Dignitaries, invitees, colleagues, ladies and gentlemen, it is an honour and privilege for me to hoist the national flag on the event of the 74th Independence Day of India on behalf of the entire BARC family. I am pleased to extend my warmest greetings to all gathered here for this solemn occasion. We are all aware of the great struggle and sacrifices our leaders and forefathers had made to gain freedom from colonial imperialism. This is an occasion to pay our homage to the brave sons of India. This also ushered in the birth of a powerful nation capable of meeting the needs of the citizens. A strong foundation in science and technology was essential in fulfilling the aspirations of the new nation. Our leaders rightly realised the need for establishing great institutions for meeting this objective.

It is in this context, Atomic Energy Establishment, Trombay later renamed as Bhabha Atomic Research Centre, was founded by Dr Homi Jehangir Bhabha. He had then realised that atomic energy would play a key role in building a strong nation. As you are all aware, BARC has now grown to the stature of a premier multi-disciplinary research centre involved in the advanced research and development in the entire spectrum of Nuclear Science and Engineering and related areas. BARC has always pursued the need to develop and deploy indigenous technology not only to meet the demands of the nuclear sector but also to address the needs of the society.

Dear colleagues, you are all aware the whole world is going through challenging times. We are faced with the COVID-19 pandemic which made its appearance early this year. BARC Hospital was geared-up to face the pandemic situation even before the first case of COVID-19 was detected in Maharashtra. BARC Hospital and its network of dispensaries are providing medical services to more than 1 lakh beneficiaries. One of the important tasks before us was to run both COVID-19 and non-COVID medical services for our beneficiaries, at dispensaries and at BARC hospital adhering to all the guidelines issued by the government authorities.

In this direction, BARC Hospital implemented various measures to deal with the pandemic. Notable among them were setting-up of a dedicated fully equipped Fever OPD, ensuring regular COVID testing through private labs at BARC hospital, creation of COVID Corner at BARC website for disseminating the COVID-19 related information and operationalizing COVID-19 Helpline Centre at DAE Convention Centre. The BARC hospital and its staff have been relentlessly providing the medical services to our CHSS beneficiaries.

I take this opportunity to convey our deep sense of appreciation to entire team of BARC hospital staff our “Corona Warriors” - for the services being rendered.

The main thrust of our activities has always been the strong research and development programmes in all disciplines of science and engineering. As in the past, this year also we have many significant achievements to our credit.

I shall now begin with highlighting some of the notable accomplishments of our organisation in the front-end and back-end of fuel cycle.

1. Research Reactor Dhruva continued to operate with a high level of safety and good availability. The Reactor was also operated during lockdown period and isotopes were delivered regularly.

2. An integrated data acquisition system for Reactor Pressure Vessel inspection for Ultrasonic and Eddy current testing (E-ULTVIS) has been qualified and deployed for RPV inspection during 25th Reactor Fuelling Operation at TAPS-1 in March 2020.

3. A Prototype Multi-train Reactor Protection System (RPS) has been designed for performing reactor safety functions. Program logic for RPS has been built using in-house developed “Safe Programming Environment for Real Time Systems (SPERTS)”.

As part of our efforts in directed research a number of technologies have been developed to serve a variety of applications, a few which I would like to mention here.

4. To meet control and automation needs of DAE, BARC along with ECIL and IGCAR has developed a Safe, Secure and cyber resilient Programmable Logic Controller platform "NUCON PLC". NUCON based test, evaluation & demonstration facility catering to 8000 Input-outputs has been commissioned at ECIL. Validation of I&C requirements of INRP project has been demonstrated at this facility.

5. A mobile robot for hot cell decontamination has been developed. The robot is remotely controlled and navigated using visual feedback obtained from on-board & in-cell cameras.

6. 4-Tesla,100 mm warm bore superconducting magnet for high gradient magnetic separation system was developed and qualified for its magnetic and thermal performance.

7. A 6 Tonne, 0.5 Tesla, high field uniformity, Stigmator dipole magnet for Lutetium isotope separation was designed, fabricated, characterized and commissioned at BARC.

8. A tele-operated mobile robot has been developed to generate 3D map of radiation levels inside the K-130 room

temperature Cyclotron vault and experimental cave area during operation. The system has been tested and commissioned at Medical Cyclotron Centre, VECC.

9. A drone-based system has been developed for automated imaging of farm crops. The system has high resolution imagers that capture thermal and visual images of crop and will be very useful in the area of agriculture research.

10. A prototype electronic mine to serve as replacement for dummy mine to assist army personnel training in demining operations was successfully developed by BARC along with College of Military Engineering (CME) Pune.

11. Environmental Radiation Monitor with Satellite Communication (ERM-SAT) has been developed with satellite communication as primary mode of data transmission under the countrywide radiation monitoring program - Indian Environmental Radiation MOnitoring Network (IERMON).

I would now like to draw your attention to some of the other noteworthy achievements in field of Basic Research.

12. In collaboration with an international team, we have succeeded in experimentally detecting “Bethe strings”, a novel state of matter that appear in certain quantum

systems, which were postulated theoretically about 100 years ago by Nobel laureate Hans Bethe and had remained experimentally undetected till now.

13. The trial observations on the standard candle Crab Nebula were conducted at Major Atmospheric Cherenkov Experiment (MACE) in Hanle, Ladakh which is the second largest gamma rays telescope in the Northern hemisphere.

14. Presence of non-compound fission in neutron deficient pre-actinide nuclei has been unambiguously demonstrated for the first time. This result highlights the significance of the dynamics in the entrance channel, while studying the evolution of asymmetric fission over the nuclear chart.

Our R&D efforts in material science has resulted in development of many special materials, a few of which I would like to highlight here.

15. Ultra high strength Cobalt-free maraging steel, with strength of 1.5 GPa in peak aged condition, suitable for aerospace and nuclear engineering applications, has been successfully developed.

16. 304L stainless steel with strength close to 1 GPa and ductility of 40% suitable for armour applications has been

developed by severe plastic deformation and thermal treatment.

17. A high temperature lubricant based on (Sodium, Potassium) polyphosphate glass containing Al2O3, CaO and CuO has also been successfully developed for high temperature extrusion of metals alloys.

18. Rare earths have important applications in nuclear, defence, space, clean & green energy, medical, electronic and other commercial sectors. In order to make the country self-reliant in rare earths processing BARC has developed and transferred four technologies to IREL (India) for the production of rare earth compounds.

Our efforts towards meeting the societal needs in healthcare, agriculture, water, environment etc. continued. BARC has developed a number of technologies in this direction, a few of which I would like to mention here.

19. BARC in association with Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, successfully completed development of prototype Deep Brain Stimulator for neurological disorders of brain. This will facilitate treating neurological conditions, like Essential tremor, Parkinson's disease & Dystonia.

20. In continuation with our pursuit of 'Wealth from Waste' strategy, we have been producing Ruthenium-106 plaques for eye cancer treatment. Till date, four plaques have been used successfully for treatment of patient at leading ophthalmic hospitals of country including Centre for sight Hospital Hyderabad, AIIMS Delhi and Sankara Eye Hospital Bengaluru.

21. With a view to ensure local availability of radiopharmaceuticals adaptable to the existing and foreseeable demand, RC&I Group has developed and transferred production technologies along with QC monographs of seven products to BRIT. These products have been approved by the Radiopharmaceuticals Committee (RPC) for non-invasive diagnosis as well as treatment of disease and monitoring therapeutic effectiveness in patients based on the dossier submitted by BARC.

22. BARC has indigenously developed a superior thermal seawater desalination technology based on Multi Effect Distillation-Thermal Vapour Compression. This technology can be coupled with the nuclear power plant for cogeneration of electricity and distilled water from seawater. The technology has been transferred to two entrepreneurs.

23. Under the DAE Vision-6 Project on 'Deployment of Water Purification Technologies in 50 villages in India', a 1000 LPH arsenic removal plant with water ATM facility was commissioned at Ichapur Gram Panchayat, North 24 Parganas, West Bengal.

24. A compact and cost-effective wastewater treatment facility of 150 KLD plant for treating wastewater from 250 houses was designed, built and cold-commissioned at DAE Township, Kalpakkam.

25. Trombay mustard variety TBM-204 has been notified for commercial cultivation by Ministry of Agriculture & Farmers Welfare, Government of India. This is a yellow seeded mutant with 10-15% higher yield compared to check varieties.

26. Two gamma-ray induced mutant rice varieties developed under BARC and Indira Gandhi Krishi Vishwavidyalaya (IGKV) collaboration, were released by State Variety Release Committee (SVRC)-Chhattisgarh. One of the mutant rice varieties has been named as Vikram-TCR to honour the late Dr Vikram Sarabhai, our Ex-Chairman on his birth centenary.

I would also like to draw your attention to some of the noteworthy developments by our centre to fight COVID-19 pandemic.

27. A compact automated Sodium Hypochlorite Electrolyser Plant (SHEP) with built in safety features and indigenous components was developed and demonstrated its efficacy for Sanitization of Office premises. The unit is ideal for onsite production of disinfectant in medium level applications like hospitals, office areas, etc.

28. Due to prevailing pandemic situation, there was a sudden increase in demand for Hand Sanitizer. To meet the in-house requirements, about 2600 litres of the Sanitiser has been prepared meeting the WHO specifications.

29. A high quality face mask utilising micro glass fibre media, has been designed and developed for effective removal of all sub-micron size particulate matter.

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 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 like to acknowledge the important roles played by Administrative Group, Medical Group, Engineering Services Group, BARC Safety Council, Scientific Information Resources Division, Accounts Division, BARC Security, CISF, Public Relations Office, Security Section, Fire Services Section, Landscape and Cosmetic Maintenance Section, Transport Section, Catering Services Section and many more, who individually and collectively contributed to the smooth functioning of the organisation. Special thanks are due to BARC Workers and Staff Union 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.

Let us all rededicate ourselves to pursue our mandate and work towards building a “Aatma Nirbhar Bharat”.

I once again extend my greetings to all of you on this occasion of our 74thIndependence Day.
Jaihind