

65th Republic Day

Speech by

Director, BARC

2014

Good Morning,

Dear Colleagues,

Best wishes for 65th Republic Day celebration. We have assembled here to salute our national flag and express our gratitude to the armed forces of our country, who give us safety and security.

The celebration functions, which begun with the hoisting of the national flag in our campus, give us an opportunity to look back into 2013 and cherish our contribution to the country. This also gives us an opportunity to look forward and set our targets for 2014. I will start by mentioning a few of the major achievements since the Founder's Day. This being a short period, the number of

achievements will be limited in number, however, all of them are very significant to our programme. The text of this speech will be available on BARC web site.

One important event in these two months has been the visit of Shri Pranab Mukherjee, Hon'ble President of India, to BARC on 15th November 2013 as Chief Guest for the BARC Training School Graduation function. He inaugurated five major facilities which have come up in the recent past. While commending our achievements he pointed out that much more is expected from us.

Let me start by listing some of our major contributions to national security.

A.1 Steady progress marked the trial operations of Arihant. Propeller shaft was rotated for the first time with nuclear steam and the vessel is being prepared for sea trials. Physics experiments at cold condition for the Arihant reload core were completed at P4 facility.

A.2 A stabilization and tracking servo system for onboard deployment in Indian Airborne Early Warning System of DRDO was developed and delivered to ECIL for integration.

A.3 The two axes gimbaled high performance servo system for the X-band Seeker of Brahmos missile has been developed and integrated with the rest of the Seeker at ECIL as part of ECIL-BARC Collaborative development.

A.4 Nine types of process sensors required by the compact LWR propulsion plant have been successfully indigenized and technology transferred to ECIL.

A.5 Indigenously developed Electrolyser Plant was delivered to NMRL and commissioned following its extensive testing at BARC for more than 500 hours meeting the requirement of end user.

A.6 BARC has made specific contributions in four areas for the indigenous development of the Light Combat Aircraft - TEJAS, which has successfully met the stipulations for airworthiness. They

include Servo Control System for the Antenna Platform Unit for Multi Mode Radar, Verification and Validation of 'Get You Home' software, Super Computing System, Shape Memory Alloy heat shrinkable sleeves.

We continued our efforts for improving Uranium production.

B.1 Field testing of indigenous membrane based technologies for treating wash liquor and weak liquor streams was carried out at UCIL, Tummalapalle, and encouraging results obtained. Design specifications for the four units of Ultra-Filtration capillary membrane system for treatment of wash liquor streams have been provided to UCIL for procurement through BARC's licensees.

B.2 Lean nitrate solution was successfully treated using multiple hollow fiber cluster facility and concentration was brought down to below 1 ppm level.

BARC continues to offer its multidisciplinary expertise for safety evaluation to various agencies.

C.1 A MoU has been signed with AERB for providing continued support for evaluation of safety of facilities and other activities of AERB.

C.2 Seismic re-evaluation of structures of Heavy Water Plant, Kota has been completed and, where required, retrofitting scheme using friction damper has been worked out. A fitness-for-service assessment was carried out and remedial measures for continued operation of plant were suggested.

At this stage let me mention some other important developments at BARC.

D.1 A new parallel processing supercomputer, ANUPAM-Aggra has been developed. The peak performance of the system is 150 Teraflops and the sustained performance measured using the High

Performance Linpack benchmark is 109 Teraflops. This development will enable Scientists and Engineers to take up high-end research and development activities in advanced fields of science and engineering.

D.2 Projector based high resolution seamless tiled display was developed at BARC to visualize intricate graphics data in 3D. This system consists of 9 LCD projectors arranged in a 3x3 tiled fashion projecting their images on a 240 cm x 180 cm screen. Absence of seams between the individual screens gives smooth break-free image. The new display also has the ability to display graphics content in 3-D using Active Stereoscopic glasses.

D.3 Commissioning of PARTH, a 'Facility for providing advanced reactor thermal hydraulics'; build jointly with NPCIL at Tarapur was initiated.

D.4 The first set of single anomalous diffraction experiments have been carried out at the Protein Crystallography beamline at Indus-2 on a protein using synchrotron x-rays close to Selenium absorption edge.

D.5 For the development of Compact High Temperature Reactor (CHTR), Niobium alloy Kilo Temperature Loop, made at NFC; for carrying out thermal hydraulic studies of lead bismuth coolant at 1000°C, was installed at Hall-7. The loop was operated up to 750 deg C and steady state natural circulation was established at that temperature.

D.6 Under a collaborative project with DMRL and IREL, BARC has prepared samarium cobalt alloy powder from indigenous samarium oxide supplied by IREL. The magnetic properties evaluated by DMRL have shown the acceptability.

D.7 For Plasma Diagnostics of Re-entry Plasma, development and Testing of High Temperature Charge Density Probes and Ion Collectors was completed for Payload Purpose at ISRO.

BARC is making all effort to transfer the technologies developed for commercial exploitation.

E.1 Low cost technology for wound dressing based on slow release of nitrogen oxide, for application on chronic non-healing wounds was transferred to a private party in Tamil Nadu. Laboratory tests have shown very promising results against a number of bacterial and fungal pathogens, including *Mycobacterium ulcerans*, which causes the dreaded Buruli ulcer, endemic to several tropical/subtropical countries. Animal trials involving full thickness infected wound, have confirmed the efficacy of the dressing.

E.2 Two rare flavonides of nutraceutical value were isolated from weed *Coronopus didymus* through development of novel, rapid and economical methods. An MOU has been signed with a private party in Nagpur, for commercial exploitation of these products and also for further exploration of new products.

We are continuing our efforts for fulfilling our commitments to PFBR in time.

F.1 95% of fuel required for PFBR criticality has been made.

F.2 Fabrication of 3 Nos. Beryllium block assemblies' encased in SS casing has completed and shipped to Kalpakkam.

Work for development of tools for radiological safety monitoring was pursued.

G.1 For the prevention and preparedness for response to radiological emergencies including threat of 'Dirty Bombs', a Quad-rotor based Aerial Radiation Monitoring System was developed. This system can be used for search of 'Orphan Sources' and assessment of any ground contamination by flying at altitudes of 10 metres.

G.2 BARC has designed and developed a Quick Scan type Whole Body Monitoring system capable of screening large number of occupational workers and members of public, in case of any nuclear/radiological emergency.

G.3 For the continuous removal of thoron gas from the off-gas stream of thorium processing facility (PRTRF), an On-line Thoron Mitigation System based on charcoal adsorption technique has been developed and characterized.

Some of the major achievements in the area of engineering services include the following:

H.1 In BARC hospital, facilities like pathology lab, blood bank and pediatric OPD have been fully renovated to meet the requirement of latest codes and guides for medical facilities.

H.2 For RLG, 11KV sub-station including 2 units of 380 KV DG sets has been commissioned.

H.3 At North Gate, construction of exit portal has been completed and made operational for users.

During this period the operating plants continued to perform exceptionally well.

I.1 DHRUVA reactor achieved highest ever availability factor during 2013 and the power was recently raised to 75 MW. I may add today morning power was raised to 80 MW. Quality and quantity of radioisotope production improved significantly.

I.2 AHWR critical facility continued to serve the researchers regularly and was operated 62 times during 2013.

I.3 The reprocessing plants at Tarapur and Kalpakkam exceeded the combined name plate capacity during the year 2013.

I.4 Advanced vitrification system at Tarapur continued to perform well and has produced 100 vitrified canisters since September 2012 when it became operational. It seems they were waiting for this auspicious day to score the century.

I.5 In 2013 TAPS 1&2 achieved lowest ever atmospheric discharge of radioactivity through liquid route.

I am thankful to various agencies like Administration, Accounts, Engineering Services, Medical Services, Landscape and Cosmetic Maintenance, who worked tirelessly for making above achievements possible.

I must also mention the proactive role taken by BSC for maintaining high standard of safety in our facilities. I see similar enthusiasm and alertness among CISF and BARC security agencies in meeting the security requirement of our campuses.

Based on the requests from our employees, it has been decided to give a memento and certificate to our employees at the time of their superannuation as a reorganization of their contribution to the programmes of the Department.

I am very happy to announce, that this 15th August onwards we will identify the Best Marching Platoon and award a Rolling Trophy to them. I request Controller, BARC to do the needful.

In 2013 BARC scientists have published 1472 papers in scientific journals.

Before I end let us look forward to the young year 2014 and make our targets in the areas in which we can surge ahead.

1. Reduce the waiting period for patients at Radiation Medicine Centre, Parel and get ourselves reorganized for improvement in academic and R&D activities.

2. Improvements in project management and fund utilization.

This has become more relevant because of the fund crunch.

3. Newer approach in technology transfers; cover newer technologies and walk the extra mile for making our technologies suitable for commercial exploitation.
4. Getting ourselves reorganized for timely execution of two DAE-DST mega science projects, India Neutrino Observatory and High Energy Accelerator development for spallation neutron source and Accelerator Driven Systems. Government sanctions for these projects are expected this year and the projects will be executed along with other DAE Units, Universities and Laboratories.

Friends, we have done well in many sectors of our activities. But country expects us to do better in the areas of high technology and frontier science. We will take two pronged approach, firstly do enough to remain ahead in technologies where we are the leaders and also make extra effort to improve in areas which were getting less attention for some time.

Thank you and Jai Hind.