

**GOVERNMENT OF INDIA  
DEPARTMENT OF ATOMIC ENERGY  
LOK SABHA  
STARRED QUESTION NO. \* 257  
TO BE ANSWERED ON 11.8.2010**

**EXPLORATION OF THORIUM**

\*257 SHRI RAJIV RANJAN SINGH ALIAS LALAN SINGH :  
DR. MURLI MANOHAR JOSHI :

**WILL THE PRIME MINISTER BE PLEASED TO STATE:**

- (a) Whether large deposits of thorium are found in various parts of the country;
- (b) If so, the details thereof;
- (c) Whether India has developed indigenous technology for using thorium for generating nuclear energy; and
- (d) If so, the details thereof alongwith the names of countries which have fully developed this technology?

**A N S W E R**

THE MINISTER OF STATE FOR SCIENCE & TECHNOLOGY AND EARTH SCIENCES (INDEPENDENT CHARGE), PMO, PERSONNEL, PUBLIC GRIEVANCES AND PENSIONS AND PARLIAMENTARY AFFAIRS.  
(SHRI PRITHVIRAJ CHAVAN)

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(a) to (d) A statement is placed on the table of the House.

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**GOVERNMENT OF INDIA  
DEPARTMENT OF ATOMIC ENERGY**

**STATEMENT REFERRED TO IN REPLY TO LOK SABHA STARRED QUESTION  
NO.257 DUE FOR ANSWER ON 11.8.2010 BY SHRI RAJIV RANJAN SINGH  
ALIAS LALAN SINGH AND DR. MURLI MANOHAR JOSHI REGARDING  
EXPLORATION OF THORIUM.**

(a) Yes, Sir.

(b) Atomic Minerals Directorate for Exploration and Research (AMD), a constituent unit of Department of Atomic Energy has established 10.70 million tonnes of Monazite resources in the Beach sand placers along the eastern and western coast of the country as well as the inland placers in parts of Kerala, Andhra Pradesh, West Bengal, Tamil Nadu, Orissa and Jharkhand.

Monazite resources contain about 9-10% of Thorium Oxide. About 8.5 lakh tonnes of thorium metal can be recovered from the said Monazite resources which will be used for future programmes of DAE.

(c) Yes, Sir.

(d) India has been working on the development of technologies for Utilisation of Thorium for Nuclear Power Generation since the inception of the Indian Nuclear Programme. As a part of this work thorium has been irradiated in our Research Reactors and also in Pressurised Heavy Water Reactors. Technologies for reprocessing of irradiated thorium fuel for the separation of Uranium-233 have also been developed on a pilot plant scale. Uranium-233 thus separated has been used as fuel in research reactor Purnima-II and later in the 30 kw Research Reactor Kamini now in operation at Indira Gandhi Centre for Atomic Research (IGCAR). Thorium based fuel has been manufactured and loaded in the Advanced Heavy Water Reactor (AHWR) critical facility for Reactor Physics experiments as well. Further development of technologies for large scale commercial level manufacture and reprocessing of Uranium 233 bearing fuels is underway.

In the early stages of development of nuclear energy in the world, several fuel options were investigated by different countries. These investigations also covered the use of thorium. Notably, the Shippingport Pressurised Water Reactor in United States and Arveitgemeinschaft Versuchs Reaktor (AVR) and Thorium High Temperature Reactor (THTR)-300, the High Temperature Gas Cooled Reactors in Germany demonstrated the use of thorium bearing fuel. However, no major programme was pursued for recycling of thorium based fuel and large scale utilization of thorium in reactors where a major component of power came from fission of Uranium 233.

Today, India is known to be the only country in the world today operating the Kamini reactor with Uranium 233 based fuel. The Indian Advanced Heavy Water Reactor is the only large scale reactor that has been designed and developed to produce a large fraction, nearly  $2/3^{\text{rd}}$  of its power from the fission of Uranium 233 in the equilibrium state of this reactor core.

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