Good Morning,

My Colleagues from BARC, CISF and other organizations,

Today we have assembled here in front of the national flag to celebrate the 68th Independence Day. Our freedom is the result of the sacrifice made by our freedom fighters who made it possible to fly our national flag. Our country men on this day 67 years ago was ushered into a free country with the expectations of freedom from exploitation and looked forward to freedom from poverty, hunger and diseases. They also wanted a strong nation so that freedom is permanent. We have to emerge as a disciplined & responsible nation while being a strong economic and military power.

The year 2014 bears several milestones in the history of our research centre. This year DAE is turning into a 60 year old institution and we are participating in the nationwide celebration of Diamond Jubilee. We are also celebrating 50 years of commissioning of Plutonium Plant at Trombay which is one of the

primary input for emerging India as a strong nation. Again 40 years ago atomic energy programme entered into new era when peaceful explosion was carried out at Pokran.

The recent visit of our Hon'ble Prime Minister, Shri Narendra Modi to BARC on 21 July 2014 is a very special occasion for us. This visit encouraged us to work harder towards wider deployment of our technologies, for the benefit of the under privileged and also to make the nation stronger.

At BARC Campuses located all over the country we are doing everything possible to fulfill the dreams of our nation. Let me start by listing here a few of the recent achievements of BARC.

Creation of state of art research facilities is a prime need for higher quality of research, I am glad to announce about the progress made in field of high energy physics.

A.1 The trial assembly of a 21m diameter gamma-ray telescope to observe the atmospheric Cherenkov radiation has been successfully completed at ECIL, Hyderabad. The telescope is now being shipped to the high altitude astronomical site at Hanle, Ladakh, for final installation and commissioning. When operational, MACE telescope will be the second largest gamma-ray telescope in the world and will play an important role in the understanding the high energy process in the Cosmos.

A.2 The Imaging beamline at Indus-2 synchrotron has been commissioned. This is a micro-imaging facility for material and bio-medical research.

A.3 The Infra-red beamline at Indus-1 synchrotron has also been commissioned for materials science studies.

A.4 As a forerunner to the Indian Neutrino Observatory programme an Inter-Institutional Centre for High Energy Physics is being built at Madurai. Infrastructural activities

have been started and work order for construction of the lab building is being issued. R&D activities for prototype Iron Calorimeter Detectors is progressing well.

Our design, analysis and testing capability developed over the years is being utilized to ensure safety in reactor construction and operation. I shall be narrating some of the special achievements in this area.

B.1 After performing inspection of welds in the upper region of Reactor Pressure Vessels of Tarapur Atomic Power Station 1&2 during previous refueling outage, efforts are on to deploy a manipulator to inspect the core belt line region of the Reactor Pressure Vessel. Design, manufacturing and shop testing of the manipulator has been completed and the system will be deployed during the forthcoming refueling outage of TAPS-1.

B.2 A piping loop, with a notch machined on one of the highest stressed welds was subjected to a shake-table test with increasing levels of acceleration. Shake table facility of Central

Power Research Institute, Bengaluru was used for this test. The piping could withstand 40 events of Safe Shutdown Earthquake level. I am proud to say that this test has been chosen by Organization for Economic Co-operation and Development/Nuclear Energy Agency (OECD/NEA) as a benchmark exercise in the framework of the Metallic Component Margins under High Seismic loads project.

We continue to work for various societal applications of nuclear energy and its spin-off technologies.

C.1 Litchi preservation processing technology successfully deployed in India was also transferred to an international trading company in Madagascar.

C.2 An automatic fruit dip treatment machine of 10 kg/h capacity was designed and developed for processing fruits and vegetables.

C.3 Nisargruna technology was implemented for the first time for animal carcass processing in the premises of Vadodara Municipal Corporation by installing 5MT/day plant. Nisargruna technology is now finding wide acceptance in the country and about 180 plants are in various stages of deployment.

Fuel fabrication is one of our core activities. We continued to meet our requirement for operating reactors and the new ones.

D.1 Apart from meeting the fuel requirement of DHRUVA reactor, carbide fuel pin fabrication was continued for FBTR at Kalpakkam.

D.2 A Glove Box set-up has been made ready for fabrication of Mechanically Bonded Metallic fuel pins for irradiation testing in FBTR.

D.3 Fabrication of fuel plates for 1st core of APSARA was completed.

Research reactors and the associated research and production facilities performed very well during this period.

E.1 Research reactor DHRUVA continued to operate at enhanced power level of up to 80 MW, with availability factor of about 81% and highest ever capacity factor of about 53%. More than 1000 samples were irradiated for radioisotope production and facilitating BRIT's radiopharmaceutical supplies. The National Facility of Neutron Beam Research at DHRUVA is being effectively utilized, in cooperation with UGC-DAE-CSR, BRNS and other institutions for about 80 active experimental projects.

E.2 Critical Facility for Advanced Heavy Water Reactor (AHWR) and 540 MWe PHWR was operated on sixty two occasions in last one year for various experiments, testing of nuclear detectors, and Neutron Activation Analysis.

Many of our facilities built in the early days need up-gradation to meet the present day's performance and safety standards. I would mention some of the important activities carried out during this period in this domain.

F.1 Two units of 11 KV Sub-Stations at Trombay Hill have been renovated with the state-of-the-art equipment like $SF_6$ gas filled Switch Gears and dry type Transformers.

F.2 VFD-based ventilation system, including PLC based control, were incorporated in Beryllium Metal Plant at BARC Vashi Complex.

In line with our tradition of R&D, we continue to develop and deploy new technologies in diverse areas. Let me bring out some of them.

G.1 A permanent magnet based focusing lens for Beam transmission and radio frequency amplification was developed and supplied for J-Band klystron for use in missiles.

G.2 An European patent has been granted for "A Flexible Magnetic Membrane based Actuation System and Devices".

G.3 High Pressure Diamond Anvil Cell is used for interferometer based spectroscopic studies of material behavior. High pressure is generated in the diamond-anvil cell by applying force to a large area and transferring that force to a small area. Three types of Diamond anvil cell, including one for radioactive sample were fabricated.

G.4 An innovative microwave-based 'Atmospheric Pressure Cold Plasma Jet' portable device (APCPJ) has been developed for decontamination of alpha active actinide contaminated surfaces. It achieved about 90% removal of alpha contamination from the metal surfaces.

G.5 An ultrafast two dimensional infrared (2D-IR) spectrometer has been indigenously developed, commissioned and tested. This is a first of its kind facility in the country.

G.6 A compact, room temperature $H_2S$ detector based on hydrogenated diamond film was developed for ppm level detection of the gas.

G.7 A Diamond films based α-particle detector was developed and the sensitivity of the detector in air has been estimated to be around 5 nCi of plutonium.

G.8 Based on successful testing by Vikram Sarabhai Space Centre, Thiruvananthapuram of Langmuir probes developed in BARC, a set of sensors and associated components have been delivered to ISRO. This will be launched in a Langmuir probe payload in Space Capsule Recovery Experiment (SRE-2) spacecraft. This will help us to understand the mechanisms underlying plasma induced radio frequency blackout observed during re-entry.

H.1 BARC Safety Council (BSC) is implementing the regulatory functions for facilities of BARC at Trombay and all outstation units for ensuring safety of the facilities, members of public and environment. They are monitoring the safety of the operating plants, both radiological and industrial, by periodic review. They are also conducting multitier safety review during the design, construction and commissioning stages for the new plants.

New developments are taking place in the area of computational facilities.

I.1 A cloud computing service called "Megh" has been developed to provide computing infrastructure to BARC Intranet users. It has 1024 processing cores, 4 Terabytes of RAM and 128 Terabytes of disk space. Users can create servers on demand according to their requirement.

I.2 We have developed and deployed storage disaster recovery system on DAE ANUNET network. This has 100 TB storage located at BARC-MUMBAI with disaster recovery storage of equal size at Computer Centre, IGCAR-Kalpakkam. Currently this storage is being used by 8 DAE units for storing their critical data.

I.3 A new software was developed for providing 3-D walkthrough model for buildings. It is useful for training security personnel and response forces in defending vital installations. A video surveillance system, useful in security applications, has been developed using indigenously built secure ECR series routers.

Special efforts are being made to improve the healthcare activities by new initiatives and creation of new facilities.

J.1 A new lectin class of radio protector was found to protect mice against supra-lethal doses of ionizing radiation. A single injection of the plant lectin offered 100% protection to mice against whole body radiation at 12 Gy.

J.2 Human trials of 170 Thulium Ethylene Diamine Teramethylene Phosphane (EDTMP) developed as a bone pain palliative has been started at Korai Medical Centre and Hospital at Coimbatore. The results show excellent accumulation in bone cancer lesion.

J.3 Waiting period for patients has been a cause of concern at Radiation Medicine Centre, Parel. Special efforts were made by RMC over last few months to reduce the waiting period. Since June 2014 the waiting period has been brought down to zero from six months by campaign mode operation.

J.4 Dispensary at Kharghar, Navi Mumbai has become partially operational and initially about 3000 beneficiaries were enrolled. Recently the number of beneficiaries has been increased to about 5000. The facilities at Kharghar will come up progressively.

BARC is collaborating with many international organizations in the areas of accelerator physics, where we made in-kind contribution by way of supplying critical components:

K.1 A focusing quadruple magnet and a dipole steerer magnet have been developed and qualified for accelerator applications and is being tested at Fermi-lab, USA. High intensity beam testing of the 3 kW, 325 MHz amplifier developed under Indian Institutions Fermilab Collaboration program is also being taken-up. A wedge tuner used for tuning the superconducting cavity operating at 2 kelvin was supplied for testing.

K.2 We have contributed to Institut Laue-Langevin (ILL), France, several vacuum housings for neutron guides and lead shields, which have been installed and commissioned there.

Certain achievements in development and deployment of technologies should be considered very special which required

multidisciplinary efforts by a large number of our colleagues. Let me mention some of them which are in open domain.

SA.1 For Prototype Fast Breeder Reactor (PFBR) fuel pin fabrication for criticality and initial power operation has been completed. Three units of Beryllium Block assemblies were also fabricated and supplied.

SA.2 High Temperature Boron Coated Counters suitable for operation at 250$^{o}$C have been developed and supplied for PFBR. All the issues related to development of High Temperature Fission Chambers (HTFCs) for PFBR have been sorted out and production is in progress.

SA.3 The reload core for 'Arihant' achieved hot criticality and all physics experiments at hot condition were completed.

SA.4 PREFERE-II continues to function very well and during the last financial year it achieved a capacity utilization of 127%. This high level of utilization has been achieved while maintaining the performance parameters for losses and releases.

SA.5 Joule Melter at Tarapur continued to perform very well and has generated 76 canisters in last financial year.

SA.6 Pressure tubes in Pressurized Heavy Water Reactors are to be replaced periodically for continued operation. These tubes are initially highly radioactive and the metal can be reused after about 20 years of cooling. A cutting and compaction technology developed in-house was used to store pressure tubes taken out of MAPS reactors.

SA.7 We have received financial sanction from the Government for construction of Integrated Nuclear Recycle Plant at Tarapur. This will be the biggest project handled so far by NRB and BARC. Presently detailed design of the facility is in

progress and construction is likely to start by the end of the financial year.

SA.8 After stabilization of all the process parameters, metallic slug processing activities was started and recovery parameters were excellent.

SA.9 Ministry of Environment and Forest clearance for execution of project at Challakere has been obtained. Pre-project activities are already in progress.

SA.10 Cutting activities for all the Glove Boxes was completed and disposal in Near Surface Disposal Facility is in progress.

The real heroes behind these achievements are my colleagues, who work behind the scene to make all these achievements possible by keeping the vital services operational. They include; Engineering Services Group, Medical Division; Administrative Group, who take care of all functions in the fields of administration, establishment, manpower planning and personnel data management; Finance and

Accounts. We also appreciate the efforts of Floriculture, Landscaping and Cosmetic Maintenance groups for the beautiful ambience of this venue and our gardens.

Security of our Centre is a matter of primary concern at all times. BARC security and CISF personnel have made commendable contribution 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.

Finally, on this auspicious day, 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 our country men.

Thank you and Jai Hind.