# HIGHLIGHTS OF ACTIVITIES

The Atomic Energy Regulatory Board (AERB) continued to carry out safety monitoring and regulatory supervision of nuclear and radiation facilities under its purview. Regulatory safety oversight of operating power plants, nuclear power projects (under site evaluation/under construction), several fuel cycle facilities, research units and large numbers of radiation facilities spread across the country was carried out.

All operating nuclear power plants and fuel cycle facilities under AERB's purview operated safely during the year and radioactive discharges and radiation doses to occupational workers were well within prescribed limits. The radioactive releases from nuclear power plants remained well within the limits authorised by AERB and the effective dose to public around the nuclear power plant sites was far less than the annual limit of 1 mSv.

## KEY ACHIEVEMENTS DURING THE YEAR

**1. Licensing/Consent of Nuclear Power Projects/ Fuel Cycle Facilities (under Construction)**

(a) Commissioning activities were in progress at unit 3 of Kakrapar Atomic Power Project (KAPP-3), AERB carried out safety review of progressive submissions and issued various consents as follows:

- ❖ Permission for draining of Light Water from Moderator System on January 13, 2020.
- ❖ Clearance for Initial Fuel Loading (IFL) into the Reactor Core on February 28, 2020.
- ❖ Clearance for addition of 65Te Heavy Water ($D_2O$) in moderator & Heavy Water addition into the Primary Heat Transport on March 18, 2020.

(b) Consent for 'First Pour of Concrete' to twin units of Gorakhpur Haryana Anu Vidyut Pariyojana (GHAVP) Units-1&2 issued on November 18, 2020.

(c) Consent for Siting of Kaiga-5&6, twin units of 700 MWe PHWRs at Kaiga site on November 18, 2020.

(d) Permission to Kudankulam Nuclear Power Projects (KKNPP) Units-5&6 for construction of 'Essential Loads Pump House Structure'

**2. Renewal of Licences of Nuclear Facilities**

(a) Licences for operation of 3 Nuclear Power Plants viz. RAPS-5&6, KKNPP-1&2 and MAPS-1&2 and Authorization for safe disposal/transfer of radioactive waste.

(b) Licence for operation of Kalpakkam Mini Reactor (KAMINI) at Indira Gandhi Centre for Atomic Research.

(c) Licences for operation of Nuclear Facilities viz. Jaduguda Mill and Bagjata Mine of UCIL; Rare Earths Extraction Plant, IREL, OSCOM; HWP-Kota, Manuguru and Talcher.

(d) Consent for Siting and Construction for setting up prototype sodium cell at HWP-Baroda.

(e) Permission for setting up of New Extrusion and Fuel Tube Facility at NFC-Hyderabad.

(f) Extended Stage-I commissioning consent for Medical Cyclotron at VECC, Kolkata.

(g) Licence for operation to ECIL, Hyderabad.

**3 Licensing /Consent of Radiation Facilities**

(a) 18,951 Licences were issued to radiation facilities involved in use of ionising radiation in medical, industrial and research activities.

(b) 4,574 permissions for procurement of radioactive sources (imported and indigenous) and 11,842 permissions for procurement of diagnostic X-ray equipment.

(c) Approved 3,256 Radiation Safety Officers (RSO) for various radiation facilities.

(d) Issued 'Classification Designation' to $^{106}$Ru eye plaque developed by BARC for brachytherapy treatment of eye cancer.

(e) Prepared and published guidance document on 'Personnel Monitoring of Radiation Workers in Radiation Facilities'.

**4. Regulatory Inspection of Nuclear and Radiation Facilities**

(a) During COVID-19 pandemic, AERB developed an alternate methodology for regulatory inspection known as Remote Regulatory inspection process to continue its regulatory oversight over the licensed activities/facilities. It consists of review of self-assessment checklist and on-line interaction with facility personnel.

(b) Special Inspection of KAPP-3 was carried out through virtual mode to check plant status, verify compliance to the requirements for the Phase-B commissioning and preparedness for Phase-C commissioning activities.

(c) 14 inspections of Nuclear facilities under construction, 36 inspections of operating NPPs and 24 inspections of Industrial and Fuel Cycle Facilities covering safety (nuclear, radiological & industrial) and security aspects.

(d) 440 inspections of medical, industrial and research radiation facilities.

**5. Enforcement Actions in Nuclear and Radiation Facilities**

(a) A warning letter for 'Enhancement of Safety Supervision at KKNPP-3 to 6 Site' was issued to the KKNPP-3 to 6 Site in view of increase in the occupational health safety related incidents.

(b) Due to unsafe radiography operations, AERB suspended the licence for operation of an Industrial Radiography institution for a period of one year. The approval for Radiological Safety Officer and Radiographer, was also withdrawn for a period of one year.

(c) Issued show-cause notice to a Radiotherapy Facility and Manufacturer/supplier of X-ray

equipment for violating the regulatory requirements specified in AE(RP)R,2004.

(d) For misuse of Radiation Professional Certificate for Nucleonic Gauge institutions, AERB issued warning letters to 8 institutes and a supplier.

**6. Emergency Preparedness and Response (EPR) at NPPs**

(a) Site Emergency Exercises were carried out at seven NPP sites.

(b) The framework has been strengthened through conduct of different types off-site emergency exercises viz. Table-Top (TT) Exercise and Integrated Command Control and Response (ICCR).

(c) Table-top exercises conducted at four sites, where as ICCR offsite emergency exercise conducted at three NPP site viz. Kaiga, Rawatbhata and Kakrapar.

(d) Design of On-Site Emergency Support Centre (OESC) has been finalized by the utilities and the implementation is in progress.

**7. Regulatory Safety Documents**

(a) Three Safety Guides viz. 'Design Basis Events for Water Cooled NPPs; 'Design of Electrical Power Systems for NPPs' and 'Accident Management Programme for Water Cooled Reactor Based NPPs' were approved and uploaded on AERB website.

(b) About 20 Regulatory Safety Documents (REGDOC) are at various stages of development.

(c) 5 REGDOCs were translated in Hindi and are under publication.

(d) 18 draft Safety Standards and Documents Preparation Profiles (DPP) of IAEA reviewed and commented.

**8. Safety Analysis, Research and Development**

(a) Developed In-house software viz. AERB Source Term Estimation Tool (ASTET) to augment computational infrastructure for Nuclear and Radiation Emergency Monitoring Centre at AERB.

(b) Developed in-house computer code to estimate the decay heat in containment, containment filters, CFVS, corium etc.

(c) 3-D model of the concrete shield along with the steel liner was developed using multi-physics software COMSOL for ISOMED facility.

(d) Conducted experiments on

- ❖ Core Melt Retention Facility (COMREF) to ascertain the possibility of sustained film boiling on the outer surface of the calandria vessel.
- ❖ Water and Steam Interaction Facility (WASIF) to investigate Condensation Induced Water Hammer (CIWH) phenomena.

Continued experimental studies in the field of cable fires in Compartment Fire Test

Facility (CFTF)

- ❖ Setup AGMS and Coolant Channel Heat-up facility for investigating coolant channel heat-up and annulus gas monitoring system related safety issues.

(e) A digital geo-spatial database on soils of Indian NPP sites (KGS site) and their surroundings are generated to provide basic information viz. soil type distribution, characterization and classification.

(f) Carried out reactor physics studies on few first-of-a-kind (FOAK) systems employed in KAPP-3 viz. Core design, analysis of core stability, estimation of Critical Channel Power.

(g) Carried out fire safety studies by developing a 3D model using Fire Dynamics Simulator, Studies on Cable Failure Criteria and fire resistance rating of the fire doors.

(h) AERB initiated analysis of seismic hazard at KAPS site using PSHA and study on application of Random Vibration Theory in Seismic Soil-Structure Interaction analysis.

(i) Under safety research programme to promote research in nuclear, radiation and industrial safety, two new projects were approved and renewed approvals for five on-going projects.

**9. Public Information and Safety Promotional Activities for Stakeholders**

(a) 4th National Conference on Regulatory Interface (NCRI) on 'Safety Regulation of Radiation Processing Facilities' was conducted through virtual mode.

(b) Organised theme meeting/workshop/webinar on various topics for stakeholders of nuclear facilities:

- ❖ Current Practices & Quality Assurance in Welding
- ❖ Framework & Regulation of Computer Security at Nuclear Facilities in DAE
- ❖ Accident Management programme for Water Cooled Reactor based NPPs

(c) In coordination with NABL, organised an awareness program for Service Agencies of Diagnostic X-ray equipment at AERB, Mumbai.

(d) Seven awareness programs conducted on radiation safety in mix mode (physical programme and virtual platform).

(e) In view of Covid-19 restrictions, AERB carried out its public communication activities through online forums. Conducted one on-line webinar on "Societal Benefits of Radiation Technology and Safety Aspects" aimed at students, faculty and professional forums, in and around Chandigarh.

(f) Participated in the Pride of India (PoI) exhibition held during 107th Indian Science Congress held at Bengaluru in January 2020.

(g) Developed radio-jingles in Malayalam and Assamese languages on licensing requirements for Medical X-ray equipment.

(h) Published an article on 'Optimization of Medical Exposures in Computed Tomography' in 'RADBUZZ' and 'FLASH' magazines widely referred by medical X-ray professionals.

**10. International Cooperation**

(a) Held 17th bilateral meeting between AERB and USNRC at USNRC's headquarters at Rockville, Maryland, USA. The technical discussions during the meeting were useful in understanding the regulatory process being followed for the regulation of nuclear & radiation facilities and challenges faced by both the countries.

(b) Preparatory meeting for extended scope IAEA IRRS follow-up mission was conducted in virtual mode (due to the global COVID- 19 pandemic situation). The terms of reference for the extended follow-up mission were finalized during the preparatory meeting.

(c) A bilateral MoU was signed between AERB and the Vietnam Agency for Radiation and Nuclear Safety (VARANS).

(d) A bilateral meeting between AERB and Canadian Nuclear Safety Commission (CNSC) was held through video conferencing.

(e) Participated in IAEA PSA technical meeting and completed assigned task on 'Development of Fire PSA Questionnaire' and submitted to CANDU PSA Working Group.

**11. Public Accountability**

(a) 130 RTI questions replied during the period.

(b) Responded 33 parliamentary questions.

(c) Redressal of all grievances pertaining to AERB through Centralized Public Grievance Redress and Monitoring System (CPGRAMS) portal in time.

(d) Completed CAG compliance audit for the year 2017-2020. No major irregularity reported.

**12. Human Resource Development**

(a) Augmentation of manpower by recruiting 6 personnel in various categories.

(b) Organised a Management Development Programmes for middle level Officers towards developing soft skills.

(c) Training Manual on 'Biological Effects on Radiation Exposure (BERE)' prepared by AERB In-House Working Group.

(d) Towards continual knowledge upgradation and competency development of its staff, AERB organized three colloquia on safety related topics and a training course on NPP Containment Safety.

**13. Infrastructure Development**

(a) Civil construction of Eastern Regional Regulatory Centre (ERRC), Kolkata building completed.

(b) Construction of Niyamak Bhavan- C building at HQ is in progress.

(c) Procured and implemented new web conferencing on-premise system (Trueconf) for conduct of virtual meetings.

(d) Enhanced IT infrastructure to meet the increased demand of VPN, Laptops and NIC e-mail facility for officers for Work from Home during COVID-19 pandemic.

**14. Promotion of Official Language**

(a) Organised a workshop on 'Hindi Quarterly Progress Report and Record Management'.

(b) Press releases issued in Hindi and published in daily newspapers.

(c) 10,532 bilingual letters sent (English and Hindi).

(d) Issued a Booklet on 'Radiation Safety in Diagnostic Radiology' in Hindi.