Republic Day-2021

Dear colleagues, friends, ladies and gentlemen,

It is my privilege to welcome you all on the occasion of 72nd Republic Day and extend my warmest greetings.

The pristine surroundings and the technological marvels around us make me feel proud of the journey of our Centre. On this day, the founding fathers of our constitution gave us a forward-looking constitution which stood the test of time for this great nation and realised the dream of a sovereign democratic republic. Our constitution also envisages scientific temper as one of the basic duties of Indian citizen. We all know that our visionary founding father Dr. Homi Jahangir Bhabha was the leading light to develop and guide us on the path of “Atma Nirbhar Bharat” in nuclear parlance. At the same time, he was also instrumental in framing the Science Policy of our nation post-independence. This policy formed the cornerstone of scientific development in India.

As we have gathered here today to celebrate the 72nd Republic Day, I would be happy to share with you some of the achievements and milestones of BARC in the recent past.

The nuclear fuel cycle related activities at this Centre, namely fuel fabrication, reactor operations, fuel recycling and waste management, are the foundational activities of BARC and I shall begin with a brief report on these activities

1. Research reactor Dhruva continued to operate with a high level of safety and availability, including during pandemic enforced lockdown. Around 500 samples were irradiated for radioisotope production during the year. Dhruva continued to serve as a national facility for neutron beam research.

2. Apsara-U reactor was operated with high safety standards for development of emerging theranostic radioisotopes and 18 samples were irradiated and delivered. Reactor achieved availability factor of more than 90% in last quarter.

3. Plutonium plant was operated successfully for reprocessing of spent fuel and recovery of Special Nuclear Materials.

4. Operation of waste management facility was continued satisfactorily to treat High Level Waste to recover valuable radio-isotope for societal applications. 6 kg of cesium glass was produced for making cesium glass pencils.

5. A facility has been installed and commissioned for recovery of heavy metal from solid rejects which facilitates time-economy and better special nuclear materials management.

6. Post irradiation examination of the first pressure tube from a 540 MWe reactor has been carried out. The pressure tube of TAPS-4 was the channel with the highest radioactivity examined at the hot cells of PIED till date.

7. BARC has developed a Non-contact, 3D profiling System for Pressure tubes of 540 MWe PHWRs at one-tenth the cost of import substitute.

Several technology initiatives and projects have achieved important milestones or reached completion. Some of these activities are as follows

8. Installation of Digital Mobile Radio (DMR) - Tier II technology with features for communication security and very good network diagnostic is completed for CISF and BARC Security Forces in Anushaktinagar.

9. A system has been developed and successfully validated for online monitoring of health of electrical systems to address requirements of ageing management of electrical cables.

10. New fire station extension building having carpet area of 1700 sq. meter has been completed and handed over to fire section.

11. Commissioning of Meteorological and Hydrogeological Laboratory, SODAR facility located at Gamma Garden was completed and these were handed over to users.

12. Additional 200 kWp Roof Top Solar panels (with cumulative 1390 kWp) have been installed at various buildings of BARC taking the total installed capacity to 1.39 MWp power.

13. Installation of Induction heated annealing furnace at NFC Hyderabad was completed and commissioning trials have been carried out successfully using 14 mm OD tubes.

I shall now mention some of the noteworthy R&D contributions and initiatives

14. A 0.5 meter neutron supermirror guide unit showing greater than 95% transmission has been developed as an import substitute using in-house coated Ni/Ti supermirrors.

15. The technology for the indigenous Thermal Ionisation Mass Spectrometer developed in BARC was transferred private entrepreneur.

16. An advanced imaging system has been developed for monitoring the protein crystallization process which enables the determination of structure of macro molecules for drug development.

17. Laser based isotope separation technique has been used for the first time to enrich Yb-176 from natural Yb-metal. After neutron irradiation and electro-chemical process Lu-177 was extracted with 99.5 % purity for medical application.

18. Experimental facility for Hybrid-Sulfur Metallic Closed Loop, for production of Hydrogen was commissioned and operated on campaign basis for further studies.

19. An organic dye-polyelectrolyte assembly based fluorescence ratiometric sensor for ATP has been developed with a detection limit of 100 nano Molar, and high discrimination over inorganic pyrophosphate.

20. A US patent was granted to DAE on the development of a novel & versatile phoswich detector to discriminate various kinds of radiations.

21. Two Single Spoke Resonator Tuners have been manufactured at BARC for tuning superconducting RF cavities under Indian Institution and Fermi Lab Collaboration.

22. An experimental set-up for measuring the 98Mo(n,γ)99Mo cross section using 10 MeV LINAC of EBC Kharghar was designed and the effective cross section of Mo-98 was measured using several energy sensitive activation foils.

23. Improved constitutive model has been developed to predict damage under stress triaxiality in ductile materials for Indian Nuclear Power Plants.

24. 3.5 kg of neodymium metal of required purity for permanent magnets was successfully produced by calciothermic reduction from indigenous raw materials. This technology of neodymium metal production will be transferred to interested entrepreneurs under incubation mode.

25. A carbon nanotubes film based reusable probe has been developed for label-free detection of a virus based on change in electrochemical impedance due to hybridization of DNA.

The contribution of BARC to missions of societal cause have always been one of our important mandates and I shall now like to draw your attention to achievements in this important segment of our activities and programmes.

26. Five lots of carrier-free high specific activity 90Y-acetate solution were separated from $^{90}Sr(NO_3)_2$ solution and supplied to RMC, Parel for radiopharmaceutical applications.

27. A new process has been developed for the production of liposomal carriers for application in the delivery of anticancer drugs, viral proteins and an Indian patent has been filed for the process.

28. Covellite has been developed as a sorbent for the removal of arsenic from contaminated groundwater to the WHO recommended level of 10 ppb. It is perfectly suitable for on the spot applications and also exhibits good cyclic stability.

29. Under the DAE Project on “Deployment of water purification technologies in 50 villages in India”, four hundred point-of-use arsenic decontamination devices of 24 LPD capacity are deployed in Village Harail, Dist. Samstipur, Bihar.

30. An Indian patent has been awarded to BARC Litchi preservation technology to increase the shelf-life of litchi up to 60 days.

31. Indigenous synthetic strategy for high value radiopharmaceutical ligands like prostate-specific membrane antigen (PSMA-617 and PSMA-11) was developed. Till date, 50 mg of PSMA-617 has been delivered to BRIT, which has been used to treat hundreds of prostate cancer patients in India.

32. A device called DEAP, based on continuous positive airway pressure to ease apnoea condition has been developed. The technology has been transferred for commercialization.

Dear colleagues

The prevailing pandemic posed several challenges to us. We successfully managed to continue our journey while providing safe and secure environment to our employees and family members.

To meet the challenge of restricted movements a Web based video conferencing tool ‘VMEET’ based on Open Source protocol has been developed which can be used with standard web browser. The entire communication is encrypted using public/private key pairs.

Despite all the difficulties, the 64th batch of BARC Training Schools was inducted on 18 January 2021.

It is very proud moment to announce that our Research Centre has been awarded 1st prize by Navi Mumbai Town Official Language Implementation Committee (TOLIC) and honoured with Rajbhasha Shield Award.

Dear Colleagues, I have only presented a few achievements of our Centre, which were accomplished only due to the sustained efforts of our scientists and technologists. On this Republic Day, I acknowledge the role played by each and every individual who have contributed to this magnificent team effort.

I would also like to take this opportunity to gratefully acknowledge all personnel providing auxiliary and support services for their contributions towards the success of our programmes. This includes the Administrative Group, Medical Group, Engineering Services Group, BARC Safety Council, Security Section, CISF, Fire Services Section, Landscape and Cosmetic Maintenance Section, Transport & Catering Services Section and many more, who are undoubtedly one of the strengths of this organisation. Our thanks are also due to all the personnel of BARC Credit Society, State Bank of India and Indian Post who are stationed at our campus and provide services to our employees. Special thanks are also due to the unions and associations for their support and cooperation. At the end, my dear colleagues, I would like to once again extend Republic Day greetings to all our employees.

Thank you, Jai Hind