



CHAPTER -05

EMERGENCY PREPAREDNESS



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Nuclear Power Plants (NPP) in India are designed, constructed, commissioned and operated in conformity with relevant nuclear and radiation 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). In addition, 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, rules and regulations 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. Heavy Water Plants (HWP) based on ammonia and hydrogen sulphide and other heavy water facilities catering to the production of solvents. These EPR 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 pre-requisites for licensing of nuclear and radiation facilities.

5.0 Role of AERB in Emergency Preparedness and Response

AERB has established regulations and guidelines specifying the principles, requirements and associated guidance and criteria for EPR for 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 approval of the EPR plans (plant, site and off-site) of the licensee, review of plans of district authority and 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 the situation, review of response actions and inform public as and when necessary. These EPR plans are periodically tested for their effectiveness through well coordinated exercises involving various stakeholders.

5.1 Review of Emergency Preparedness and Response Plans

During the year, NPPs and other non-nuclear facilities conducted periodic emergency exercises. Plant Emergency Exercise (PEE), Site Emergency Exercise (SEE) and Off-site Emergency Exercises (OSEE) were carried out as per approved 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 as per the revised off-site emergency exercise framework. During the year, EPR plans of KGS 1&2 and KGS 3&4 were approved.

5.2 Framework for Conduct of Off-Site Emergency Exercises

The existing requirements and arrangements for preparedness and response to nuclear and radiological emergency (NRE) takes into account current international standards, lessons learned from the Fukushima accident w.r.t Emergency Preparedness and Response (EPR) and inputs/feedbacks from all stakeholders.

AERB recently adopted a revised scheme for conducting off-site emergency exercises. The scheme includes Table-Top (TT) exercise, Integrated Command Control and Response (ICCR) exercise and Field Exercise and Demonstration (FED). It also includes consulting and obtaining feedbacks from the stakeholders (NDMA, CMG-DAE, NPCIL, HSEG-BARC and AERB).

In TT exercises, the emphasis is on testing the

decision-making capability of plant authorities to declare emergency and evolve protection strategy based on plant conditions to recommend protective actions.

In ICCR exercises, the emphasis is on decision-making process, command control functions, early warning and field response, resource mobilization, inter-agency co-ordination, and communication. The exercise involves activation of Plant/Site Authorities, District Authorities, Crisis Management Group –DAE (CMG-DAE) & DAE- Radiation Emergency Response Director (DAE-RERD). These exercises (TT and ICCR) are to be conducted in a realistic environment where the information on the event and possible consequence will not be known to the response organizations participating in the exercises.

In FED exercise, field response and protective measures in public domain are tested.

Table 5.1: Framework for conduct of Off-Site Emergency Exercises at NPP Sites

Type of Exercise	Frequency	Responsible Agency	Oversight
Table Top (TT) Exercise	In every two years for each Station and within 6 months of a new Site Director/Station Director (in twin-unit site) taking charge	NPP *	AERB
Field Exercise and Demonstration (FED)	Once every year and all Habitable Sectors to be covered over a period of 8 years.	District Authority * (Supported by NPP for Planning and Technical Inputs)	NDMA
Integrated Command Control and Response (ICCR)	Every 3 years for each NPP Site The date of conduct of Exercise shall be chosen such that Exercises cover different Seasons and Metrological Conditions	NPP* & District Authority, CMG-DAE, RERD	AERB & NDMA

* Prime Responsibility for conduct of exercises

The framework for conduct of Off-Site Emergency Exercises (Table 5.1) was finalised after consulting the stakeholders and with requisite review at AERB.

5.3 Emergency Exercises at NPPs

The NPPs have started conducting Off-Site Emergency Exercises as per the new framework. During the year, the Table-Top OSEE was conducted at five NPPs viz. TAPS 3&4, KGS 3&4,

NAPS 1&2, KKNPP 1&2 and MAPS 1&2. AERB officials observed these exercises at the NPP sites. Decision making capabilities and response actions by Plant/Site Authorities were observed. Nuclear and Radiological Emergency Monitoring Centre (NREMC) at AERB was also activated. The progression of event, response actions and recommended protective actions were monitored and assessed.

The number of SEE and OSEE conducted at various NPP Sites in 2023 are listed in Table 5.2.

Table 5.2: Site and Off-Site Emergency Exercises at NPP Sites for the Year 2023

NPP Sites	SEE	OSEE (Table-Top)
Tarapur	1	1 (TAPS 3&4)
Rawatbhata	1	-
Kalpakkam	1	1 (MAPS 1&2)
Narora	1	1 (NAPS 1&2)
Kakrapar	1	-
Kaiga	1	1 (KGS 3&4)
Kudankulam	1	1 (KKNPP 1&2)
Total	7	5



Table-Top Off-Site Emergency Exercise



Table-Top Off-Site Emergency Exercise

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 as and when required. To facilitate this, AERB has instituted an Emergency Response Monitoring Organization (ERMO). The activities of 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 infrastructures.

The capabilities of NREMC include accident analysis, assessment of emergency response actions & protective actions and communication with Stakeholders. The resources related to software systems with on-line 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 functions are tested including independent assessment. In case of real emergencies, NREMC is activated as per the established plans and 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.