Independence Day Address 2026

by

Director BARC

Dear Colleagues, invitees, ladies and gentlemen,

Heartfelt greetings to all members of the BARC fraternity on our 80th Independence Day.

Today, we pay our highest tributes to the countless brave men and women whose unwavering courage, selfless dedication, and innumerable sacrifices secured the freedom of our beloved nation from colonial rule. We also salute all those who have steadfastly carried forward this legacy, safeguarding the sovereignty, unity, and enduring freedom of our great nation through their dedicated service and commitment.

The story of independent India is one of extraordinary resilience, determination, and achievement. It is the story of a nation that, despite formidable challenges, has built a robust foundation of scientific knowledge, technological capability, and innovation. BARC has been privileged to contribute significantly to this remarkable national journey by being custodian of a proud legacy of scientific self-reliance envisioned by our founders. Since inception, BARC has remained steadfast in its mission of advancing the nation's strategic capabilities, ensuring energy security, and harnessing nuclear science and technology for the benefit of society. Every scientific breakthrough and technological innovation, every reactor operated safely and efficiently, and every milestone in research and development strengthens India's resolve to become a resilient, self-reliant, and technologically advanced nation.

As you are all aware, the scope of BARC's activities is very broad, encompassing virtually every facet of nuclear science and technology across both the power and non-power sectors.

I shall now cover some of the notable accomplishments under different verticals.

Vertical 1

Research reactors at Trombay continued to operate with high level of safety fulfilling the mandate. Dhruva research reactor operated with high availability. Secondary coolant pump common discharge header leak in Dhruva was rectified and reactor was restarted in exceptionally short time. Replacement of elastomer ‘o’-rings of SOR guide

tubes of Dhruva reactor was completed successfully with minimum downtime of reactor. Apsara-U reactor was successfully operated at different positions after shielding augmentation to utilise the thermal spectrum for detector testing. Critical Facility was operated 38 times as per requirements of users to test neutron detectors required for nuclear power plants and testing for products under development such as organic samples of Boron Neutron Capture Therapy (BNCT) agent.

Radiation Data Acquisition System (RADAS) for Dhruva has been upgraded to provide radiation monitoring data, along with real-time/historical trending, dynamic alarm generation, and alarm management.

Photo Neutron Source (PNS) Assemblies for TAPS 1 & 2 fabricated and supplied by BARC were installed to successfully to start and operationalise the reactors after long shutdown.

Post Irradiation Examination (PIE) and related activities with radioactive samples were continued. The pressure tube rolled joint stubs from RAPS-3 were studied in detail. Fracture toughness was determined for irradiated reactor pressure vessel surveillance samples from KKNPP 2. Mechanical tests were conducted on fuel clads subjected to LOCA in integrated facility to determine shifts in ductile to brittle transition temperature. Under-water cutting of irradiated beryllia reflector assembly and dimensional measurement of beryllia blocks was carried-out and it was confirmed that there was no swelling to ascertain the cause of swelling of Beryllia reflector assemblies.
In the area design, development and establishment of new reactors, significant progress has taken place. Process of finalisation of EPC contract to establish Isotope Production Reactor is in advanced stage. Physics design of Molten Salt Reactor core is in progress. The Detailed Project Report (DPR) for High Temperature Gas Cooled Reactor, being designed dedicatedly for hydrogen generation, is in advanced stage of approval. Environmental Impact Assessment (EIA) study and geo-technical investigations are being carried out on the proposed site at BARC, Vizag.

The project to establish High Flux Research Reactor (HFRR) at BARC Campus, Visakhapatnam, Andhra Pradesh was approved by the Cabinet Committee on Security and activities have been started to award contract for detailed engineering, procurement and construction (EPC).

The project proposal for Bharat Small Modular Reactor BSMR-200, being jointly developed by BARC and NPCIL with rated electric power output of 220 MWe, was approved by the Atomic Energy Commission. The project has received support from all the concerned ministries of the government and the proposal has been cleared by the Empowered Technology Group (ETG).

DPR of BSMR 300 has been prepared and is being submitted for approval.
BARC Safety council granted six regulatory clearances covering different nuclear fuel cycle and reactor facilities.

Vertical 2

A good reactor programme must be supported by an efficient nuclear fuel cycle. During this year,

Production of fuel assemblies for research reactors Dhruva, FBTR and Apsara-U was continued to ensure availability of reactors at desired levels. Fuel for Dhruva was supplied at enhanced requirements due to change in operation strategy. LEU targets plates were fabricated for Fission moly plant for production of fission moly as per requirement. Availability of all the plutonium-based fuel fabrication radiochemistry, isotope facilities and post irradiation examination (PIE) hot cells was ensured and necessary upgradation was carried out for continued readiness. Radiometallurgy wing was relicensed for continued regular production after auditing and compliance of recommendations.

Reprocessing and waste management facilities at Trombay, Tarapur and Kalpakkam continued to operate efficiently, maintaining high standards of safety, sustainable throughput, and radiological control. A new facility was hot commissioned for Storage of Special Inventory Packages. Installation and Testing of Cold Crucible Induction Melter (CCIM), a third generation melter, was completed and pouring of the glass product was also demonstrated.

Fuel Fabrication Plant at Tarapur continued to fabricate fuel elements for Prototype Fast Breeder Reactor at designated capacity.

Production of indigenously developed strontium selective crown ether was scaled up. Sr-90 has several applications including extraction of Y-90 for medical application and Radioisotope Heater Units (RHU) / Radioisotope Thermoelectric Generators (RTG) for possible terrestrial applications.

Activities related to new fuel fabrication projects are making very good progress. These include Fuel Fabrication Facility (FFF) at Tarapur, TL-1, 2 and 3 for plutonium-based fuels and TL-5 for uranium-based fuel at Vizag and Fuel Fabrication Plant within FRCFC, Kalpakkam.

Similarly, low level waste management plant at TL-7 and other waste management projects at Vizag have also made very good progress.

Activities at upcoming fuel recycling projects are also making good progress. Work on integrated plants continued at INRP and FRFCF. Civil construction of several blocks was completed in INRP and electrical, mechanical and utility work was started. The installation of process equipment and piping work commenced in reprocessing block process cells and waste storage vaults.

In FRFCF, installation of process equipment started in multiple units and installation of 2000Te super compactor for hull compaction and some of the machines and furnaces have been completed.

Vertical 3

In the area of development of accelerators and laser applications,

Folded Tandem Ion Accelerator (FOTIA) has completed 26 years of successful operation, delivering heavy ion beams to various users from R&D institutes and industry. It was operated for more than 2000 Hours during last one year for variety of experiments.

As an in-kind contribution to the Proton Improvement Plan project of Fermilab USA, BARC delivered a 2 kW capacity, custom built cryogenic plant, capable of delivering Superfluid Helium at 2 Kelvin. Installation of all major systems and components of this plant is completed and pre-commissioning activities have been initiated.

The mechanical design, engineering drawing and manufacturing of major components of an indigenous 18 MeV Medical Cyclotron have been carried out for VECC. The fabrication was also completed and items were dispatched to VECC.

BSC has granted stage-II regulatory clearance for establishing Infrastructure for various Accelerators planned at BARC Facilities, Vizag. The work is progressing as planned and MEHIPA project has been initiated.

BARC has persistently put efforts for meeting the societal needs of the country in the area of agriculture, food, water environment, and healthcare. I shall now highlight some of the major achievements in these areas.

Vertical 4

In the area of nuclear agriculture, the crop varieties developed by BARC are very popular among farmers. In the Kharif season of 2026, two Trombay rice varieties accounted for 37% of the total indented foundation paddy seeds for the state of Chattisgarh while in Maharashtra more than 17000 quintals of Trombay variety seeds were sold. Two of the Trombay groundnut varieties are now check varieties for national trials by Indian Council of Agricultural Research (ICAR) while 21 varieties of various crops are being used by ICAR as parents for national crossing programme for developing new varieties.

Other agriculture related technologies of BARC have also been proving useful for farmers. E.g., mushrooms preserved with BARC technologies are now being exported. In the area of water purification technologies, import substitute hollow fibre ultra-filtration membrane was developed in collaboration with technology partner. The membrane used in pre-treatment step of seawater reverse osmosis plants gave excellent result as compared to commercially available membranes.

In field of health care,
Chlorophyllin released as Aktocyte last year is now being exported. In clinical studies, it has proven useful for brain cancer patients suffering from radiotherapy induced brain radio-necrosis where it showed up to 65% improvement.

Successfully formulated a nasal delivery system for the indigenous organo selenium radiotherapy adjuvant DSePA, ensuring 20 times higher drug availability with minimal systemic side effects.

An electrochemical device, consisting of a sensor array and a portable interface has been developed for identification of pathogenic bacteria and Antibiotic Sensitivity Testing (AST). The sensor has been validated using patient derived samples in collaboration with hospital.

Enriched Lu-176 production, using laser technology, has more than doubled for making Lu-177 to meet the raising requirements.

About 975 Ci of ^{177}Lu was produced, radiochemically processed and supplied in the form of clinical grade radiochemical formulation. Bhabhaspheres, radioactive skin-patches and I-125 OcuProsta seeds for the treatment of patients suffering from liver cancer, keloids and ocular cancer, respectively, were supplied.

Following the philosophy of “Wealth from Waste”, valuable radioisotopes such as Ruthenium-106 plaques for eye cancer treatment and Yttrium-90 for neuroendocrine tumours treatment were recovered and supplied to hospitals. A new process was developed for increasing the production capacity of Yttrium-90. Cesium-137 pencils were produced and supplied to BRIT for blood irradiation.

Hot trials for batch processing of 25 Ci iodine at Cirus IPF were successfully completed and tests are progressing well for 50 Ci iodine batch.

Five new diagnostic studies based on Ga-68 and Tc-99m and one new treatment based on ^{177}Lu-DOTA-FAPI have been initiated at the Radiation Medicine Centre, for the routine clinical patient services. Similarly, both radioiodine and ^{177}Lu based radionuclide therapies have been initiated on a regular basis at RMRC, Kolkata. More than 3000 patients were provided radionuclide therapy at RMC while more than 13000 patients received radio diagnostic services. At BARC Hospital, an increased number of clinical departments and patient care services have commenced operations from the new building. New pharmacy centre has also started functioning in the new building.

Vertical 5 & 6

BARC has always been proactive in pursuing directed research and development advanced technologies. There have been some noteworthy advancements across these diverse domains this year.

Thirty-seven technologies have been transferred to 47 industries and 12 new technologies have been published for commercialisation. A new AKRUTI centre has been established at Pune University for outreach activities on DAE technologies and entrepreneurship development.

To accelerate technology translation and transfer, BARC entered into a MoA with the "AIC BARC Anushakti Foundation" to serve as its official technology translation arm.

There was significant progress in the area of nuclear hydrogen generation. In a first of its kind activity, clean hydrogen production as demonstrated using in house developed 4 step copper-chlorine hybrid thermocycle coupled with nuclear heat from Fast Breeder Test Reactor. Technology partner BPCL established an India's green hydrogen production facility based on BARC technology for large scale electrolyser stack refuelling station at Cochin International Airport based on BARC technology for large scale electrolyser stack, it is linked to an advanced 0.5 MW, with one lakh litre per hours hydrogen production capacity alkaline water electrolyser system.

Grooved oxygen free high conducting copper former with square helical geometry were fabricated by hot extrusion for the development of high temperature superconductor (HTS) based cable-in-conduit-conductor (CICC) and supplied to IPR, Gandhinagar for Fusion Programme.

Rare Earth and Titanium Theme Park of IREL was inaugurated in Bhopal showcasing technologies developed by BARC for rare earth (RE) and titanium metals, RE recycling and RE phosphors production at pilot plant scale.

The inhouse developed alumina based ceramic membrane reactor for treating ammonia and hydrogen sulphide gases in waste gas streams was demonstrated at

Heavy Water Plant (Manuguru). It achieved nearly complete NH_3 conversion and >85% H_2S conversion during treatment of simulated gas mixture.

The 6/4 MeV dual energy linac for Cargo scanning was Heat run tested for long duration to assess durability and dose rate of 2 Gy/min from W-target at 400 pulse repetition frequency (PRF) with dose stability within 1% was achieved.

Upgraded version of inhouse developed turbo molecular pump- Anuturbo-80- with 50,000 compression ratio was designed and fabricated.

A prototype parallel plate gamma compensated ionization chamber for neutron flux measurement was tested at variable reactor power from 100 W to 1 MW in the new thermal column test facility of Apsara-U reactor.

Six High Temperature Boron Coated Counters (HTBCC) and Fission Chambers installed in the control plug of PFBR were used for the initial fuel loading of the reactor. Isotopic separation and enrichment of Nickel-62 isotope has been carried out successfully up to 99.5% using the indigenous Electromagnetic Isotope Separation facility.

A Strontium-90 based Beta-Photovoltaic Nuclear Battery using gadolinium scintillator - perovskite diode configuration has been experimentally demonstrated with a power output of about 10 microwatts.

A robotic system has been designed, developed and fabricated to automate handling & dispensing of radioactive solutions. The control architecture and customized software for full automation were also developed. The system has been validated.
Process was optimised for overall uranium recovery of approximately 90% from Kudar ore. Similarly, a process flowsheet has been designed for more than 90% recovery of Li from lepidolite concentrate along with more than 80% recovery of Rb and Cs. This integrated process paves the way for recovering the critical metals by valorization of the mined ore.

A first of a kind certified reference material of B-10 enriched boron carbide certified for 12 properties was produced.

A new facility named MENACA (Multimodal Elemental Neutron imaging and ACtivation Applications) has been successfully commissioned at Apsara-U for elemental characterization.

BARC provides various facilities for research using beam lines to users from various universities and institutions. In last six months, the National Facility for Neutron Beam Research (NFNBR) at the Dhruva reactor supported over 100 research groups and BARC beamlines at the Indus synchrotrons, Indore served 261 users.

As a part of preparedness towards management of Nuclear and Radiological Emergencies, BARC has developed a state-of-art vehicle based 'Mobile Radiological Assessment Laboratory' (MRAL) for strengthening the response capability towards any potential radiation emergency situation. These vehicles are being deployed at environmental survey laboratories of various nuclear power plant sites.

BARC has implemented a Quality Management System conforming to ISO/IEC 17025:2017 in its ionizing radiation standards laboratories and has subsequently participated in an international peer review of its quality system and technical activities. Twelve Calibration and Measurement Capabilities (CMCs) of BARC in the field of ionizing radiation are now published in the BIPM Key Comparison Database.

A web-based application named Indian Registry of Occupational Dose (IROD), has been developed and successfully implemented across India for the registration and management of occupational radiation dose records.

An indigenous broadband Magnetic Resonance Facility with Ferromagnetic Resonance (FMR) and Electron Spin Resonance (ESR) was established to enables comprehensive characterization of quantum and nuclear materials.

About 150 radiation sources with various radioisotopes were fabricated and supplied to different users including departmental, educational and industry for multi-techno applications.

Vertical 8

The scientific and technological developments shared here are possible only with sound human resource development programme, good infrastructure and reliable technical services.

BARC lays very high emphasis on development of human resources. It has become even more important in view of Nuclear Energy Mission. During last year OCES programme received more than 90,000 applications. 266 TSOs joined in OCES programmes and 31 in DDFS programme

On the job training for more than 1000 CAT 1 and 2 trainees is progressing well in various labs and facilities.

Administrative officers of BARC regularly deliver lectures at the Administrative Training Institute to provide training to officials at various levels.

In the services sector, excellent efforts of our engineering services, ensured more than 97% overall availability for all civil, electrical, HVAC, mechanical utility services at Trombay campus.

Colleagues, the scientists and engineers of BARC regularly get recognised by various organisations for their outstanding contributions.

Some of the officials who received awards or recognitions this year are

Dr Mohit Tyagi was elected Chairperson of Indian National Young Academy of Science.

Shri Rajath Alexander was selected for INAE Young Engineer Award 2026.

Shri B. C. Sahoo, Shri S. B. Rahate and Shri D. B. Wagmare of Fire Services were honoured with the DG's DISC by the Director General, Civil Défense and Fire Services, Ministry of Home Affairs (MHA).

Dear colleagues

The achievements presented are the representative few of the big list. These achievements are the result of hard work put in by all of the members of BARC family and their commitment to excellence.

As we look towards the future, let us carry forward the same spirit of innovation, dedication, and patriotism that has guided our journey thus far. The challenges before us are complex and demanding, but they are matched by our capabilities, our resilience, and our unwavering resolve. With our excellent human resources and scientific infrastructure, and an unwavering commitment to national service, I am confident that BARC will continue to scale new heights and make enduring contributions to India's scientific and technological progress for the vision of a Viksit Bharat.

I would also like to take this opportunity to acknowledge the important roles played by Administrative Group, Engineering Services Group, Medical Group, BARC Safety Council, BARC Security, Anushakti Nagar Security, CISF, Security Guard Board personnel, Public Relations Office, Fire Services Section, Landscape and Cosmetic Maintenance Section, Transport & Catering Services Section, contract workers and many more, who individually and collectively facilitated the smooth functioning of the organisation. Special thanks are due to BARC Workers and Staff Unions for their support and cooperation. I am also thankful to all the personnel of BARC Credit Society, State Bank of India and Indian Post who are stationed at our campus and have been providing good services to our employees.

Thank you & Jai Hind