

REPUBLIC DAY ADDRESS OF DIRECTOR , BARC

I extend my warmest greetings to all of you on the occasion of 71st Republic Day of the nation. As we stand here on this solemn occasion, with the national flag fluttering against the backdrop of the Trombay hill and with the iconic Cirus and Dhruva reactors in the foreground, it evokes feelings of pride and honour which our nation and organisation has earned over these seven decades. The Indian constitution which was launched on this day is a document intended to endure for ages and the heritage bequeathed to us by the founding fathers of the nation. Sovereignty as enshrined in our constitution, should be viewed not merely as a national concept. The egalitarian values of justice, equality, liberty and fraternity should also be regarded as the constitutional message to be practiced at the personal, societal and institutional levels. The achievements of this organisation owe much to the sovereignty of creative thinking, experimentation and reportage embedded in the organisational culture. We have made great contributions over the six decades and more of our existence due to steadfast adherence to these values, within the ambit of organisational goals and mandates.

The nascent field of atomic energy took birth in India in 1954, not much after the rebirth of this ancient nation, and it has since been a long, arduous and successful journey. Our aim remains fixed on goals and objectives set forth by our founders towards harnessing the power of the atom in the service of the nation. We have a broad-based mandate, with equal emphasis on scientific research, technological innovation, development and deployment- for the nuclear sector as well as towards applications to other domains. Our focus on translating our efforts towards societal applications is equally noteworthy. As we are gathered here today to celebrate the 71st Republic Day, I shall be listing out 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. Dhruva reactor continued to operate with a high level of safety and availability. 720 samples were irradiated in tray rods and PCF facility during the year for isotope production.
2. Production of radioisotopes has commenced at Apsara-U reactor. 32 samples were irradiated in the reactor core.
3. UED has processed and delivered the committed target of 30.0MT nuclear grade Uranium metal and supplied to AFD for fuel fabrication for DHRUVA Reactor.
4. Critical Facility for Advanced Heavy Water Reactor (AHWR) operated on 77 occasions and fine structure flux measurement in and around experimental cluster were carried out. Testing of nuclear detectors and irradiation of large volume samples for Neutron Activation Analysis continue to be carried out at this facility.
5. Reprocessing, Waste Management and Fuel Fabrication plants continued to perform well and achieved their targets. PREFRE-2 at Tarapur reprocessed a record quantity of spent fuel for the fourth successive year. At WIP, Kalpakkam, The Joule Melter operated without any interruption for 352 days and reached a milestone figure in terms of number of curies vitrified and number of product canisters produced.
6. An indigenously developed automated guided vehicle has been commissioned at the New Uranium Oxide Fuel Production Plant, NFC for transfer of pellet boats between compaction and sintering stations. Deployment of AGV will increase throughput of fuel fabrication process.

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

7. The installation of the 21m diameter MACE -Major Atmospheric Cherenkov Experiment- telescope at Hanle, Ladakh has been completed with the installation of all the subsystems of the telescope. Optical alignment of the mirror panels, engineering runs and trial observations are currently underway.
8. RF Seeker for guiding the long range BrahMos missile was designed and developed by BARC and ECIL. The seeker was found to meet all the guidance and control requirements for performing search, detection, tracking and homing onto the target and the missile was successfully tested in December 2019.
9. Dual energy Linac achieved 200 Hz, interlaced mode of operation with 6MeV and 4 MeV energies giving a radiation dose of 1 Gray at 1 meter. The linac will be utilized in the gantry system of the Indian Cargo Scanner.
10. Indigenously developed, six degrees of freedom, hexapod based high precision mirror alignment system has been commissioned at RRCAT. It will be used for alignment of dispersive extended x-ray absorption fine structure (DEXAFS) beamline, BL-8 of Indus-2.
11. Support and collaborations with national and international accelerator programmes continues and solid state RF amplifiers, RF protection systems and RF interlock systems have been designed and delivered to LEHIPA, RRCAT, and Fermilab.
12. An Ultra High Vacuum compatible Pulsed Laser Deposition System has been designed, developed and installed at Angle Resolved Photoelectron Spectroscopy beamline for In-situ Photo Electron Spectroscopy studies on thin film samples. The facility would find use for materials research involving electronic structural studies in thin

films of various technologically important materials for next generation electronic devices.

13. Design of Core catcher for IPWR with in-house developed sacrificial material has been carried out and validated in scaled core catcher with 550 kg melt at temperature more than 2500 °C.

14. Immobilisation of active metallic waste of Zirconium alloys from PHWR fuel bundles, decommissioned SS 304 steel glove boxes and inactive metallic waste in kilogram quantities by creating a low melting eutectic alloy has been successfully demonstrated.

15. Fifty five nos. of Bhabha Kavach (Bullet Proof Jackets) meeting all qualifying requirements of ballistic tests as per new BIS standard have been manufactured for CISF stationed at BARC .

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

16. A process has been developed for making high performance iron oxide based foam catalyst for sulphuric acid decomposition reaction of Iodine-Sulphur process for hydrogen generation. The catalyst has given steady performance of ~85% conversion efficiency over 100 hours of testing.

17. An indigenously developed severe accident source term analysis code PRABHAVINI v1.0 with the collaborative efforts of BARC, NPCIL and AERB has been installed in ANUMEGH, Super Computing Facility. The code has the capability of simulation of several critical parameters of an operational reactor.

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.

18. Under a pilot project on “Deployment of Water Purification Technologies in 50 Villages in India”, the first 1000 Litres per hour water treatment plant based on RO technology was commissioned in November, 2019 at Somthana Village of Nanded District, Maharashtra. Water is dispensed at a nominal cost using a preloaded card. The plant is catering to the drinking water and other requirements of about 2500 villagers.
19. A Linseed variety, TL-99 (Trombay Linseed-99), developed by BARC has been released and notified for commercial cultivation by the Central Sub-Committee on Crop Standards Notification and Release of Varieties - Ministry of Agriculture and Farmer's Welfare, GOI. TL 99 is the first linseed variety in India released for edible oil purpose.
20. A novel, low cost and compact biogas plant for processing biodegradable waste has been developed. Due to the compact design, it can be mounted on a mobile platform and used in areas where locating a conventional biogas plant is difficult.
21. Fenugreek seeds are widely used for their medicinal properties. A Technology for debittering and taste masking of fenugreek seed extract was developed and licensed to an entrepreneur. The product has been launched commercially.

The infrastructure and the safety culture of BARC is one of our strengths. BARC is committed to ensure safety of the occupational workers, public and the environment. All facilities and projects of BARC met the highest safety performance standards set during this period. Safe disposal of chemicals is an important aspect of safety and environmental consciousness and as a part of this process, 10000 litres of liquid organic chemicals from various Groups of BARC were incinerated successfully.

Dear colleagues, the milestones and achievements presented in this address are not an all-encompassing description of our work but merely provides a glimpse of the breadth, scope and vastness of our programmes

and missions. They represent the collective effort of all our employees who contribute 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.

Even as we look back with pride at what has been achieved, it is equally important to look forward and plan well for the future. In this era of rapidly changing technological advances, it is imperative that we evolve a long-term vision and take steps to increase our presence in some of the futuristic and cutting edge frontiers, from which shall emerge the technologies of the future. These may be regarded as high risk activities with no guaranteed pathways for success, but the returns for achieving breakthroughs are certain to be equally rewarding, for the organisation and the nation.

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 Services Group, Engineering Services Group, BARC Safety Council, Security Services, Fire Safety Services, Landscape and Cosmetic Services, Transport Section, Catering Services 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.

Thankyou, Jai Hind