

Independence Day Address
by
Director, BARC

Dear colleagues, invitees, ladies and gentlemen,

With great pride and honour, I extend my warmest greetings to all on the 77th Independence Day of the nation. We celebrated the Azadi Ka Amrit Mahotsav all across the country and now it is the time to rededicate ourselves to fulfil the dream of Amrit Kaal. It is my pleasure to greet everyone gathered here on this occasion as we pay our respects to the brave sons and daughters of our motherland who made innumerable and unimaginable sacrifices to achieve independence for our country. A nation can progress and develop only when all of her children put in a collective effort. It is the indigenous science and technology which plays most important role in the economic growth, prosperity of the country and high living standards of its people. As members of this great institution, which is known as the abode of futuristic science and technologies, let us commit to increase our efforts to fulfil the dream of the founding fathers of the nation to make the country fully developed in Amrit Kaal.

As you all are aware, BARC is a multi-disciplinary research institution with footprints across diverse domains. We continue to focus our efforts on strong research and development programmes, aimed to benefit the society and the nation in multiple areas.

I shall begin by highlighting some of the notable accomplishments in the front-end and back-end of the nuclear fuel cycle.

1. Dhruva reactor continued to operate with a high level of safety and availability factor of 76%. Around 400 samples were irradiated for radioisotope production. The reactor served as a national facility for neutron beam research where several researchers from various academic institutions in the country utilised the reactor for scientific studies
2. Apsara-U reactor operation was continued with a high level of safety and availability factor of 85%. Shielding augmentation of tray rod facility for handling high specific activity molybdenum has been completed.
3. Critical Facility was operated on 36 occasions for various important experiments, testing of nuclear detectors, activation of large volume samples for Neutron Activation Analysis and irradiation of gold foil for flux measurement.
4. Fuel fabrication for all of DAE's research reactors continued to ensure reactor availability at the desired power level. Fuel Fabrication Plant continued to fabricate PFBR fuel elements.
5. Post irradiation examination of pressure tubes from MAPS-1 and various tests on Reactor Pressure Vessel surveillance samples from KKNPP VVER were carried for their strength and fitness for service assessment.

6. An Automated Ball Indentation based In-situ Property Measurement System was developed and deployed in four pressure tubes of RAPS unit-3 to measure mechanical properties.
7. Waste Management and reprocessing facilities at various BARC locations continued to achieve excellent performance. New facilities were augmented and De-Nitration Plant was successfully hot commissioned.

Our persistent efforts towards meeting the societal needs in agriculture, food, healthcare, water and environment have continued to yield dividends during the year. I shall now highlight some of them.

8. The indigenously developed synthesis of PSMA-11 ligand at BARC for diagnosis of prostate cancer was approved by Radiopharmaceutical Committee for affordable patient use.
9. More than 600 dosages of Lu-177 were produced using indigenous LASER route.
10. After successful trial irradiation at Dhruva, regular production of medical grade High Specific Activity Moly-99 was started on commercial scale and 48 target plates were irradiated.
11. KRUSHAK facility, Lasalgaon has been upgraded by installation and commissioning of cold storage for onions. 30 tons of onions have been irradiated & stored in this facility for periodic evaluation of quality parameters.

12. Department of Consumer Affairs along with National Cooperative Consumers' Federation of India Limited has signed an MoU with BARC for "Large scale feasibility trial" for preservation of onions. More than 1000 MT of onions have been irradiated under this MoU and periodic analysis of onion quality parameters during cold storage is in progress.
13. Four Trombay crop varieties have been released and Gazette notified for commercial cultivation which includes one variety each of sorghum, mungbean & blackgram for Karnataka and one sorghum variety for Maharashtra.
14. Under the DAE's Project on deployment of water purification technologies in rural and remote locations of India, deployment has been carried out in 116 equivalent villages of India.
15. Advance Effluent Water Treatment Plant based on ozonation technology was commissioned with 750 LPH capacity at ONGC Mehsana for field demonstration to treat oil contaminated effluent water and make it suitable for agricultural use in rain parched adjoining area. A 150 kLD capacity hgSBR technology-based Sewage Treatment Plant has been erected, commissioned and operationalised at Surat which is giving excellent quality of treated water.
16. A Dye Filtration Plant based on Radiation Grafted polymer adsorbents was developed and deployed in Jodhpur, Rajasthan for treating textile mill wastewater.

As part of our efforts in directed research a number of technologies have been developed and transferred to private entrepreneurs and PSUs. Several new technologies have crossed significant milestones. I shall briefly mention a few of them.

17. A total of 194 agreements were signed for transferring new technologies to industry during the year.
18. A new table top 10MeV, 5kW RF electron LINAC started functioning and tested up to 4.3 kW beam power. This can be used for effective medical sterilization.
19. Pulsed plasma generating tool has been qualified in ONGC oil wells up to 1.5km depth for Enhanced Oil Recovery under the MoU between BARC & ONGC.
20. Inter Ministry collaborations were initiated for deployment of Indian Cargo Scanner in Jawaharlal Nehru Custom House and electron beam accelerator for tannery water treatment in Unnao towards field trials.
21. A first-of-its kind integrated facility for hydrogen production by copper-chlorine thermochemical cycle using was commissioned and hydrogen production was demonstrated.
22. The indigenously developed cyber security solution at organization level; Secure Network Access System has been deployed successfully in prestigious organizations like Indian Space Research Organisation, Defence Research & Development Organisation and Ministry of Home Affairs. The

technology is now available for transfer to industry for further proliferation.

23. A Helium Leak Detector has been developed indigenously & deployed for operation in the corrosive environment.
24. A Thermal Ionisation Mass Spectrometer for precise isotope ratio measurements of uranium and plutonium has been designed and developed.
25. A lab-based system has been developed with the indigenous D-T neutron source and Bismuth Germanate detector for recording the gamma ray spectrum emitted by coal samples by neutron activation. The system determines the elemental composition of coal for the estimation of Gross Calorific value.
26. Seven additional units of import substitute Sodium Iodide single crystal based detector assembly have been made for incorporation in the Backpack Gamma Spectrometer System (BGSS) for radiation surveillance.
27. The technology for CsI:TI single crystal based one dimensional pixelated detectors has been developed indigenously. Forty High energy and 40 Low energy CsI:TI detectors have been fabricated for X-ray Baggage Indigenous Scanner.
28. An indigenous high current ion source has been developed for electro-magnetic isotope separator for producing medically important Lu-176 isotope, the precursor of Lu-177.

I would now like to bring out some of the other noteworthy developments and contributions at our Centre.

29. Recently on 04th August 2023, the Low Energy High Intensity Proton Accelerator (LEHIPA) has been operated to successfully demonstrate acceleration to 20 MeV. Presently, beam intensity of around 2 mA has been achieved. Majority of sub-systems of LEHIPA have been designed indigenously and manufactured by Indian industry, mainly by MSMEs. This has opened up a new era in the field of high current and high energy proton accelerators in India. This technology can be used in the development of proton synchrotrons for radiation therapy for cancer treatment, for production of radio-isotopes, basic research using radio-active ion beams, and also serves as the first step towards future accelerator-driven reactor systems.
30. A clean room of class 10,000 with clean bench of class 100 and fume hood facility has been established at BARC hospital for processing of samples for ultra-low-level detection under nuclear forensic analysis capacity building.
31. An indigenously developed 5-Ton Electro Hydraulic Servo Shake table was commissioned and is available for experimental seismic evaluation of structures & components.
32. Special Plate Fuel Facility is fully commissioned and operationalized. The LEU target plates fabricated from the facility are being handed over to Fission Molybdenum Plant on

regular basis for successful production of medical grade Fission Moly radioisotope.

33. Under R&D Phase of Indian Institutes and FermiLab collaboration, Low Level RF system, Resonance Control System and RF Protection & Interlock system have been developed & supplied to Fermilab for further testing.
34. The in-house fabrication, testing and supply of second column of heavy water upgradation plant of KAPP – 4 nuclear power plant has been completed.
35. Indigenously developed Scanning Electron Microscope has been installed at the newly inaugurated Central Research Instrumentation Facility at IIT Bhubaneswar.
36. Three units of indigenously developed Dry Type Mark-III Calorimeter have been installed and commissioned for assay of materials.
37. Bio Safety level 3 laboratory, used to study infectious agents, was successfully commissioned for research on tuberculosis disease, drug discovery in tuberculosis and vaccine efficacy studies.
38. To strengthen department's commitment for early detection and response to any possible radioactive release, coverage of online radiation monitoring under Indian Environmental Radiation Monitoring Network (IERMON) has been expanded to 30 states and union territories. Currently, BARC has 556 systems installed across the country.

39. Under the objective of estimation of nationwide natural background gamma radiation levels using environmental TLDs, one year monitoring covering 25 states and union territories was completed.
40. The MACE telescope operating at Hanle has successfully detected statistically significant high energy gamma-ray emission from the direction of an active galaxy at a distance of 667 million light-years from the Earth. It was also detected by other international agencies.
41. Apart from its scientific importance, the MACE telescope is also catching a significant attention in Astro-tourism of the Ladakh region. A team of 28 young delegates, belonging to diverse fields from ten nations, visited the MACE telescope as part of the ongoing activities of the Azadi Ka Amrit Mahotsav organized by the Indian Council for Cultural Relations.
42. Radiotracer investigation was successfully conducted in a cross-flow reactor at BPCL, Noida. Based on the study, the design of the reactor was improved and the flow dynamics was optimised.

I am immensely happy to congratulate following of our colleagues for recognitions received by them.

43. Dr. K. Tirumalesh has been conferred the National Geoscience Award in Applied Geology category for the year

2022 jointly with Dr. Harish Bahuguna of Geological Survey of India by the honourable President of India.

44. Dr. Jyotirmayee Mohanty has been selected for the IUPAC 2023 award for 'Distinguished Women in Chemistry'.
45. Shri E. K. Nile, Fireman-E has been awarded with "Commendation Certificate and Bronze Disc" for the year 2022.
46. Dr. Archana Sharma received EMC Engineer Award and Member Achiever Award in XV Triennial & III Intl. Conference of IWSA.
47. Dr. Dimple Dutta and Dr. Nandita Maiti have been elected as the Fellow of Royal Society of Chemistry (FRSC), UK

Dear colleagues, the achievements presented in this address are just a gist of our accomplishments in the very recent times. They represent the collective effort of all our employees who have contributed in equal measure to this large team effort. I urge them to continue to serve the organisation with the same spirit of teamwork and cooperation which has fetched rich dividends to the organisation and the nation.

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, Anushaktinagar Security, CISF, Public Relations Office, Fire Services Section, Landscape and Cosmetic Maintenance

Section, Transport & Catering Services Section 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.

I once again extend my Independence Day greeting to all and wish everyone a fulfilling, purposeful and successful year ahead.

Jai Hind.