



## **Independence Day Address**

**Sunday, August 15, 2021**

by

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**Chairman, AEC & Secretary, DAE**

Respected seniors, dear colleagues, ladies and gentlemen

A very good morning and greetings to all of you on the occasion of the 75<sup>th</sup> Independence Day of our nation.

The Indian nation was reborn on this day 75 years ago. The veil of darkness was lifted after centuries of suppression, and we earned our freedom due to the valiant efforts and sacrifices of our freedom fighters, leaders and visionaries of those times. Much has been achieved by our country over the last 75 years in many fields including agriculture, education, infrastructure, healthcare, science and technology, space including atomic energy. These accomplishments are the best tribute we have paid to our founding fathers.

The Atomic Energy Commission was founded soon after independence in 1948, and has steered our country in becoming a world leader in many aspects of nuclear science and technology. The country is in a celebratory spirit today with the launching of Azadi Ka Amrit Mahotsav, which is an intensive, country wide campaign to showcase India's accomplishments since 1947. I shall take this opportunity not only to showcase some of our achievements during the last one year, in the spirit of celebration which has engulfed our nation today, but also to rededicate ourselves in the service of the nation towards fulfilling the mandates given to us.

We are all well aware of the ongoing pandemic and the lockdowns which were required to be imposed to control the spread of the virus. The activities of DAE were also affected as were many others, but despite these impediments, substantial progress has been achieved in numerous areas. I would like to now highlight some of the major achievements of our Department during the last year.

**A. I shall first enumerate a few accomplishments of the nuclear power sector:**

1. NPCIL has continued to demonstrate its exemplary capability for the safe and reliable operation of our nuclear power plants.
2. NAPS-2 has set a fresh record of 852 days of continuous operation. This is the 37<sup>th</sup> occasion that one of our reactors has operated continuously for more than a year and we have a cumulative record of about 551 reactor-years of safe operation. During the lockdown period as well, all our NPPs have operated optimally, and we have continued to maintain a fleet capacity factor of around 85 % throughout the year.
3. I am happy to inform that the construction of KKNPP 5&6 (2X1000 MW) reactors, which are being set up in cooperation with the Russian Federation, have commenced with the placement of First Pour of Concrete on June 29, 2021.
4. NPCIL has also completed the casting of piles for the nuclear building 1 in Gorakhpur Haryana Anu Vidyut Pariyojana, GHAVP-1 and 2.

**B. BARC has continued to be at the forefront in advancing the non-power applications of nuclear science and technology to help improve the quality of life for the citizens and contribute to the societal and economic development of the nation. I shall now present a few salient developments in this sphere:**

5. BARC has played a crucial role in the development of high value import substitute radiopharmaceutical ligands, PSMA-617 and PSMA-11, for treatment of cancer patients in India.
6. Indigenous Carrier-free Yttrium-90-acetate and Ruthenium-106 plaques were prepared for cancer diagnosis and treatment.
7. In the field of nuclear agriculture, two new rice varieties, Vikram-TCR and CG Jawaphool Trombay developed by BARC, have been recently notified in the gazette.
8. Under the Jal Jeevan Mission of the Government of India, a 2000 LPH capacity fluoride removal plant, catering to 4 villages was installed, commissioned and handed over to the Sagargaon Gram Panchayat in Khordha District of Odisha.
9. 400 point-of-use arsenic decontamination devices of 24 LPD capacity were

deployed in Village Harail, Dist. Samastipur, Bihar. A beginning has thus been made by the department for the deployment of water purification technologies in 50 villages in India.

**C. BRIT has launched the following products during this period:**

10. Two radiopharmaceuticals  $^{90}\text{Y}$ -HA and  $^{177}\text{Lu}$ -HA developed by Radiopharmaceuticals Division, BARC, which serve as effective and economical substitutes to the imported yttrium-90 radiopharmaceuticals for the management of joint related disorders.
11. HYNIC-RGD cold kits (for Technetium-99m) towards early diagnosis of malignant tumours.

**D. The medical cyclotron at VECC has delivered radioisotopes which have been used for the launch of several products by BRIT to various hospitals/Nuclear Medicine Centres in and around Kolkata, on a regular basis.**

12.  $^{18}\text{F}$ -Sodium Fluoride has been produced and supplied to the Indian Army's Command Hospital at Kolkata for bone scanning applications and the results have been encouraging.
13. [ $^{68}\text{Ga}$ ] Gallium Chloride which is used for the preparation of  $^{68}\text{Ga}$  Gallium PSMA-11 for the diagnosis of Prostate Cancer has been launched along with  $^{68}\text{Ga}$  Gallium DOTATATE for the diagnosis of Breast Cancer & Neuroendocrine Tumour.
14.  $^{201}\text{Tl}$  Thallous Chloride has been launched for Myocardial Perfusion & Parathyroid Imaging studies.
15. At VECC, a major milestone in the country's first K500 Superconducting Cyclotron has been successfully achieved by accelerating and extracting the first harmonic, 252 MeV Nitrogen $^{4+}$  beam (i.e., 18 MeV/nucleon) from the machine. This is currently the highest beam energy available in the country for experiments in nuclear physics and other researches.

**E. In addition, BRIT has also continued its activities related to increasing**

**societal use of irradiation. I would like to emphasise one of them.**

16. As part of our international commitments, BRIT has exported 1.35 MCi of Co-60 Irradiator sources to Sri Lanka, Malaysia and Vietnam.

17. An indigenously developed Co-60 based Industrial Radiography Device “COCAM-120” has been launched by BRIT for the NDT industry. The device is used for Radiography of material of thickness ranging from 40 mm to 200 mm in steel.

**F. Tata Memorial Centre (TMC), a constituent unit of DAE, has not only been at the forefront of enhancing the cancer treatment facilities in the country, but has also played an important role in the nation’s fight against the COVID-19 pandemic:**

18. TMC has supported over 100 hospitals in India with oxygen concentrators, oxygen generation PSA plants, PPE, N95 masks, monitors and ventilators.

19. TMC has initiated CAR-T cell therapy for the first time in India, and brought down the costs from Rs 4 crores to Rs 25 lakhs.

20. Many studies performed at TMC have made a leading contribution to the global cancer care efforts. Four landmark studies from TMC have changed cancer treatment protocols worldwide and have been published in world leading medical journals.

21. The Homi Bhabha Cancer Hospital & Research Centre at Sangrur under DAE, the only rural cancer centre catering to rural belt of Punjab, Himachal Pradesh, Haryana & Rajasthan, has continued to function despite the pandemic and has been awarded the Certificate of Appreciation from Govt. of Punjab in furthering the Ayushman Bharat Yojana for the year 2020-2021.

**G. I shall now present some of the activities at Raja Ramanna Centre for Advanced Technology (RRCAT), during this period:**

22. The Indus synchrotrons (Indus-I and II) have been kept available for users from all over the country even during the pandemic. AERB clearance for setting up two new beam lines on Indus-II has been received.

23. An electron beam radiation processing facility has been set up using a LINAC. This facility has started operations with FDA license for sterilization of medical devices in January 2021 and medical device manufacturers have started using

this facility.

24. As part of the 75<sup>th</sup> independence anniversary contributions (Azadi ka Amrit Mahotsav), RRCAT has showcased its technologies and devices developed for biomedical diagnosis. The portable cancer screening device "Oncodiagnoscope" developed by RRCAT was used during a screening camp held for CISF at Indore.

**H. ECIL has continued to contribute to the national programmes for high-end technology applications being pursued by various departments of the country. Some of the deliveries from ECIL would now be presented:**

25. A High Speed NUCON PLC for fast, real-time control and automation process applications has been developed, which has been accepted by ISRO for use in the new test facilities of ISRO Propulsion Complex (IPRC), for qualification of Cryo/ Semi Cryo Engine and sub systems used in PSLV, GSLV, GSLV Mk III launch vehicles.
26. ECIL and IGCAR have jointly developed Ion mobility spectrometry (IMS)-based explosive detectors and supplied these to IB, CISF, CRPF and other paramilitary forces for field evaluation.
27. A prototype dual view X-Ray baggage inspection system has been developed by ECIL.
28. ECIL has built a fully indigenous 18m mono-pulse earth station antenna to operate in the S and X microwave band for the Aditya Mission of ISRO. The system is currently under installation at Bylalu (ISTRAC site).

**I. I shall now move on to present some of accomplishments and successes at IGCAR during this period:**

29. The Fast Breeder Test Reactor (FBTR) and the U-233 fuelled Kalpakkam Mini Reactor (KAMINI) at IGCAR have continued to operate successfully.
30. In collaboration with BARC, IGCAR has successfully developed and demonstrated a process for magnetic pulse welding of stainless-steel grade 316L(N) end-plug with ODS alloy thin-walled fuel cladding, and overcome issues related to loss of creep strength of the alloy in fusion welding processes.

**J. As the fuel manufacturing facility for power reactors, Nuclear Fuel Complex (NFC) serves one of the important mandates of DAE and a few of its salient accomplishments during this period are as follows:**

31. NFC has met its production targets and made timely supplies of PHWR fuel bundles, BWR fuel assemblies, structural, SG tubes etc. to cater to the requirements of NPCIL despite the pandemic.
32. As you are aware, NFC is the largest “integrated” fuel fabrication facility in the world. During recent times, NFC has put in systematic efforts to improve recovery in various plants including automation. This has helped in improved quality, productivity, safety and subsequent cost saving.
33. As a step towards Atma Nirbhar Bharat, NFC has successfully manufactured & delivered 2557 Steam Generator tubes to M/s BHEL for the 1st Steam Generator of the upcoming 700 MWe PHWR at GHAVP.
34. Plasma Melting Furnace for recycling of Zirconium alloy scrap Probe Manipulator for Tactic Unit has been Indigenously developed as an import substitute.

**K. With respect to the operations of Heavy Water Board during this period:**

35. All the heavy water plants being operated by HWB have met the heavy water production targets despite the COVID-19 pandemic / lockdown period.
36. HWB has successfully fabricated  $^{10}\text{B}$ -enriched Boron Carbide pellets and supplied to NFC, Hyderabad for fabrication of control rods for FBTR.
37. HWB has also supported the fuel reprocessing activities of DAE and has met the major requirements of Organo-phosphorous solvents for extraction and recovery of Rare-metals during the Front and Back end of the Fuel Cycle.

**L. AMDER continues its pursuit for exploration of minerals, and augmenting the country’s resources for uranium, Rare Earth Elements and Rare Metal and Rare Earth (RMRE) resources. It has delivered the following to the nation during this period:**

38. 24000 tonnes in situ uranium oxide ( $\text{U}_3\text{O}_8$ ), 1,73,000 tonne rare-earth oxides, 2.20 tonne columbite-tantalite (Nb-Ta mineral), 7.40 tonne xenotime (yttrium and heavy rare earth mineral)-bearing poly-mineral concentrate, 1.315 tonne beryl (Be-mineral) and 1.99 tonne spodumene (Li-mineral) have been identified.

39. AMD has identified a potential block for lithium exploration, with up to 6-7% Li<sub>2</sub>O between Kanahalli and Mangalur in Yadgir district, Karnataka.
40. During this year, AMD has facilitated the export of 20,317 tonnes of Beach Sand Minerals.

**M. UCIL has continued to achieve 'Excellent' ratings from 'The Department of Public Enterprises, Ministry of Heavy Industries & Public Enterprises, Govt. of India for the third consecutive year and its performance during the year 2020-21 remained above the set target:**

41. UCIL is augmenting its capacity for domestic uranium production and has taken up thirteen new projects in different parts of the country for implementation on priority. Pre-project activities in this regard are progressing satisfactorily.

**N. IREL has continued to post profits and increase its production targets for minerals. It has also commenced construction activities of the Rare Earth Permanent Magnet Plant at BARC, Vizag and Rare Earth & Titanium Theme Park, Bhopal.**

**O. DAE has continued to make substantial contributions to the mega science projects, CERN (ALICE, CMS, WLCG), ITER, LIGO, SKA, etc. through its aided and R&D institutes:**

42. IPR has supplied In-Wall Shielding assembly as part of its commitments to the ITER project.
43. An important milestone in the ITER Tokamak Assembly has been achieved with the installation of the Cryostat Lower Cylinder developed in India in the Tokamak pit for further assembly and integration operations of ITER.
44. An indigenous diagnostic neutral beam system has been developed in the field of plasma heating in fusion reactors using neutral particle beam injectors. A new welding methodology has been developed for this purpose and has been qualified against the acceptance parameters prescribed by ITER.
45. An important import-substitution technology has been developed by IPR for the vacuum barrier used in fusion machines. This technology will also find use in the development of accelerators.

**P. IPR has also been actively engaged in technology development and**

**incubation for societal benefits:**

46. A portable hand-held plasma sterilizer has been indigenously developed for disinfection of surfaces contaminated by microbes like bacteria and viruses.
47. Plasma treatment has been used to provide anti-fouling properties on silicone catheter surfaces to prevent catheter-related infections in patients.
48. As part of its contribution to Atma Nirbhar Bharat, IPR has developed an import substitute for Electron Cyclotron Resonance Plasma Source (ECRPS) for ground testing of satellite solar panels.

**Q. All aided institutions of DAE have continued to pursue advanced and cutting-edge fundamental research in the field of basic sciences, astronomy, astrophysics, and education. Some of the accomplishments and milestones worthy of mention are the following:**

49. The **Giant Metrewave Radio Telescope (GMRT) of TIFR has achieved the honour of having been selected as an IEEE Milestone facility.** This is only the third such IEEE Milestone recognition for an Indian contribution, after the pioneering work done by Sir J.C. Bose and the Nobel prize-winning discovery by Sir C. V. Raman.
50. The researchers at TIFR, Hyderabad have efficiently doped a plastic-based semiconductor and have used this method for demonstrating state-of-the-art non-silicon based solar cells.
51. TIFR has developed Nano-Sponges of solid acid which transform carbon dioxide to fuel and plastic waste to chemicals which can help in reducing CO<sub>2</sub> levels and climate change.
52. For the period of May 2020-April 2021, Nature Index database of high-quality publications has placed HBNI at the 97th position amongst the top 100 with respect to physical sciences. HBNI is the only institution from India to find a place amongst the top 100 institutes.
53. HBNI stands at the second position for all disciplines and at the top position for physical sciences amongst all the Indian institutes.
54. DAE's service organisation, DCSEM has received 'Construction Industry Development Council (CIDC) Vishwakarma Award' for 2021 under the new category "Awards for Corona warriors of Construction Industry".

**R. DAE continues to strive towards developing technologies which can provide immense value and benefits towards industrial as well as societal**



**applications. To provide impetus to the translation of DAE technologies and inspired by the Atal Incubation Mission, four incubation centres were launched at BARC, IGCAR, RRCAT and IPR on 30th October last year, which was the 111th Birth Anniversary of our founder Dr. Homi J. Bhabha. A number of technology transfer agreements were signed during the launch event:**

55. Various incubation centres have signed MoU for technology development under incubation as well as technology transfer agreements with different centres. I would like to mention a few examples:

- i) M/s. Eagle Star Ventures Pvt. Ltd., Navi Mumbai for Fast Current Transformer;
- ii) M/s. Kavitul Technology, Baroda for DEAP (Device to Ease Apnea Problem) technology;
- iii) M/s. Ideal Sensors, Chennai for Solar-powered autonomous gamma dose radiation monitor to measure the environmental radiation;
- iv) M/s. First Source Impex, Bengaluru for Portable light weight air volume sampler for Environmental radioactive sampling;
- v) Shri Ramachandra Institute of High Education & Research, Chennai for low cost, non-invasive, non-ionising radiation based Breast tomography technique;
- vi) Indian Centre for Agricultural Research (ICAR) Krishi Vigyaan Kendra at Perambalur for application of radioisotopes and radiation technology in agriculture and food preservation;
- vii) M/s. Ankur Scientific Technologies Private Limited, Vadodara for a Plasma Pyrolysis based system for eco-friendly disposal of Biomedical Waste;
- viii) Tata Motors Ltd. for deployment of a Liquid Nitrogen based refrigerated container system on vehicular platform.

Dear colleagues, though it has been my endeavour to present salient contributions of all organisations and units of DAE, it is certainly not possible to mention every aspect of our vast programme in the short time available. However, I would like to emphasise

that every task, project and activity is of equal importance towards the progress and achievements of this organisation and I take this opportunity to deeply and sincerely acknowledge the contributions of every single individual of our DAE family.

Immense gratitude has also to be expressed to the frontline workers, of our organisation as well as others, who have worked selflessly and tirelessly during the pandemic. Thanks are also due to all the auxiliary and support staff, security personnel, catering and transport workers and many others who work silently but whose contributions are vital to the smooth functioning of the organisation.

Dear colleagues, we are well aware that DAE was born soon after independence in 1948 and it has been our privilege to receive immense governmental support right since its inception. Commencing activities from a very low technological base in the country, DAE has risen to every challenge in the last few decades to achieve mastery over all aspects of nuclear technology and its utilisation for societal good. We need to salute our predecessors and founding fathers for their vision, enterprise, grit and innovative spirit, which has taken our organisation to such great heights.

Even as we look back with awe and pride at what has been achieved, it is equally important to carry out some introspection and recalibrate our goals and motivational levels towards achieving greater success at a rapid pace, in keeping with the needs and aspirations of our fellow countrymen.

This is a pledge we need to take for ourselves and a commitment we need to make to the nation on the solemn occasion of the 75<sup>th</sup> Independence Day, which is being celebrated as “Azadi ka Amrit Mahotsav” all over the country.

I once again wish you all a very Happy Independence Day.

Thank you and Jai Hind