FOUNDER'S DAY SPEECH

BY

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on

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Senior members of the DAE Family, Distinguished invitees, representatives of the media, my dear colleagues, ladies and gentlemen- it is my pleasure to extend my greetings to all of you on the occasion of the 109thBirth Anniversary of our founder Dr. Homi Jehangir Bhabha, which is celebrated as the Founders Day of BARC. The organisation is in the 64th year of existence and much of what has been achieved and implemented owes its genesis to the seeds sowed by Dr Homi Jehangir Bhabha and the other pioneering leaders of his time. In order to make India scientifically advanced and technologically self-reliant, Dr Bhabha believed in the necessity of creating an institute with a strong synergy between scientific research and technological innovation. BARC was created on the strength of his belief on this paradigm and stands today as a shining example of the success of this model.

Our best way of paying homage to the founder is to carry forward his legacy of excellence and relevance which has been bequeathed to us. I shall now be briefly enumerating some of the important achievements of our institute during the last year to bring out these aspects of our organisational work.

A. India has been following a closed fuel cycle and the expertise in front end and back end technologies has been demonstrated in numerous ways. The activities at the front end included commissioning, operations, inspection and research activities. I shall now read out a few of these for your kind attention.

1. I begin with our most recent achievement, the successful commissioning of the 2 MW swimming pool type upgraded 'Apsara-U'research reactor, which attained first criticality on 10th September 2018. The reactor would provide a maximum thermal neutron flux of 6.1×10^{13} n/cm^2/s and fast neutron flux of 1.3×10^{13} n/cm^2/s. It would aid various research initiatives, shielding experiments as well as provide augmented production of radioisotopes for medical, industrial and agricultural applications.
2. Research reactor Dhruva continued to operate safely with a high level of availability and capacity factors. During this period, a technically challenging first of its kind repair of the primary heat exchanger system as well as the refurbishment of several other systems to enhance safety, improve operational convenience and extend the life time of the reactor were successfully completed in a short duration of 65 days. Dhruva has delivered 535 radioisotopes for societal benefits during this period.

3. In-Service Inspection of total more than 150 Coolant Channels was successfully carried out using BARCIS for all PHWRs during this year. All hardware including BARCIS inspection heads for the above inspection activities were deployed after qualification and certification. BARC Reactor Vessel Inspection System (BARVIS) was deployed for in-service Inspection of Reactor pressure vessel of TAPS Unit-2.
4. PIE of KAPS-1 Q-15 and P-18 Pressure Tubes, along with associated research involving a large number of scientists from different groups viz. CG, MG, BTDG etc., was completed which helped in understanding root cause of failure. Rectification carried out on the basis of these studies led to the start-up of KAPS-2 after rehabilitation.
5. For validation of core catcher design of AHWR and IPWR and demonstration of severe accident management, experiments have been conducted with indigenously developed sacrificial material with simulant melt at more than 2500 °C. Similar experiments were also conducted for demonstrating in-Calandria corium retention for 700 MWe PHWR in scaled Calandria vessel.
6. Uranium metal Ingot batch size has been doubled for the better recovery of uranium. 2 batches of nuclear grade uranium metal ingots with a recovery of 98% have been successfully produced.

And at the back end

1. Reprocessing Plants KARP & KARP II at KalpakkamandPREFRE-2 at Tarapur continued to perform well, achieving record outputs.
2. 22 batches of radiopharmaceutical grade Yttrium-90, devoid of alpha contamination derived from Strontium-90 extracted from high level waste at Trombay has been supplied to RMC. RPC clearance has been obtained to carry out clinical trials.
3. 30 kW Hafnium electrode based air-plasma torch has been developed and put into operation at RSMS for low level solid waste treatment. About 400 kg of waste has been processed and a VRF of about 30 has been achieved. A combination of cellulosic and rubber waste (in 80/20 configuration) was also disposed by this technique at a throughput of about 1 kg/kw-hr, thereby demonstrating its efficacy for multiple applications.
4. An efficient process for recovery of hafnium was demonstrated on pilot plant using novel indigenous solvent by recovering about 3.5 kg of hafnium oxide having more than 99% purity. Technology is ready for deployment at NFC.

B. The contributions to the health care sector remains one of our important mission objectives.

1. About 6000 batches of F-18 radiopharmaceuticals have been produced and supplied to 18 hospitals in Mumbai.
2. A freeze-dried BPAMD kit has been developed for the easy and convenient formulation of 68Ga-BPAMD, an agent routinely used for PET (positron Imaging Tomography) imaging of skeletal metastases. The kit has been clinically evaluated in collaboration with Kovai Medical Centre and Hospital (KMCH), Coimbatore and also been supplied to Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh.
3. A robotic system called DNA Microarrayer, to accelerate the genetic disorder study in clinical diagnosis has been developed. This innovative and competitive technology, which will accelerate the research in the healthcare sector at affordable cost, has been transferred to industry.
4. A patent has been granted to "The wound dressing capable of in-situ NOx release and a process for manufacturing the same" by The Patent Office, Government of India. This technology is one of its kind and first in India having huge potential for treating diabetic foot ulcer. The technology is tailor made for Indian conditions and does not required any stringent storage condition (Shelf life of 2.5 years at 37°C). The dressings can also be used for treating burns as well as radiation induced burns.
5. A rapid and economical extra cellular acidity analyser based on the electrochemical measurements to detect cancerous cell has been developed. This kit costs 1/5th of imported kit based tests and provides quick and accurate diagnosis.

C. **Food Technology and Nuclear Agriculture have delivered important products. These achievements are especially noteworthy as they take considerable periods to mature after rigorous testing**

1. 'Stuffed Baked Food' (SBF-Litti) was developed using radiation technology as a special purpose food for calamity affected people and other needs. The product (300 kg) was supplied to the flood affected needy people of Himachal Pradesh through State Disaster Management Authority.
2. TKR 1 Kolam rice, developed by BARC in collaboration with Konkan Krishi Vidyapeeth, Dapoli, was released for cultivation in Konkan region.
3. Bio-efficacy of the Trichodermavirens mutant-based biofungicide formulation developed by BARC was tested in thirty farmers' fields in Nadia District of West Bengal. An average increase of about 20% was achieved using this formulation.

D. Basic and directed research efforts have delivered products, services and systems., some notable deliveries being as follows

1. Test samples of Ballistic Shield capable of giving protection against armour piercing bullets (Level IV) have been developed and successfully tested by CRPF. 10 numbers of Bhabha Kavach specially made for field trials in anti-terrorist operations have also been successfully tested.
2. Design, development, qualification and delivery of 13 nos. of focussing Quadrupoles for MEBT and HEBT lines of P2IT accelerator at FNAL under Indian Institutions Fermi lab collaboration has been successfully completed.
3. Helium Jacketing Vessel was successfully built around the Niobium cavity of Super Conducting Spoke Resonator, meeting stringent qualification requirements. This has been delivered to FERMI Lab, USA.
4. An in-situ X-ray absorption spectroscopy (XAS) for measurements on heterogeneous catalysis processes has been designed and developed at Indus SRS, RRCAT, Indore. This facility will be extremely useful for studies leading to optimizing catalysts for pollution treatment of industrial and automobile effluents.
5. 500 meters long 97-filament single length Nb3Sn based Low Temperature Superconductor wire was fabricated at AFD as part of indigenous fusion programme.

E. I shall now briefly touch upon some other important activities deserving mention in this forum

1. Integrated Centre for Crisis Management (ICCM) has been commissioned and is operational at Modular Laboratories, BARC to ensure preparedness for response to any security threats, conventional emergencies and CBRN threats. This 24x7 facility monitors radiological and meteorological parameters and is equipped with all necessary facilities to deal with emergency situations.
2. In-house security systems such as Hand Based Multi-biometric Fusion System (HMFS),Face Recognition System, Stereo-vision Based Intrusion Detection System, Abandoned Baggage Identification System and Physical Intrusion Detection System have been developed and are ready for deployment.
3. 400 kWp grid interactive Solar PV Plant has been completed and commissioned on roof of various buildings at BARC, North Site.
4. Radiotracer investigations for online detection of leakages heat exchangers was carried out at a petrochemical refinery leading to reduced down-time and a cost saving of about 100 crores to the refineries.
5. Transfer of technologies to industry partners and entrepreneurs continues to take place regularly. Notable amongst these are the '**Technology to Grow 3-Inch DiaSingle Crystals of Thallium Doped Caesium Iodide for Dark Matter Detection'**, '**Helium Leak Detecto**r' and '**Table Top Static Gas Sensing Unit**'.

6. Integrated Reference System of MPPCS comprising of 10 simulators and 40 nos. of LWR Control Systems racks commissioned and handed over to SBC, Vizag for regular operation, training and regulatory certification tests for project B1, B2.

Dear Colleagues, you may have noted that due to the paucity of time, I could only touch upon a few of the achievement and it has not been feasible to be comprehensive and inclusive. However, I would like to iterate that every job, task, programme and project bears equal significance and importance to the overall goals and objectives of this organisation. The contributions of every individual are valuable towards the progress and wholesome growth of BARC and this may be treated as a personal gesture of thanksgiving. I would like to urge all of you to continue to strive and deliver to the country and the society, for our people look up to organisations like these to offer them solutions to their difficulties.

Sincere expression of gratitude is also extended to personnel of auxiliary services and support personnel who work tirelessly behind the scenes to keep the machinery and ecosystem of BARC running smoothly. This includes the services provided by the Administrative Group, Medical Group, Engineering Services Group, BARC Safety Council, Scientific Information Resources Division, Accounts Division, Public Relations Office, Security Section, Fire Safety Section, Landscape and Cosmetic Maintenance Section, Transport Section, Catering Section and many more, who individually and collectively contributed silently but whole heartedly to the success 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.

At the end, I would like to take this opportunity to thank all my colleagues, past and present, who have nurtured, mentored or supported me at BARC. I can say from the bottom of my heart that I could not have achieved anything without these pillars of support and no words shall be adequate to express my sense of gratitude. I move on to assume higher responsibilities but I cannot but leave behind a part of my soul at BARC, which has been a home away from home ~~to be~~ for almost 4 decades. However, I shall continue to interact with you in numerous forums and seeks your best wishes, support and blessings to carry forward the mandate of DAE to the best of our capacities and abilities.

Thank you and Jaihind