hydrogen sulphide based Heavy Water Plants (HWP) and some of heavy water plants catering to the production of solvents. These plans are prepared as per AERB Safety Guidelines and the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 for On-Site and Off-Site Emergency Preparedness for non-nuclear installations and deal with the effective

management of any eventuality with a potential to pose an undue chemical risk to the plant personnel and public.

The establishment and submission of emergency preparedness plans and procedures is one of the prerequisites for licensing of radiation facilities (RF) also.

5.0 Role of AERB in Emergency Preparedness and Response (EPR)

AERB has established regulations and guidelines specifying the principles, requirements and associated guidance and criteria for EPR for all response organizations. It also ensures and verifies that arrangements for preparedness and response to a nuclear and radiological emergency for facilities and activities under purview of licensee are adequate. This is achieved by review and approving the EPR plan of the licensee, oversight of the arrangements and preparedness of the licensee through regulatory inspection and observation of emergency exercises. During an emergency, AERB's role is to keep itself apprised of situation, review of response actions and inform public as and when necessary.

5.1 Review of Preparedness for Emergency at NPP Sites

AERB reviews the preparedness of NPP to handle these emergency conditions through review of EPR plans, conduct of regulatory inspection and observation of emergency exercise following a graded approach. During the year, NPPs continued to conduct emergency exercises. Plant Emergency Exercise (PEE), Site Emergency Exercise (SEE) and Off-site Emergency Exercises (OSEE) were carried out as per prescribed frequency. PEEs were conducted by NPPs with the frequency of once in every quarter. SEEs were conducted at all NPP

sites following the frequency of once in a year. OSEE was carried out at NPP site with a frequency of once in two years.

The OSEE framework has been strengthened through conduct of different types of exercises, namely the Table Top (TT) exercise and Integrated Command Control and Response (ICCR) OSEE. In the TT exercises, the emphasis is on testing the decision making capability of plant authorities on aspects such as classification, declaration, notification and evolving protection strategy based on plant conditions for recommending protective actions.

In the ICCR OSEE procedure, in addition to the decision making process by plant authorities, the aspects of testing command control functions, early warning and field response along with resource mobilization in realistic environment, inter-agency co-ordination, communication, etc., are being tested. The ICCR procedure involves activation of the overall response framework covering Plant Authorities, District Authorities, Crisis Management Group DAE (CMG-DAE) & DAE- Radiation Emergency Response Director (DAE-RERD). These exercises are conducted in a realistic environment where the information on the event and possible consequence are not known to the response organizations participating in the exercise.

During the year, the ICCR OSEE was conducted at three NPP sites viz. Kaiga, Kakrapar and Rawatbhata Sites. AERB officials observed these exercises at the NPP sites. Decision making capabilities and response actions by Plant and District Authorities were observed. Nuclear and Radiological Emergency Monitoring Centre (NREMC) at AERB was also activated and progression of event and response actions was monitored and assessed.

5.2 Strengthening of Emergency Preparedness Plans of NPP

The preparedness for response during any emergency conditions emanating in NPPs is being strengthened. This is carried out through augmenting the arrangement and updating the EPR plans considering various developments (technical basis, feedback from Fukushima event, IAEA and ICRP publications) and in accordance to the current regulatory requirements.

NPPs were asked to revise the EPR plans for managing Plant, Site and Off-site emergency response based on the template approved by AERB. The revision of plans considers the following.

- Changes in emergency response organization and notification to other response agencies in line with the revised response framework established in the revised off-site EPR plan
- Harmonized approach and criteria for activation of various emergency response centres
- Plant specific Initiating Conditions (ICs) and Emergency Action Levels (EALs) for classification and declaration of emergency
- Integration of Emergency Operating Procedure (EOP) and Severe Accident Management Guidelines (SAMG) that are part of accident management programme with the emergency response plans.

5.3 Decision Support System

Decision Support System (DSS) for handling nuclear emergencies is intended to provide comprehensive and timely information to emergency managers on an emergency arising from a nuclear accident. Based on the estimated source term and meteorological condition, the DSS identifies affected sector and the dose to public is

estimated. It also estimates public dose based on radiological monitoring readings of installed radiation monitors at NPPs and meteorological conditions. These estimates are used to decide appropriate protective actions in the public domain. Implementation work on DSS is in progress at all the NPP Sites.

5.4 Nuclear and Radiological Emergency Monitoring Centre at AERB

During nuclear and radiological emergency, AERB monitors and keeps itself informed about the emergency situations. It reviews & assesses the emergency situations and informs the public and the Government on the safety significance of events and actions being taken. To facilitate this, AERB has instituted an Emergency Response Monitoring Organization (AERB-ERMO) which gets activated during an emergency. The activities of AERB-ERMO are carried out and coordinated by the Nuclear and Radiological Emergency Monitoring Centre (NREMC) established at AERB. The Centre has various cells for Communication, Assessment, Analysis and public information along with necessary software and hardware infrastructure. The capabilities of NREMC include emergency analysis, assessment of emergency response actions & protective actions and communication with all Stakeholders. The software systems with online Decision Support System (DSS), source term and radioactivity release assessment, environmental monitoring data inputs, video conferencing with other emergency response agencies and trained & experienced personnel have been established.

NREMC is kept on alert mode during any abnormal natural phenomena occurring in any of the districts containing NPPs and subsequently activated as required. Further during plant and site emergency exercise conducted by NPP sites, NREMC is poised to receive information about the on-going exercises. In case of OSEE at NPP Site, NREMC is activated and its various responsibilities are tested including independent assessment. In case of real emergencies, NREMC is activated as per the established procedures.

During the year, NREMC was activated during the conduct of off-site emergency exercises at various NPP sites. The functioning of NREMC during the off-site exercise serves the dual purpose of monitoring the response action executed by the Licensee and other response agencies during the exercise by carrying out independent assessment and verification and for testing the plans and procedures established at AERB for monitoring an emergency response. Mock exercise for testing the functioning of overall AERB-ERMO was also conducted.

5.5 Development of Regulatory Documents Related to Emergency Management

As a step towards holistic revision, the existing requirements and guidance on emergency management are being consolidated/updated through a dedicated safety code and safety guides for management of nuclear and radiological emergency. AERB published the Safety Code on Management of Nuclear and Radiological Emergencies in December 2022. Details are covered in chapter 6.