



*cmpdi*

*A Mini Ratna Company*

# Sustainable Unearthing of **Mineral Resources** Begins with Us



**CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED**

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## About CMPDI

To keep pace with the growth and latest technological developments in the mineral and mining industry, there is need for a consultant who can facilitate selection of appropriate strategy-options to operate in today's competitive environment.

CMPDI stands as a symbol of a specialist consultant for all those who are in the mineral and mining sector. With four decades of experience and talent bank of more than 900 multi-disciplinary professionals having expertise in Mineral exploration, Mine planning & design, Infrastructure engineering, Environment management, Mineral beneficiation and Management services— CMPDI is truly a unique and dynamic consulting organization and is a consultant behind India's sustainable energy security.

CMPDI is an ISO 9000:2015 (Quality Management) and ISO 37001:2016 (Anti Bribery Management System) accredited organization ensuring high standard of consultancy work for its clients.



*Earth Science Museum, CMPDI (H.Q.), Ranchi*



*Main Gate, CMPDI (H.Q.)*

Professionals at CMPDI combine innovation, experience and initiative to deliver fast and effective solutions in planning, implementation and management of projects. CMPDI is equipped with modern laboratory facilities for undertaking various analytical works to supplement its services.

It operates through its headquarters at Ranchi, the capital city of the State of Jharkhand, and seven strategically located Regional Institutes spread over six states.

The company is recognized as 'preferred' consultant by Indian clients including government and private sector and leading one in International arena.

## Services offered

- Geological Exploration & Resource Evaluation
- Mine Planning & Design
- Environment Planning & Monitoring Services
- Geomatics Services
- Infrastructure Engineering & Design
- Beneficiation Services
- Development of Coal based non-conventional energy resources
- Renewable Energy Service
- Laboratory Services
- Other Management Services

# Geological Exploration & Resource Evaluation



CMPDI offers its services in mineral exploration, deposit modelling, resource & quality evaluation, resource management, mining geology, hydro-geological & geophysical studies, geo-engineering investigations, following UNFC norms, etc.

To provide quality services, CMPDI is effectively utilising technologies like remote sensing, multi-probe geophysical borehole logging, 2D/3D seismic refraction survey, etc.

CMPDI has already undertaken over 1200 integrated exploration projects in varying geological and terrain conditions and nodal agency for coal & lignite exploration on behalf of MOC.



## Services offered

### Geological support for mining

- Production support or mine development drilling and prediction of faults and pinch/wash outs
- Delineation of roof/ floor and dirt bands

### Drilling

- Coring-Diamond rotary drills up to a capacity of 1000 m depth (N size)
- Non-coring-Direct rotary and DTH drills for hydrogeological investigations, etc.

### Geophysical surveys

- Multi-probe geophysical logging of boreholes, seismic surveys(HRSS/refraction), magnetic surveys, electrical resistivity surveys, gravity surveys, 2D/3D seismic surveys using PARADIGM software

### Deposit modelling

- Using geo-statistical and geological software packages including MINEX and in-house developed CEMPGEODOC and SASLINT software

### Resource evaluation

- Deposits of Coal, Lignite, Manganese, Iron ore (Magnetite and Hematite), Phosphorite, Coal bed methane, Bauxite, REE, etc.

### Resource management

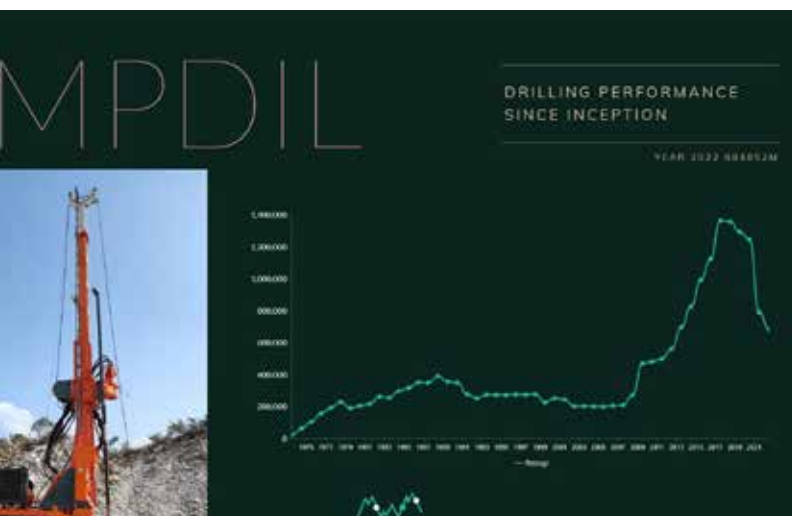
- Strategic planning for future exploration depending on market demand
- Updation of reserve/resource of individual blocks or coalfields

### Hydrogeological studies

- Accredited as GWCO by QCI NABET
- Systematic ground water investigations
- Mining hydrogeological studies

### Geo-engineering

- Determination of strength properties of rocks and coal and RQD (Rock Quality Designation) to assess strength characteristics of strata



# Mine Planning and Design



CMPDI is a premier consultant in Open pit and Underground mine planning & design in Coal, Lignite, Iron, Bauxite and other minerals. CMPDI has prepared over 900 mining project reports with individual project capacity up to 75 Mtpa.

Services provided for opencast mine planning & design to CIL and its subsidiaries has helped these organizations to achieve an unprecedented growth in coal production from opencast mines, from a level of 16.4 Mt. in 1973-74 to one of the largest coal producer in the world. CMPDI uses multiple advance software tools for resource modelling, mine planning, scheduling & geotechnical engineering.

CMPDI's experience in mechanised underground mining technology spans exploitation of coal seams from 1 to 20 m thickness, at different gradients from flat to 75 degrees; with soft to extremely hard coal; liable to spontaneous heating and gassiness and under varying roof strata conditions.



## Services offered

- Master planning of coalfields
- Conceptual engineering studies
- Techno-economic studies
- Detailed Project Report/Feasibility Report
- Detailed engineering with working drawings
- Mine ventilation and transport planning
- Operational planning
- Slope Stability studies
- Mine Capacity Assessment including determination of capacity utilization of mines
- Performance analysis of equipment
- Prediction of surface subsidence through numerical modelling
- Preparation and evaluation of specialised tender documents for long term mining & associated infrastructure contracts.



### Some of the large projects planned by CMPDI

PROJECT	COMPANY	TOTAL CAPACITY (Mtpa)
<b>OPENCAST</b>		
Kusmunda Expn	SECL	75.0
Gevra Expn	SECL	70.0
Magadh	CCL	51.0
Bhubneshwari Expn	MCL	50.0
Dipka Expn	SECL	40.0
Kulda-Garjanbhal Combined	MCL	40.0
Siarmal	MCL	40.0
Integrated Lakhanpur Belpahar	MCL	30.0
Gopalji-Kaniha	MCL	30.0
Amarpali Expn	CCL	25.0
Nigahi Expn	NCL	25.0
Subhadra (Utkal+Gopalprasad West)	MCL	25.0
<b>UNDERGROUND</b>		
Borda	WCL	6.00
Jhanjra Expn	ECL	5.00
Patratu ABC	CCL	5.00
Sangam	WCL	4.00
Silewara Deep	WCL	3.20



Jhanjra underground, ECL

## Environmental Planning & Services



CMPDI holds a position of eminence in the field of mine environment planning, impact assessment and management for mining and coal beneficiation projects, environmental engineering and state of the art environmental laboratory services. Some of the new areas in which CMPDI has diversified are;

- environmental & hydrogeological studies for disposal of fly ash
- development of air quality model
- bio-treatment of industrial effluents
- carrying capacity based development planning
- watershed modelling, rainwater harvesting
- issues related to policy framework
- mine closure planning and climate change
- scientific sand replenishment study

It provides entire range of environmental engineering services like planning and design of pollution control facilities, preparing EIAs and EMPs, OB dump reclamation plans, environmental master plans, progressive and final mine closure plans, etc. CMPDI is accredited by NABET and Quality Council of India as an EIA consulting organization for two sectors namely, mining of minerals including opencast / underground mining and Coal washeries as per the requirement of Ministry of Environment & Forests, Government of India for its EIA/EMP services. CMPDI has a network of six environmental laboratories in different coalfields. Its central laboratory at Ranchi is accredited with Central Pollution Control Board and received OHSAS (Occupational Health & Safety Advisory Services) certification. It has received accreditation of NABL (National Accreditation Board for Testing & Calibration Laboratories).



CBM lab CMPDI (H.Q.)



Environment lab CMPDI (H.Q.)

## Services offered

### Environmental quality monitoring

- Air, Water, Noise and Soil quality
- Stack monitoring

### Environmental engineering

- Water treatment plants
- Effluent treatment and recycling plants
- Hazardous waste disposal site engineering
- Municipal effluent disposal site engineering
- Acid Mine Drainage remediation
- Solid Waste Management

### Natural resource management

- Land use planning
- Rain water harvesting
- Watershed management plans

### Regional planning

- Regional environment management plans
- Ecological restoration planning
- Carrying Capacity of Environment
- Baseline Study for EIA/EMP planning
- Vertical Greenery System

### Special studies

- Review of existing mining and environment policies, legislations, standards and mechanisms for monitoring compliance, institutional strengthening for regulatory and counterpart institutions.
- Study of environmental problems and action plan for restoration of environmental quality
- Mine closure planning
- Fly ash disposal studies
- Riverine Ecology Study and Replenishment Study of rivers



## Geomatics Services



CMPDI has established a full-fledged Geomatics division dedicated to Remote Sensing, Survey and Drone applications for integrated natural resources management. Geomatics division has a professional multidisciplinary team having rich experience in the field of airborne survey, satellite data processing, GIS, Surveying, Photogrammetry, GPS, Digital photogrammetry, Drone Operations, LiDAR & Gyroscopic Surveys etc.

Keeping pace with state of the art technological innovation CMPDI is expanding its feet in geospatial arena. CMPDI is extensively using the geospatial technology in all the three stages of mining i.e. Pre-Mining, Syn-Mining and Post Mining ranging from Topographical Survey, Mineral Exploration, Land Use Mapping, Watershed Management, Excavation Measurement to Slope Stability, Ground Subsidence Measurement, Coal Mine Fire mapping, Environmental Management, Settlement Mapping, Land Reclamation, Mine Closure Monitoring as well as various Drone based applications. Besides mineral sector, CMPDI has already used this technology for locating potential pit head and coastal thermal power Station (TPS) sites, reservoir siltation, sodic land mapping and coastal zone management amongst others.

Considering the best application of geospatial technology in mining sector, Coal India/CMPDI has been conferred with Geospatial World Excellence Award-2012 at Amsterdam, The Netherlands for Application of Geospatial Technology in Mining.





## Services offered

CMPDI offers its Geomatics services in all the three stages of mining i.e. pre-mining, syn-mining and post-mining ranging from topographical survey, mineral exploration, environmental management planning to excavation measurement, land reclamation monitoring, erosion and siltation, coal mine fire, land subsidence measurement and Drone based applications.

### Surveying

All types of Surveying jobs are undertaken by CMPDI using latest survey equipment which are as follows:

- 3D TLS/ LiDAR / ETS Survey
- DGPS Survey
- Centre line alignment of tunnels using Gyroscope
- UG correlation survey using Gyroscope
- Drone Survey using Optical, LIDAR & Thermal sensors
- Large scale topographical, cadastral, industrial survey is also carried out for different clients.

### Survey Services

- Excavation Measurement
- Gyroscopic survey
- Sand Replishment Studies
- Topographical survey
- DGPS Survey
- Route alignment

### Remote Sensing Services

- Vegetation Cover / Land Use Mapping
- Land Reclamation Monitoring
- Watershed Management
- Reservoir Sedimentation Assessment
- Environmental Management Planning
- Coal Mine Fire Mapping

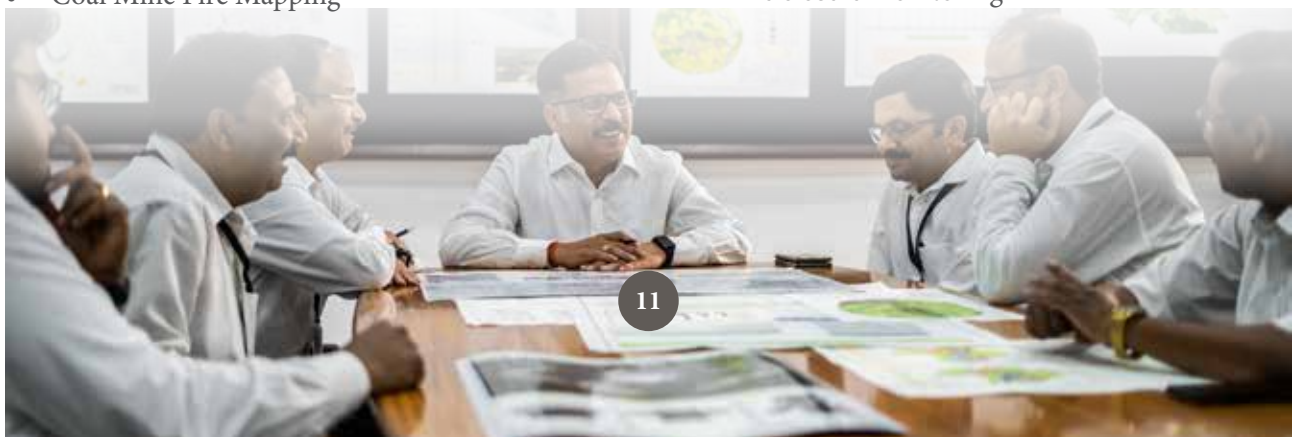
- Sodic Land Mapping
- Site Selection for TPS, Washeries and other
- Mineral Exploration

### Industrial Units

- Settlement Mapping
- Efficiency monitoring of installed solar panels

### Drone Services

- Topographical Mapping
- Generation of DEM/DTMs
- Generation of High Resolution Orthophoto Mosaic for Settlement Mapping
- Blasting Monitoring in mines
- Inspection of HEMMs/Civil Structures and other inaccessible areas
- Plantation Height Assessment
- Air Quality Monitoring
- Sand Replenishment Studies
- Soil Moisture Conservation Studies
- Thermal Survey/ Mapping
- Vegetation Cover Mapping
- Real time footage/ Videography for Live Mine Monitoring
- Dump Height & Slope Monitoring
- Subsidence Monitoring
- Reconnaissance Survey for Identification of Coal bearing Areas
- Mine closere monitoring



# Infrastructure Engineering & Design



CMPDI's engineering services provide comprehensive infrastructure design and construction capabilities in the field of architecture, civil, electrical and mechanical engineering.

- CMPDI has planned more than 300 material handling plants upto 50 million tonnes per annum capacity
- Power Supply Systems: more than 190 substations/OH lines upto 220kV
- Workshops: more than 150 of different specialities i.e. Central, Regional and Project workshops
- Townships: more than 25 for coal & non-coal sectors
- Smart Township Planning
- Adequacy Studies
- Vertical and Inclined transport systems
- Renewable Energy

## Services offered

- Planning of large capacity, high speed bulk material handling plants
- Turnkey execution of coal handling plants
- Planning of sub-stations





- Planning of workshops of various types and capacities
- Township planning including roads, power supply, water supply system, drainage, water/sewerage treatment plants etc.
- Site selection for pit head thermal power plants based on remote sensing data
- Project Management Services of Solar Power, Civil Construction and Tender management
- Techno-economic feasibility study of captive power plants based on pulverized coal and FBC technology
- Project Management Consultancy (PMC) Services of CMPDI are provided to create Smart City/Townships/Villages, Green Office Buildings, infrastructures, Liquid (STP/WTP) & Solid Waste Management systems, Mine tourism, Eco Parks, Nallah Diversions, Bridges & Culverts, Roads, etc., through conceptualization and commissioning of projects



*Ananya Vatika, Hasdeo Area, SECL*

## Beneficiation Services

CMPDI specializes in planning, design and construction of new washeries and modification of existing washeries for coal and mineral beneficiation.

### Services offered

- Planning of coal and mineral beneficiation plants on BOO, BOM and ROM modes
- OB to Sand processing Plant Planning
- Feasibility study of Deshaling Plants
- Preparation of feasibility/project reports including macro level analysis, washability studies, environmental impact assessment and techno-economic analysis
- Technical studies, performance evaluation and operation & maintenance related consultancy for existing washeries
- Pilot scale studies and trials



*Amlohri OB to Sand plant, NCL*



# Development of Coal based non-conventional energy resources



CMPDI is pursuing development of Coal based non-conventional clean energy resources like CBM, CMM, UCG, Shale Gas and SCG as a part of CIL's commitment towards implementing clean coal technology for achieving corporate commitment of green mining. Demonstration project was carried out under UNDP GEF funding at Moonidih. Jharia CBM Block-I awarded to Prabha Energy where CMPDI is the PIA.

## Services offered

- Delineation of potential CBM blocks within mining leasehold of CIL Subsidiaries
- Principal Implementing Agency (PIA) for the development of CBM under Memorandum of Agreement (MoA) with respective subsidiary companies and the development of the gasification Projects
- Preparation of Project Feasibility Report (PFR) of CBM Blocks for commercial extraction of CBM through CBM Developer (CBMD) and gasification projects
- Intending for setting up a Coal to Chemical/fertilizer & Potential Downstream Product(s) Plant through Coal Gasification.

# Field Services

## Blasting

Technical services for blasting related work in both coal and non- coal mine with sophisticated testing equipment are provided by CMPDI. The services include controlled blasting, ground vibration study and testing of explosives products.

## Services offered

- Controlled blasting & ground vibration study
- Performance evaluation of new explosives
- Testing of explosive products
- Scientific study of blast designs

## Non Destructive Testing (NDT)

- NDT of components of machinery, installations and other structural elements

## Ventilation, Gas survey & Strata Monitoring

- Planning and design of ventilation systems including monitoring/Gas assessment and testing for underground mines.
- Design of support rulers



# Laboratory Services



*Petrographic laboratory CMPDI (H.Q.)*

CMPDI has well equipped laboratories with highly skilled manpower and state of the art equipment for carrying out chemical, petrographic, geo-mechanical and washability studies apart from CBM related studies. The data generated by these laboratories formed the basis for characterization and grading of coal in exploration, mine feasibility reports, washery designs and downstream utilization and CBM potentiality studies.

CMPDI has NABL accredited lab to carry out Non-Destructive testing of various mining equipment/HEMMs and structure of Coal handling plants for identifying internal cracks in iron structure without dismantling it.

A state of the art CBM Lab is functional at CMPDIL to facilitate generation of all parametric data related to CBM/Shale gas related studies, reservoir characteristics and assessment of CBM and Shale gas resources.

## **Geo-chemical laboratory**

Geo-chemical analysis like proximate & ultimate analysis, GCV determination of coal and lignite and other special tests are being carried through microprocessor based automatic calorimeter and analyser.

## **Petrographic laboratory**

Petrographic analysis is carried out for coal, coke, source rock evaluation for hydrocarbons, oil shales and coal bed methane assessment through sophisticated microscopes. Mineral phases in coal, rocks and metals is identified through X-ray diffractometer. Micro area analysis and cleat studies for CBM are carried out through Scanning Electron Microscope. All the petrographers are accredited by International Committee for Coal and Organic Petrology (ICCP).

## **Mining laboratory**

Physico-mechanical properties of rocks are determined which form design inputs for mine planning and other technical services being rendered by CMPDI. It also undertakes testing of roof supports and building materials. Rock Mass Rating (RMR) of roof strata is determined for design of support systems for underground workings.

## **Washery laboratory**

Washability characteristics of coarse, small and fine coal and shattering & pulverizing characteristics of coal are determined for assistance in planning and design of coal beneficiation plants.

## ICT

ICT is set to revolutionise mining industry and mine operations in the coming years. CMPDI has geared itself fully to meet the challenges in this sector. It has centralised software infrastructure for Mine Planning and Design which is shared by all Regional Institutes using MPLS-VP based WAN with LANs at HQ and all Regional Institutes.

CMPDI is now a data hub for centralised applications developed by CMPDI for Coal India for HR applications. CMPDI also provides consultancy for design of networks, infrastructure and software applications in mining industry.

CMPDI is aware of the importance of information security and is certified for ISO 27001. Equipped with latest tools, CMPDI is striving ahead for a paperless office concept, IP based surveillance systems and video conferencing.

CMPDI provides consultancy services for:

- Mine communication and mine safety systems
- Establishment of internet and intranet
- Real time fleet management system for large opencast mines using GIS & GPS
- Land information system using enterprise GIS
- Introduction of e-Office for entire Coal India Limited
- Data Analytics Software SAS has been introduced



## R & D

The major research areas covered under coal sector are:

- Coal exploration
- Mining methods
- Mine safety
- Coal beneficiation and utilisation
- Mine reclamation and mine environment studies
- Satellite applications

CMPDI has state of the art facilities to undertake research & development projects, apart from being the nodal agency for the S&T projects funded by GOI in coal and lignite sector and R&D projects funded by Coal India R&D Board.

Notable advances have been made through R&D efforts in application of new technology in coal mining.

New areas like coal bed methane and its utilization and underground gasification as well as surface gasification and air quality monitoring using satellite data is being addressed through R&D projects.

CMPDI is making efforts for enhancing quantum of R&D work needed to address the complexity of operations of coal industry and also for wider involvement of research agencies in the S&T programme.



*Geotechnical laboratory CMPDI (H.Q.)*



## Other Management Services



### Coal Investment Promotion Services

- Assistance to Government of India in identification and assessment of coal blocks for investments through public and private sector participation.

### Management Systems Consultancy Services

- CMPDIL is facilitating for implementation of Management System standards in all subsidiaries of Coal India Limited and providing consultancy services for application of different Management System standards, like ISO 9001, ISO 14001, ISO 45001, ISO 50001, ISO/IEC 27001, ISO 37001, etc.

### Human Resource Development

- Knowledge Management and Training to CIL's workforce

### E-auction Services

- Introduction of e-procurement system by CMPDI has resulted in total transparency by minimizing human intervention. Moreover, CMPDI is adding up a new vertical in the form of development of coal e-auction platform for conducting coal e-auction for CIL and the Subsidiary Companies which is being presently carried out by MSTC and mJunction.



## OUR CLIENTS

1. EASTERN COALFIELDS LIMITED
2. BHARAT COKING COAL LIMITED
3. CENTRAL COALFIELDS LIMITED
4. WESTERN COALFIELDS LIMITED
5. SOUTH EASTERN COALFIELDS LIMITED
6. NORTHERN COALFIELDS LIMITED
7. MAHANADI COALFIELDS LIMITED
8. COAL INDIA LIMITED
9. ADANI ENTERPRISES LIMITED
10. ANDHRA PRADESH MINERAL DEVELOPMENT CORPORATION LIMITED
11. AP EXPLOSIVES PRIVATE LIMITED
12. ICVL, MOZAMBIQUE
13. CG NATURAL RESOURCES PRIVATE LIMITED
14. GOVT. OF BIHAR
15. GUJARAT STATE ELECTRICITY CORPORATION LIMITED
16. DIRECTORATE GENERAL OF HYDROCARBONS
17. ADITYA BIRLA GROUP
18. GOVT. OF UP
19. IDEAL DETONATORS PRIVATE LIMITED
20. HINDUSTAN COPPER LIMITED
21. IRCON INTERNATIONAL LIMITED
22. MAHAGENCO
23. JINDAL POWER LIMITED
24. JINDAL STEEL AND POWER LIMITED
25. NEYVELI LIGNITE CORPORATION INDIA LIMITED
26. JMS MINING PRIVATE LIMITED
27. KARNATAKA POWER CORPORATION LIMITED
28. RAJASTHAN STATE MINE AND MINERALS LTD
29. MIDWEST GRANITE PRIVATE LIMITED
30. MINERALS LAB SERVICES PRIVATE LIMITED
31. MOIL
32. MP NATURAL RESOURCES PRIVATE LIMITED
33. MYTHRI INFRASTRUCTURE AND MINING INDIA PRIVATE LIMITED
34. NATIONAL ALUMINIUM COMPANY LIMITED
35. NATIONAL MINERAL DEVELOPMENT CORPORATION LIMITED
36. NATIONAL THERMAL POWER CORPORATION LIMITED
37. NEYVELI LIGNITE COPROATION LIMITED
38. ODISHA COAL AND POWER LIMITED
39. ODISHA MINING CORPORATION LTD.
40. ORISSA MINERALS DEVELOPMENT COMPANY LIMITED
41. POWER GRID CORPORATION OF INDIA LIMITED
42. RAJASTHAN STATE MINES & MINERAL LIMITED
43. RUNGTA SONS PRIVATE LIMITED
44. SBL ENERGY LIMITED
45. SINGARENI COLLIERIES COMPANY LIMITED
46. STEEL AUTHORITY OF INDIA LIMITED
47. TATA STEEL LIMITED
48. THDC INDIA LIMITED
49. TOKISUD MINING PRIVATE LIMITED
50. VEDANTA LIMITED
51. WEST BENGAL POWER DEVELOPMENT CORPORATION LIMITED
52. And many more including MDO, Pvt entities apart from PSU



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