

Founder's Day Address

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by

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**Dr Sinha, Chairman, AEC, Senior Members of the DAE Family,
Distinguished Invitees, Media representatives, my Colleagues and
friends,**

I extend a warm welcome to all of you to the Founder's Day functions, commencing with this event here this morning. Today we pay respectful homage to our visionary Founder, Dr Homi Jehangir Bhabha, on his 103rd birth anniversary. We have assembled here for introspecting on our performance and achievements of the past year, and rededicate ourselves to continue to do our best in ensuring maximum benefits to our society from nuclear applications.

To begin with let me tell you about the major performance highlights and achievements of BARC during the last year.

A.1 With KARP and PREFRE-2 in operation, reprocessing programme has seen a turn around and has achieved all time record in capacity utilization. The new reprocessing plant (PREFRE-2) has completed the first full year of operation with outstanding performance both in terms of production and process parameters.

A.2 PHWR pressure tube (PT) ballooning experiments were conducted simulating stratified coolant channel during severe accident scenario. The Pressure Tube heat-up has been found to be arrested after the contact between Pressure Tubes and Calandria Tube, thus establishing moderator as a heat sink for PHWRs.

A.3 Natural and enriched U-6wt% Zr alloy fuel slugs meeting all specifications have been produced by injection casting, and supplied to IGCAR for sodium bonding and test irradiation in FBTR.

A.4 Customized online radon monitors which can operate accurately upto 95% humidity levels, fitted with optional connection for pollutant gas sensors (for CO₂, CO, SO₂ and NO₂) were designed and fabricated indigenously and installed at Turamdih mine. They are utilized for the effective management of mine ventilation system and optimization of radiation dose to the mine workers.

A.5 A technology has been developed for long-term preservation of fresh litchi fruit and demonstrated to farmers in Maharashtra; technology transfer has also taken place.

A.6 Atomic Energy Rules 2012 (Radiation Processing of Food & Allied Products) have been notified by DAE for publication in the Gazette of India. The new rules will allow enhanced commercial exploitation of the food irradiation technology on a wide product range for achieving sanitary and **phyto**-sanitary standards in international and domestic markets.

A.7 Under rain water harvesting program, harvesting to the tune of around 300 million litres annually has been implemented leading to annual savings of Rs.100 lakhs by effective utilisation of rain water from lake no. 11 in Trombay foot hills.

A.8 A 100 meter long 30 kA hybrid Nb-Ti based Superconducting Cable-in-Conduit-Conductor (CICC) has been fabricated on a 2 meter diameter bobbin at AFD and was despatched to Institute of Plasma Research.

A.9 BARC is a part of Compact Muon Solenoid detector team at CERN – LHC, which discovered experimentally the Higgs Boson. BARC team, in association with BEL, has supplied more than 100 silicon sensors. BARC scientists have been named in the first paper published on the discovery of **Higgs Boson**.

A.10 A large study of newborn from high and normal level natural radiation areas of coastal Kerala was recently completed. The frequency of chromosome aberration and karyotype anomalies between newborns from high and normal radiation level were similar and no radiation dose related trend was observed.

A.11 Two compact pulse power systems, namely, 400 keV Linear Induction Accelerator and 300 kV compact pulse power system have been developed based on high power magnetic pulse compression switches and exploding wire array switch respectively for high power microwave generation. A 20kV, 40 kJ electromagnetic forming and

welding machine was also developed using synchronized spark gap switches for cold welding for industrial and nuclear applications.

A.12 Protein Crystallography beam line, to be used by a large group of Scientists all over India, has been commissioned at Indus-2, RRCAT.

A.13 An Isotope Hydrology Laboratory with advanced equipment has been set-up at the Himalayan Environmental Studies and Conservation Organization, Dehradun to train the local people for spring recharge related studies.

A.14 BARC has designed, developed and deployed the Secure Network Access System to effectively address the requirement of sharing information with “intent and purpose”, by monitoring whether a registered user conforms to the ‘policy and profile’ of usage.

With the high level of expertise a large number of my colleagues carryout work involving high technology in safe and efficient manner. These include O&M activities for reactors, waste management facilities, medical cyclotron, isotope production, breeder seed production, etc. Dedication of my colleagues in this area is exemplary.

Scientific and technological excellence of my colleagues results in receipt of significant number of honours awards every year. But this year there is something special to tell. Dr. Sandip Basu from

RMC has received CSIR Shanti Swarup Bhatnagar prize in Medical Sciences.

Now, I would touch upon some more achievements at BARC, which are equally important.

B.1 For the ageing management of existing fleet of reactors, a “Weld Inspection Manipulator” has been built for inspection of welds in Reactor Pressure Vessel and deployed successfully in TAPS-1 for cleaning the Reactor Pressure Vessel welds and carrying out UT examination.

B.2 A consignment consisting of 8200 enriched boron carbide pellets has been supplied to PFBR for reactor control rod applications.

B.3 Our second advanced vitrification system for high level waste at Tarapur, has become operational and is giving excellent performance.

B.4 BARC Channel inspection system has been commissioned at TAPS-3&4 and ISI of 16 coolant channels of TAPS-4 carried out.

B.5 For PHWR life management wet scrapping tool-III and circumferential scrapping tool were developed for coolant channels.

B.6 Fabrication of fuel plates for modified APSARA commenced in January 2012. A novel powder metallurgy process developed to

meet the required uranium loading and roll-bonding technique is adopted for fabrication.

B.7 Critical Facility for Advanced Heavy Water Reactor (AHWR) and 540 MWe PHWR was operated on 52 occasions for various experiments.

B.8 High purity rare earth metals such as lanthanum, cerium and praseodymium which finds application in nuclear, permanent magnets as well as other high technology areas has been prepared by electrowining from their chloride salts by molten salt electrolysis process.

B.9 A reduction–diffusion method has been developed to prepare Samarium–Cobalt alloy in laboratory scale.

B.10 Two more DAE Emergency Response Centres have been established at Manavalakuruchi and Mysore during this period.

B.11 Confectionery grade large seed Trombay groundnut variety, TG 47 (Bheema), with 115 days maturity, released and notified for commercial cultivation.

B.12 The solar powered Environmental Radiation Monitor for open field installation under IERMON program has been augmented with facilities such as Local Area Network (LAN) and Optical Fibre Based Communication channels. The monitor has been integrated with Automatic Weather Station developed by ISRO.

B.13 A mixed alkali (Li-Na) based low melting borosilicate glass formulation for preparation of Cs glass source has been developed for blood irradiator application.

B.14 Spot Picker Robot developed for RMC accurately analyzes and identifies the protein spots from 2D gels **electrophoresis** and picks & transfers the proteins for analyzing protein expression, thus enhancing data quality in the field of **proteomics**.

B.15 For Cargo Scanning applications, the development of a 3/6 MeV Dual Energy Compact Electron Linac X-ray source has been completed.

B.16 A Force Reflecting Tele-robot representing a new generation of remote handling technology with advanced features has been developed.

B.17 Four mass spectrometers were developed, installed and commissioned at user sites. They include Inductively Coupled Plasma Mass Spectrometer, process gas mass spectrometer, Thermal Ionisation Mass Spectrometer and Quadrupole Mass Spectrometer.

B.18 The first indigenously developed Double Crystal Monochromator which is a key component in Synchrotron beam lines has been commissioned.

B.19 To study materials at high pressure and high temperature, a facility to raise temperature upto ~3000 K of sample under pressure upto a mega bar, in a diamond anvil cell has been commissioned.

B.20 A high power RF system at 350 MHz was designed, developed and successfully tested at 60 kW with 67 % efficiency in Continuous Wave mode.

B.21 Solid state amplifier technology development is being done both at 350 MHz and 325 MHz using RF transistors. Recently, two amplifiers at 325 MHz have been tested separately at 1 and 3.2 kW power level with an efficiency of 68 %.

B.22 Advanced Solar Energy Collector based on array of line focusing reflectors and overhead line cavity receivers has been successfully commissioned at IDEMI, Mumbai, giving 8 kW power.

E.1 During this period 20 nos. technology was transferred by BARC. Some of these recently transferred technologies include digital radiotherapy simulator, banana tissue culture, shape memory alloy making etc.

Excellent support from my colleagues in administration, accounts, health care, fire services, engineering services, security organizations is appreciated by all. Without these none of the above could have been achieved.

Dear Colleagues,

I am happy to inform that we launched a logo and Brochure for BARC this year symbolising the spectrum of our mandate and objectives. BARC programmes and deliveries directly address nearly all vital sectors of societal needs, namely, food, water, energy, healthcare, industry, environment, education and national security. It is not possible to cover in a short time all the highlights of each and every programme of BARC, collectively being implemented by a team of over 15,000 employees, leave alone the fact that I have not even made a mention about the work of large numbers of my colleagues in the strategic domain. Thus omissions in my speech here today are mainly due to time constraints and do not undermine the importance of all work left uncovered.

Exposure to international scientific event is an important component in grooming the young scientists.

Last year SMiRT-21, an important event in the field of nuclear technology, was organized for the first time in India. This was attended by around 600 delegates and helped many of our young colleagues to participate in such an international event.

BARC has common programmes with all other units of DAE. My request to all the units are that let us make the interactions more focused and goal oriented. We will walk the extra mile to make these programmes a success.

In the last four months four things have happened, which I am very happy about. The P-4 facility and the facility at Hall-8 have started functioning after very long shut down. Again with the operationalisation of second stream at Advanced Fuel Fabrication Facility (AFFF). I am sure fuel for PFBR criticality will be available in time. I am very proud of these achievements.

The fourth thing is the co-operation extended by my colleagues and our associations in improving the discipline in the Centre. I thank all of them and wish continued effort on their part in this regard.

Colleagues, on this very special day, let us once again solemnly rededicate ourselves to continue our professional pursuit of excellence and relevance in the frontier areas of nuclear science and technology for the betterment of life of the large population of our nation.

Thank you all – Jai Hind.