

GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
RAJYA SABHA
UNSTARRED QUESTION NO-483
ANSWERED ON 24/07/2025

EXPLORATION AND MINING OF RARE EARTH MINERALS

483. SHRI KARTIKEYA SHARMA

Will the PRIME MINISTER be pleased to state:-

- (a) the steps being taken to promote the exploration and mining of rare earth minerals in the country;
- (b) whether Government is promoting startups in the field of development of rare earth refining techniques; and
- (c) whether Government is taking any measures through its research institutes in advancing research for finding alternatives to rare earth elements in use cases such as in magnets and semiconductors?

ANSWER

THE MINISTER OF STATE FOR PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND
PRIME MINISTER'S OFFICE (DR. JITENDRA SINGH)

- (a) Critical minerals such as lithium, graphite, cobalt, titanium, rare earth elements etc. are demand intensive due to their strategic uses in various sectors, viz., electric vehicles, renewable energy and defence. The Ministry of Mines has undertaken significant steps including various policy reforms to ensure exploration and mining of these critical sectors:

The Mines and Minerals (Development and Regulation) Act, 1957 (MMDR) has been amended through the MMDR Amendment Act, 2023 w.e.f. 17.08.2023. Major reforms of Amendment Act, 2023 are:

- i. Omission of six minerals from the list of 12 atomic minerals namely Lithium, Titanium, Beryl and beryllium bearing minerals, Niobium, Tantalum and Zirconium bearing minerals.
- ii. Created a list of 24 critical & strategic minerals in part D of Schedule-I of the MMDR Act.
- iii. Section 11D of the Act empowered Central Government to exclusively auction mining lease and composite licence for critical & strategic minerals specified in Part D of the Schedule-I of the Act.
- iv. Introduced exploration license for 29 minerals included in Schedule- VII.

In addition, Ministry of Mines has also been empowered to auction blocks for grant of Exploration Licence through an order under section 20A of MMDR Act 1957.

To enhance the exploration program for identifying potential mining sites in order to boost domestic production for the critical minerals, Geological Survey of India (GSI), in the FY. 2024-25, has taken up 195 mineral exploration projects for critical and strategic minerals across the country. In the FY. 2025-26, total 227 projects are under execution.

Ministry of Mines has also focused on funding various projects of mining exploration through National Mineral Exploration Trust (NMET). So far, NMET has funded 195 projects of critical minerals through various exploration agencies.

To encourage private participation in exploration, Ministry of Mines has notified 33 private exploration agencies (NPEAs). These agencies are taking up exploration projects through funding from NMET.

Consequent to the amendment in the MMDR Act, Central Government has auctioned 34 blocks in five tranches.

First tranche of auction of offshore mineral blocks has been launched in November 2024 for 13 mineral blocks which includes 7 blocks of polymetallic nodules having critical minerals in Andaman Sea.

First tranche of auction of blocks for Exploration License (EL) was launched in March, 2025 for 13 Blocks for various critical minerals.

To support the critical minerals sector, Government has eliminated customs duties on 25 minerals and reduced Basic Customs Duties (BCD) on 2 minerals in the Union budget 24-25. During 2025-26 Budget, GoI exempted cobalt powder and waste, the scrap of lithium-ion battery, Lead, Zinc and 12 more critical minerals.

Further in order to develop a coordinated approach, the Union Cabinet has approved the launch of the National Critical Mineral Mission (NCMM) on 29 January, 2025 with an expenditure of Rs. 16,300 crore and expected investment of Rs.18,000 crore by PSUs, etc. The Mission will be implemented over a period of seven years, from FY 2024-25 to 2030-31 with a budgetary support of INR 2600 crore.

The Mission aims to secure a long-term sustainable supply of critical minerals and strengthen India's critical mineral value chains encompassing all stages from mineral exploration and mining to beneficiation, processing, and recovery from end-of-life products.

To strengthen the domestic processing capabilities for critical minerals, under the NCMM, INR 500 crore has been allocated for developing processing parks, INR 1500 crore has been allocated for incentive scheme for recycling of critical minerals from secondary sources. Pilot projects for mineral recovery have been approved with an allocation of INR 100 crore. Besides, to foster innovation the Ministry is providing funding R&D institutions, start-ups, and MSMEs.

Considering the strategic importance of critical minerals in the country, Geological Survey of India (GSI) has given thrust to the exploration of various critical minerals including REEs specified in Part D of the First Schedule of MMDR Amendment Act, 2023. Over the years, there is a substantial increase in the number of exploration projects for REE minerals taken up by GSI, from 17 exploration projects in 2020-21 to 95 exploration projects in FS 2025-26, across the country.

The state wise details of total number of exploration projects taken up by GSI for REE minerals from 2023-24 to 2025-26 is furnished below:

FS Year	State (No. of projects)	Total No. of Projects
2023-24	Andhra Pradesh (6), Arunachal Pradesh (1), Assam (3), Bihar (2), Chhattisgarh (2), Gujarat (5), Jharkhand (4), Karnataka (1), Kerala (2), Madhya Pradesh (1), Maharashtra (4), Meghalaya (4), Odisha (3), Rajasthan (11), Tamil Nadu (2), Telangana (2), Uttar Pradesh (2), West Bengal (4).	59
2024-25	Andhra Pradesh (3), Assam (4), Bihar (5), Chhattisgarh (6), Gujarat (1), Jharkhand (8), Karnataka (2), Kerala (1), Madhya Pradesh (4), Maharashtra (4), Meghalaya (3), Odisha (6), Rajasthan (15), Tamil Nadu (4), Telangana (5), Tripura (1), Uttarakhand (1), West Bengal (5).	78
2025-26	Andhra Pradesh (4), Assam (4), Bihar (7), Chhattisgarh (4), Gujarat (3), Jharkhand (10), Karnataka (5), Kerala (1), Madhya Pradesh (3), Maharashtra (5), Meghalaya (6), Odisha (3), Rajasthan (18), Tamil Nadu (5), Telangana (4), Tripura (1), Uttar Pradesh (1), West Bengal (11).	95

Since MMDR Amendment Act, 2015, GSI has augmented 482.6 Million Tonne of REE resource at various grades and cut-off in different parts of the country.

Since Amendments to the MMDR Acts, 2015, GSI has handed over 13 resource bearing G2/G3 geological reports and 2 Geological Memorandums of REEs to the State/Central Governments for consideration in the auctioning process.

To intensify the search for critical minerals including REEs, GSI has launched 'Critical Mineral Assessment Programme' (CMAP) to target the secondary enrichment zones of critical minerals including REE on nationwide scale with an aim to develop an effective exploration strategy that can lead to the discovery of new potential zones in different parts of the country. Since its inception in 2024-25, GSI has taken up 27 CMAP in different parts of the country.

GSI has adopted several strategies to intensify the search for covered, concealed, and deep-seated mineral deposits, particularly for critical and strategic minerals including REEs through (i) Advanced Geophysical techniques (National Geophysical Mapping, National Aero-Geophysical Mapping, drone based geophysical mapping, Magneto Telluric survey) (ii) Innovative survey Techniques (Multispectral/Hyperspectral mapping), and (iii) Advanced data processing and integration (Regional Mineral Targeting (RMT), Mineral Prospectivity Mapping using AI/ML, 3D predictive modelling, etc.). These integrated approaches expedite survey activities and help to narrow down target areas for further exploration, enabling more efficient and effective

discovery of concealed, deep-seated, critical mineral resources including REEs minerals across the country.

Atomic Minerals Directorate for Exploration and Research (AMD), a constituent unit of Department of Atomic Energy (DAE), is carrying out exploration and augmentation of minerals of rare earth elements (REE) along the coastal / inland / riverine placer sands as well as in hard rock terrains in several potential geological domains of the country.

As on date, the REE resources estimated by AMD are as follows:

Approximately 7.23 million tonne (Mt) in-situ Rare Earth Elements Oxide (REO) contained in 13.15 Mt monazite [a mineral of Thorium (~10% ThO₂) and Rare Earths (~55% REO)] occurring in the coastal beach, teri / red sand and inland alluvium in parts of Andhra Pradesh, Odisha, Tamil Nadu, Kerala, West Bengal, Jharkhand, Gujarat and Maharashtra.

1.29 Mt in-situ REO resource in hard rocks in parts of Gujarat and Rajasthan.

To promote the exploration of rare earth minerals in India, AMD is carrying out exploration to identify additional resources of rare earths in the beach sand deposits along coastal tracts in parts of Tamil Nadu, Karnataka, Odisha and Andhra Pradesh. Further, AMD is also carrying out survey and prospecting operations to augment rare earths resources in hard rock terrains in parts of Tamil Nadu, Karnataka, Rajasthan, Gujarat and Jharkhand.

- (b) Yes. Under “Promotion of Research and Innovation in Start-ups and MSMEs in mining, mineral processing, metallurgy and recycling sector (S&T- PRISM)” component of Science and Technology Programme of Ministry of Mines (MoM), two startups — Ashvini Rare Earth Pvt. Ltd. (Pune, Maharashtra) and Saru Smelting Pvt. Ltd. (Meerut, Uttar Pradesh) — have been awarded grants and provided technology transfers from Bhabha Atomic Research Centre (BARC).
- i. Ashvini Rare Earth Pvt. Ltd. is implementing the project “Establishment of Pilot Plant (TRL-7) for Extraction of Neodymium - Praseodymium (Nd-Pr) metal from Nd-Pr oxide through Calcio-thermic reduction route for NdFeB base permanent magnet application.”
 - ii. Saru Smelting Pvt. Ltd. is working on “Lithium ion-electro fusion reactor for alkali metals” for lithium extraction using molten salt electrolysis.

In addition to these, other startups have been supported under the S&T PRISM programme for projects related to rare earths, critical minerals, and recovery technologies. Notable examples include:

- i. Polyprotic Chemicals Pvt. Ltd. (Vadodara, Gujarat) for “Solvent Extractants and Ion-Exchange Resin Chemicals for Strategic and Rare Earth Metal Recovery.”
- ii. Caliche Private Limited (Shillong, Meghalaya) for “GARBH – A Software for Exploration of Rare-Earth Elements.”
- iii. PG Tech Pvt. Ltd. (Indore, Madhya Pradesh) for “NdPr Metal Production through Molten Salt Electrolysis Technology.”

These initiatives are focused on rare earth recovery from industrial waste, development of efficient separation and extraction processes, and innovative exploration and processing techniques, thereby contributing to India's efforts toward self-reliance in strategic and rare earth minerals.

- (c) Through Ministry of Mines, Research for alternatives to rare earth (RE) elements, particularly in applications such as magnets and semiconductors are being actively pursued through dedicated research institutes.

Research is currently focused on two thrust areas:

- i. Development of magnet-free motors, and
- ii. Development of RE-free magnets. In the latter, potential alternative chemistries have already been identified and are under advanced investigation.

Significant progress has been made in the development of magnet-free motors, with ongoing engagement with industry for further development. Simultaneously, two promising RE-free magnet chemistries are being explored in depth.

An extensive landscape study has also been undertaken, leading to the initiation of a focused programme on RE-free and magnet-free drives targeted at the automotive sector.
