

GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
RAJYA SABHA
STARRED QUESTION NO.181
TO BE ANSWERED ON 22.08.2013

THORIUM RESERVES FOR ELECTRICITY GENERATION

*181. SMT JAYA BACHCHAN

Will the PRIME MINISTER be pleased to state:

- (a) whether India has an abundance of Thorium Reserves which can be used for electricity generation; and
- (b) whether Government has taken any steps to tap this resource for electricity generation and if so, the details thereof and if not, the reasons therefor?

ANSWER

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

- (a) & (b) A statement is placed on the table of the House.

STATEMENT REFERRED TO IN REPLY TO RAJYA SABHA STARRED QUESTION NO. 181 DUE FOR ANSWER ON 22.08.2013 BY SMT JAYA BACHCHAN REGARDING THORIUM RESERVES FOR ELECTRICITY GENERATION.

- (a) Yes, Sir. Thorium is abundantly available in India, in the beach sand, placer deposits along the west and east coasts of India. The Department of Atomic Energy (DAE) through its Atomic Minerals Directorate for Exploration & Research (AMD) has surveyed almost the entire Indian coastline and identified locations where the beach sand contains significant quantities of monazite, which is the main source of thorium in India. Exploration activities carried out by AMD over the past six decades have resulted in establishing *in situ* resources of 11.93 million tonnes of monazite in the country, which in turn contains about 1.07 million tonnes of thorium oxide (ThO₂).
- (b) Unlike Uranium, which can be used as nuclear fuel, thorium alone cannot be directly used as nuclear fuel. In the first instance, thorium has to be used along with either enriched uranium or plutonium while being put into any reactor. The spent fuel then contains an isotope called uranium-233. This is the second man-made fissile material apart from plutonium. The third stage of Indian nuclear power programme contemplates making use of Uranium-233 to fuel Uranium-233 – Thorium based reactors, to provide energy independence to the country for several centuries. The intention of the DAE is to use thorium as the main stay of its long-term nuclear power programme. Using the nuclear properties of uranium, plutonium and thorium, it can be easily shown that to get a rapid growth of installed nuclear generation capacity in a country like India with limited uranium resources, the large-scale deployment of thorium has to be postponed to the third stage of the Indian nuclear programme after the plutonium-based (Fast Breeder Reactors) (FBRs) have enabled accelerated growth in the nuclear generation capacity in the second stage of this programme. Bhabha Atomic Research Centre (BARC) and other research organisations attached with DAE are engaged in various R&D activities to address the utilisation of thorium in different types of reactors. Some important highlights of these activities are the following :
- (i) Thorium Oxide (Thoria) pellets contained in bundles have been used in the initial cores of our Pressurised Heavy Water Reactors (PHWRs). Thoria based fuels have also been irradiated in the research reactors CIRUS and Dhruva. After such irradiation these fuel elements have been examined in the laboratories at BARC, yielding excellent results.
- (ii) The irradiated thoria pins of CIRUS have been reprocessed to obtain U233. The recovered uranium 233 has been fabricated as fuel for the 30 Kilo Watt (thermal) KAMINI reactor which is in operation at Indira Gandhi Centre for Atomic Research (IGCAR) at Kalpakkam.
- (iii) The very challenging technologies for fabrication of Thoria based fuel pellets, carrying uranium-233, have been established.
- (iv) A 300 MW Advanced Heavy Water Reactor (AHWR) using thorium based fuel has been designed and developed. This reactor will serve as a technology demonstrator for not only the thorium fuel cycle technologies, but also several advanced passive safety features. A Critical Facility was commissioned in 2008 at BARC, and is used for carrying out experiments to further validate the physics design features of AHWR. A project for launching construction of AHWR has been included in the XII plan.
