

Good Morning,

My colleagues from BARC, CISF and other organizations,

Today we have assembled here in front of the national flag to celebrate the 67<sup>th</sup> Independence Day. As we enjoy our freedom we also remember the sacrifice made by our freedom fighters to make it possible to fly our national flag. As the foreigners left this soil, expectations of the people of India soared and apart from freedom of expression they looked forward to freedom from poverty, hunger, diseases and of course they also wanted a strong nation so the freedom was never lost again. To achieve all this we have to emerge as a disciplined & responsible nation and a strong economic and military power.

We, at various campuses of BARC, are doing everything possible to meet the expectations of our countrymen. Let me start by listing here a few of the recent achievements of BARC.

As you are aware BARC achieved a landmark towards national security when the reactor on board 'Arihant', country's first indigenous nuclear submarine went critical in the wee hours of 10<sup>th</sup> August. The project which originated at Trombay campus involved a large number of personnel from BARC, DRDO and Navy, who worked with total dedication over a long period of time to make this dream come true. The programme saw its first success when the land based prototype at Kalpakkam became operational in 2006. I salute all my ex and present colleagues in this programme, who made an immense contribution in seeing through this high technology endeavor. I am sure; we will see rapid strides in creation of an indigenous nuclear fleet and built a confident India.

Now let me tell you about some of our achievements in the energy related sectors:-

- A.1** The last lot of spent fuel from CIRUS was successfully reprocessed. With this campaign, all the spent fuel inventory of CIRUS has been reprocessed.
- A.2** The Uranium Thorium Separation Facility (UTSF) was also operated simultaneously to reprocess the last 12 irradiated 'J' rods from CIRUS. All the Thoria-lean raffinate waste generated during reprocessing of the 'J' rods was also successfully processed at WIP.
- A.3** Calibration of Self Powered Neutron Detectors developed by NPCIL for 700 MWe PHWRs was done in one of the Dhruva beam tubes.
- A.4** The improved Mark-2 Weld Inspection Manipulator was deployed during the current 23<sup>rd</sup> refueling outage of TAPS-2 and has given excellent performance by way of elimination of signal noise. Reactor Pressure Vessel was inspected using this manipulator with Ultrasonic Inspection technique.

**A.5** All the infrastructural services have been fully commissioned at “Non Destructive Testing & Low Temperature Superconducting Facility” at BARC, South Site. This include special Beryllium handling facility for fabrication of Beryllium Oxide filled pins in PNS vibro filling area housed in this project.

**A.6** Construction of Additional Spent Fuel Storage Facility was started at Tarapur.

**A.7** Warm commissioning of WIP Kalpakkam initiated.

**A.8** Design, installation, commissioning of a Batch Reconversion Facility for conversion of HEX gas to Tetrafluoride powder completed.

**A.9** Indigenous production of power resistant Perfluoro Polyether (PFPE) lubricating oil in the pilot plant set up started.

Our contributions towards food production and preservation, water purification and medical care continued.

**B.1** About 372 quintals of breeder seed of Trombay groundnut of various varieties were produced at the Gauribidanur farm and in the fields of progressive farmers. The seeds were distributed all over the country.

**B.2** 10 kGy irradiation of 'Litti' or 'Batti', a stuffed food commodity, with a covering of wheat dough and stuffing of gram flour with spices, and packaged in polythene, showed effective elimination of spoilage organisms and a shelf life of 12 months. The microbiologically safe food item would be useful during disaster management operations.

**B.3** The Low Temperature Technology of Fresh Water Generator utilizing waste heat for sea water desalination was transferred to the industrial house for expanding the deployment potential. Intensive on the job training was provided to the licensee for capacity building.

**B.4** An ultra filtration system based on membrane cartridges was developed to produce pathogen free water with 0.01 ppm turbidity. This system is suitable for deployment in any hospital.

**B.5** Medical isotope production and distribution all over the country along with BRIT continued in an efficient manner.

**B.6** Stage-II of RO plant at Kalpakkam has started supplying DM water to MAPS.

At BARC one of our primary objectives is to maintain a clean environment. We have contributed in the following areas:-

- E.1** For the first time, High Level Liquid Waste was processed for vitrification at a throughput of 30-35 lph deploying all the three available metallic induction heating furnaces simultaneously.
- E.2** BARC has made a light weight neutron rem counter based on Zr as (n,2n) converter useful for surveillance of high energy accelerators. The instrument's dose response matches with the ICRP dose response curve up to 1 GeV.
- E.3** The field experiment related to marine benchmark study on possible impact of Fukushima radioactive release in the Asia pacific region was carried out in Indian Ocean. The analysis of sea water and marine biota, especially migratory fish, did not show any impact of Fukushima radioactive release in our coastal environment.

- E.4** De-silting of lake no. 10 near PP for augmenting the capacity of the lake for rain water harvesting was completed.
- E.5** “Variable Refrigerant Volume” air-conditioning system at Uranium Metal Reduction Technology (UMRT) facility at South Site has been commissioned.
- E.6** Complete biochemical pathway for the biodegradation of Tributyl Phosphate by a TBP tolerant *Sphingomonas* strain RSMS has been elucidated.
- E.7** Recovery of uranium from lean acidic stream at 60 litre/hr. scale using dispersion type liquid membrane in micro-porous Hollow Fiber cluster was successfully demonstrated.

A strong nation has to have a strong science and technology base. BARC as a premier research institute of the country, continue to contribute towards this in a big way.

- S.1** A subcritical neutron multiplying assembly driven by an indigenously developed deuteron accelerator has been successfully commissioned. The measured multiplying factor (Keff) is consistent with the predicted value of 0.89.
- S.2** The Controlled Temperature Irradiation Facility (CTIF) for study of the behavior of fuel and in-core materials, and a self-serve facility for studies based on short lived isotopes, have been commissioned.
- S.3** Prototype of a Non invasive Beam Position Monitor for SPIRAL2 of Ganil, France has been developed and tested at IPN, Orsay, France. It is one of the essential diagnostic instruments used to measure the position of the beam. This development is very useful for LEHIPA and our future accelerator programs.

**S.4** Linear thermoelectric modules based on Lead Tellurium and TAGS alloys with ~6% power conversion efficiency were supplied to the ISRO for simulated testing with regard to application in radioisotope generators.

**S.5** A time-domain based low-coherence fiber-optic interferometer has been indigenously developed for depth-resolved tomography imaging of scattering samples for material science research. The setup has sensitivity of over 90dB and is able to probe highly scattering samples including biological ones, up to a depth of 1 mm with a resolution of 10 micrometers.

**S.6** A Full-range vacuum gauge capable of measuring pressure continuously from 1 bar to  $10E-9$  mbar has been developed.

**S.7** Major modification was carried out on KALI 5000 to produce a pulse of 30 GW at 1 MeV using transformer oil based Blumlein and indigenous energy storage capacitors based Marx generator. It has been tested up to 865 kV, 23 GW output pulse.

**S.8** A 2-slit configuration emittance meter was developed and the emittance of the ECR ion source was measured to be around  $0.19 \pi$  mm-mrad. The proton fraction of  $\sim 70\%$  also has been measured.

**S.9** Laser techniques involving picoseconds sum-frequency generation, and femtosecond laser-induced breakdown spectroscopy, were developed for trace element analysis and for remote monitoring of chemical species in atmosphere and hostile environment.

**S.10** An indigenously designed and developed Radio Frequency Quadrupole (RFQ) has been commissioned at BARC. Proton beam was successfully accelerated to 200 keV through the RFQ, with a transmission of 70%, and results are in excellent agreement with the design values.

Operation and maintenance of high technology plants, requiring very high level of technical qualification and skill, were carried out efficiently.

**R.1** One tank full of Intermediate Level Waste has been successfully processed.

**R.2** Critical Facility for Advanced Heavy Water Reactor (AHWR) was operated on forty occasions for various experiments during the calendar year.

**R.3** PREFRE-2 and KARP continued to work at high capacity. Performance indicators were also excellent.

**R.4** Advanced vitrification system continued to vitrify high level waste from PREFRE plants at Tarapur.

**P.1** Special thanks to my colleagues, who work behind the scenes to make all these achievements possible by keeping the vital services operational. They include; Engineering Services Group, Medical Division; providing healthcare facilities to the entire Mumbai based CHSS beneficiaries; Administrative Group who take care of all functions in the fields of administration, establishment, including manpower

planning, personnel data management; Finance and Accounts; and the Floriculture & Landscaping Section and Cosmetic Maintenance Section for the beautiful ambience of this venue and our gardens.

**P.2** Security of our Centre is a matter of primary concern at all times. BARC security and CISF personnel have given commendable attention to the physical protection of our establishment. I also wish to express appreciation for the BARC Fire Service personnel for their role in the protection of the various establishments of BARC. The sincerity and dedication of my colleagues working in these areas have made it possible to make our campuses all over the country safe and secure.

Before I conclude, I would like to mention some more of our achievements which I am proud of –

- X.1** A large number of us work for national security behind the scene, quite often in harsh working condition. Normally we do not come to know about their achievements except once in a while such as this time.
- X.2** Research reactor Dhruva continued to operate with availability factor of about 80%; recently, the power of the reactor has been raised to 70 MW to improve the quality and quantity of radioisotope production and utilization. This small step would go a long way in our contribution towards the health care for the people of our country.
- X.3** Our Human Resource Development Division has achieved something very special in attracting talent to our Training Schools in various campuses. All year round effort for this has resulted in 294 Trainee Officers joining the Training Schools. This is almost 30% higher than last year's enrolment.

**X.4** BARC choir has been established this year. They gave two excellent performances, one on the Technology Day and the other at the Valedictory Function. Today is the third event.

**X.5** Our annual expenditure in plan budget, both R&D and I&M has improved in the last financial year. In fact we achieved full utilization of funds made available at RE stage. Nuclear Recycle Board did still better. They utilized full fund available in the year at RE stage and 93% of funds requirement projected at BE stage.

I am thankful to all my colleagues and various associations, who have helped us in maintaining high level of performance and discipline.

The submarine incident, which you read in today's paper, is a grim reminder of the importance of safety. Our BARC Safety Council is doing a commendable job in ensuring safety. Let us all work together under BSC's leadership to make our activities incident free.

Finally, on this auspicious day for all Indians, we once again pay tribute to all the patriots who gave us freedom. We show our gratitude by striving hard to take the country to greater heights and fulfill the aspirations of the Indian masses.

Thank you and Jai Hind.