

**GOVERNMENT OF INDIA  
ATOMIC ENERGY  
LOK SABHA**

UNSTARRED QUESTION NO:4216  
ANSWERED ON:19.12.2012  
DEVELOPMENT OF NEW DESIGN REACTORS  
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**Will the Minister of ATOMIC ENERGY be pleased to state:**

(a) whether the nuclear scientists have designed or have been designing new nuclear reactors which can be located in densely populated areas in the country; and

(b) if so, the details thereof and the progress made by the Government in this regard so far?

**Answer**

THE MINISTER OF STATE FOR PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND PRIME MINISTER'S OFFICE (SHRI V. NARAYANASAMY) :

(a) Yes, sir. Bhabha Atomic Research Centre (BARC) is currently engaged in design and development of Advanced Heavy Water Reactor (AHWR). The reactor design addresses substantial technology development towards advanced passive safety features as needed for large scale deployment of nuclear energy in a densely populated country like India, in future. A strong case can be made for locating this reactor close to population centers, but it will require successful demonstration of the first prototype reactor incorporating these advanced technologies, followed by a revision of existing Atomic Energy Regulatory Board (AERB) siting Code.

(b) Several passive systems (listed below) have been incorporated in AHWR to ensure safety and confinement of radioactivity under complete loss of power, loss of external supply of coolant water and absence of prompt operator actions, etc.

- i. Core heat removal by natural circulation of coolant (requiring no pumps) during normal operation and shutdown conditions.
- ii. Direct injection of Emergency Core Cooling System (ECCS) water in the fuel cluster in passive mode during postulated accident conditions like Loss of Coolant Accident (LOCA).
- iii. Containment cooling by passive containment coolers.
- iv. Passive containment isolation by water seal, following a large break LOCA.
- v. Availability of large inventory of water in Gravity Driven Water Pool at higher elevation inside the containment to facilitate sustenance of core decay heat removal, ECCS injection.
- vi. Passive shutdown by poison injection in the moderator, using the system pressure, in case of Main Heat Transport system high pressure due to failure of wired mechanical shutdown system and liquid poison injection system.
- vii. Passive moderator cooling system to minimise the pressurisation of calandria and release of tritium through cover gas during shutdown and station blackout.
- viii. Passive concrete cooling system for protection of the concrete structure in high temperature zone.

Extensive Safety evaluation has been performed for AHWR with various postulated initiating events and it has been shown that in each of these events, there would be no release of radioactivity.

There have been three nuclear accidents so far in the world: Three Mile Island in USA, Chernobyl in the erstwhile USSR and Fukushima in Japan. AHWR has been assessed for the initiating events in each of these accidents and the results have been observed to be acceptable.