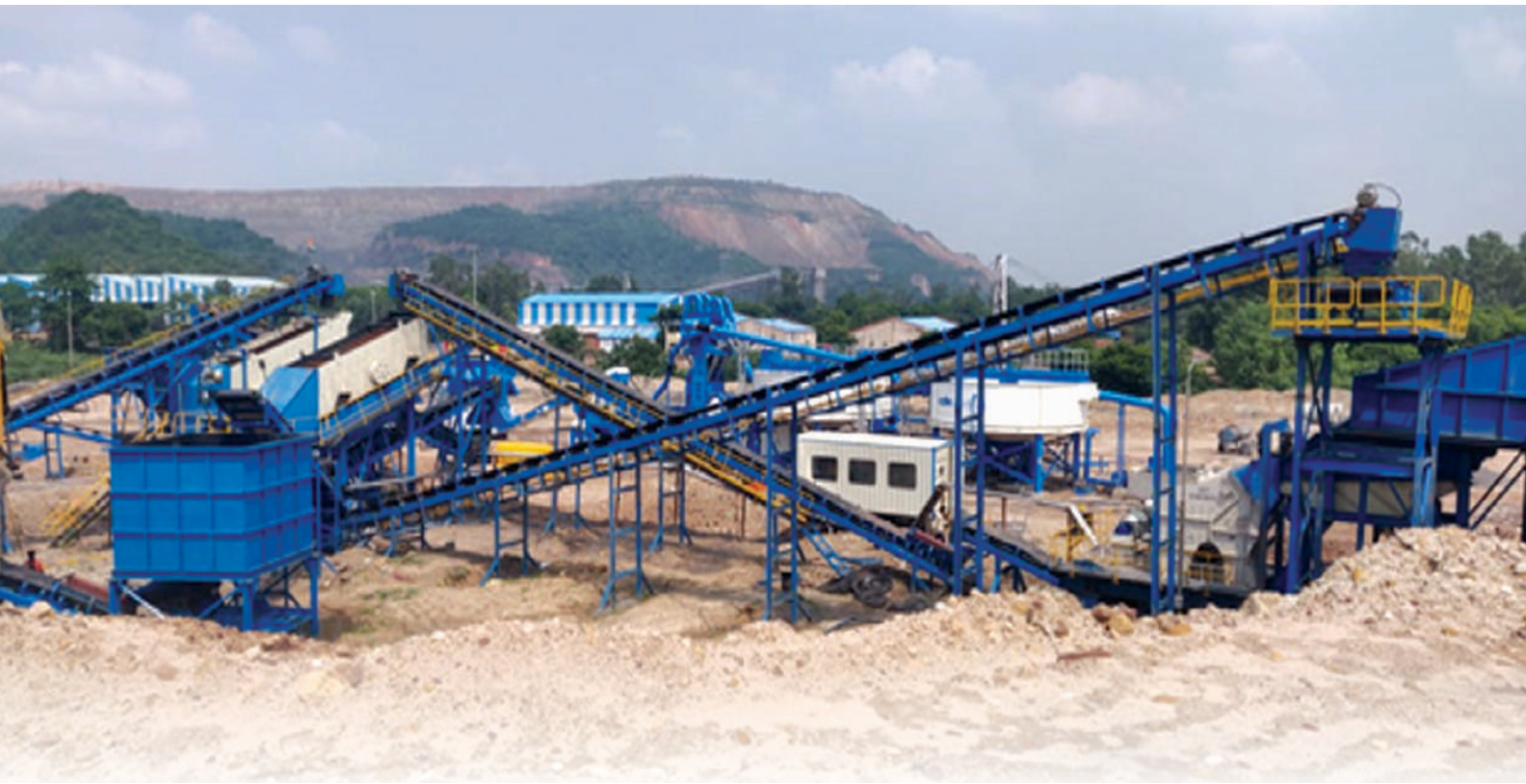
सत्यमेव जयते

MINISTRY OF COAL
GOVERNMENT OF INDIA
2024



REPORT
OF
HIGH-POWERED EXPERT COMMITTEE
ON
GAINFUL UTILIZATION OF OVERBURDEN IN COAL SECTOR

CONSTITUTION OF HPEC

1. Constitution of HPEC

Ministry of Coal, Government of India vide OM No. SDC/1/2023-SDC dated 22/02/2023 had constituted a High-Powered Expert Committee (HPEC), under the chairmanship of Joint Secretary, Sustainability and Just Transition (S&JT) Division, Ministry of Coal (MoC) with the approval of Hon'ble Minister of Coal, for gainful utilization of overburden (OB) in coal sector. The composition of the HPEC is as under:

Sl. No.	Name, Designation and Organization	Role
1	Joint Secretary, S&JT Division, MoC	Chairman
2	Advisor (Projects), MoC	Member
3	Director (Technical), Coal India Limited	Member
4	Chairman-cum-Managing Director, CMPDI	Member
5	JS or Director level officer from NITI Aayog	Member
6	JS or Director level officer from MoEF&CC	Member
7	JS or Director level officer from Ministry of Railways	Member
8	JS or Director level officer from MoRTH	Member
9	Expert from BMTPC, MoHUA	Member
10	Deputy Secretary, S&JT Division, MoC	Member Secretary

2. Terms of Reference

The Terms of Reference (ToR) of the HPEC are as under:

i. To make a policy framework in order to create a conducive environment for promoting the production of alternative/substitute construction material from the overburden of coal mines so that our natural resources presently being used for construction materials, ballasts etc. may be saved.

ii. Suggestions for a regulatory/advisory framework to introduce the concept of WHOLE mining which will direct the exploration agencies to include the quantification of all the minerals present in the total strata in their Geological Reports and a similar system of pre-feasibility examination of uses of such materials, in the mining plan.

iii. System of region-wise assessment of demand for building material, minerals, ballasts etc. a possible supply of it from the processed overburden material.

iv. To prepare a Policy Framework, for engaging the premiere Technical and Research Institutions like Building Material and Technology Promotion Council (BMTPC) etc. in carrying out studies for categorization of the available overburden material along with the technical solutions vis-à-vis the end product and for promoting the manufactured building material from overburden.

v. Guidelines for preparation of EIA/EMP for overburden processing units considering the overall positive impact on the environment.

vi. Promoting self-regulation of the stakeholders i.e. OB providers, OB processing units' owners, alternate construction material buyers, builders, real estate owners, developers, etc. so that acceptance of manufactured building materials from overburden may be adopted in the fast pace.

vii. Suggestive legal framework for OB processing units such as the need for EC, CTE, CTO, Royalty, permissions from State Governments etc.

The OM regarding constitution of HPEC along with Terms of Reference is attached as Annexure-I.

भबानी प्रसाद पति, भा.व.से.
संयुक्त सचिव
Bhabani Prasad Pati, IFS
Joint Secretary

आज़ादी का अमृत महोत्सव

सत्यमेव जयते

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वसुधैव कुटुम्बकम्
ONE EARTH • ONE FAMILY • ONE FUTURE

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GOVERNMENT OF INDIA
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FOREWORD

The coal sector remains a critical pillar of India's economic development, accounting for a significant share of the country's primary energy resource and contributing to over 70% of electricity generation. However, as we strive to meet the nation's energy demands, we are also increasingly aware of the importance of sustainable resource management and environmental stewardship.

Overburden (OB), the material that is removed during coal mining to access the underlying coal seams, has traditionally been considered as waste and disposed of in dumps. However, with the growing focus on circular economy principles and sustainable mining practices, this material presents a valuable opportunity for gainful utilization.

The High-Powered Expert Committee (HPEC) on Gainful Utilization of Overburden in the Coal Sector was constituted by the Ministry of Coal with a mandate to explore and promote the use of overburden in various sectors, including construction, railways, roads, rare earth elements extraction, and land reclamation. This report represents the culmination of the Committee's efforts to develop a comprehensive policy framework that encourages the use of OB as a resource rather than waste.

The report outlines strategies for the characterization and processing of overburden, regulatory recommendations, and potential avenues for its use across different industries. It also emphasizes the concept of "Whole Mining," which seeks to maximize the extraction and utilization of all materials present in the mining strata, thereby minimizing environmental impact and enhancing economic value.

I am confident that the recommendations contained in this report will pave the way for a more sustainable and resource-efficient coal sector in India. By adopting gainful utilization of OB, we can not only reduce the environmental footprint of coal mining but also create new economic opportunities and contribute to the nation's sustainable development goals.

I extend my sincere gratitude to the members of the HPEC for their dedicated efforts in preparing this report. I also commend the Ministry of Coal and all stakeholders involved for their commitment to advancing sustainable practices in the coal sector.

(Bhabani Prasad Pati)
Chairman (HPEC) / Joint Secretary

Date: 02.08.2024

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Chapter : I INTRODUCTION AND PRESENT PRACTICES

1.0 Introduction

The coal is backbone of economic development of our country and has around 50% share of primary energy resource. It accounts for over more than 70% in electricity generation in the country. More than 90% of the coal production is achieved through opencast mining on account of economic factors. During opencast mining, the overlying soil and rocks are removed as waste to extract coal and the fragmented rock (overburden or OB) is heaped as dumps. The overburden generated during coal mining is disposed of initially as external OB dumps and later in mine voids as internal dumps. Most of the overburden materials, which is treated as unavoidable is disposed of at the surface, which occupies a considerable land area and requires extensive planning and control to minimize the impact arising out of OB disposal.

Since the primary aim so far had been to extract coal for meeting the energy and industrial need of the country, the policies and regulations for exploration and mining is aligned with the sole objective of coal production and useful value of OB, if any, has not been considered.

1.1 Present Practices

As per the Memorandum and Articles of Association of coal companies, the mandate given to them is to carry on the trade or business of coal mining including the management of coal mines, either independently or for and on behalf of or under the direction of the Central Government or any State Government. The private mine owners are also mandated to produce coal either for their own captive use or for use by the other entities.

The focus of the coal companies is, therefore, for investigation, exploration and planning for extraction of coal. The other materials, which are generated are considered as waste material and disposed of as prevalent practice. It may, however, be mentioned that no material per se can be called as waste, as everything has got its own use in one way or the other.

It may be mentioned that OB which has so far been considered as waste material, and disposed of as external and internal dump, may contain valuable/useful material or may be utilized after processing in some other sectors based on its suitability. The composition and feasibility of OB is therefore required for its gainful utilization, lessen the impact on land & environment and to promote circular economy.

Even as the mandate is to produce and dispatch coal to its consumers, Coal/Lignite PSUs have taken an out of box initiative to produce sand from overburden at a much cheaper price and

usages of processed OB for stowing purpose. This will not only help in minimizing environmental pollution due to sand siltation from overburden, but will be also an option for getting cheaper sand for construction purpose. Production of sand has already started.

During opencast mining of coal, the strata lying above coal seam is known as overburden comprising of clay alluvial sand and sandstone with rich silica content. The overburden is removed to expose and extract coal from beneath. After completion of coal extraction, the overburden is used for back filling to reclaim the land in its original shape. While extracting overburden from top, swell factor of the volume accounts for 20-25%. Initiative has been taken to utilize overburden in converting to sand by crushing, sieving and cleaning.

Usages of OB as M-Sand: The very first initiative of such conversion, has been taken by Western Coalfields Ltd. (WCL), a subsidiary of CIL, in its mines. Initially, a Pilot Project was launched where sand was extracted through machines erected departmentally. This sand has been offered to Nagpur Improvement Trust at a much cheaper price for constructing low-cost houses under Pradhan Mantri Awaas Yojana (PMAY). The price of sand is almost 10% of the market price with better quality. The sand produced is being given to Govt. units such as NHAI, MOIL, Mahagenco and other smaller units, at one third of the market price. Rest of the sand is being sold through open auction in the market, which is helping locals to get sand at a much cheaper price. The use of overburden has minimized the volume of land required for overburden dump. This initiative also lowers the adverse footprint of river-bed mining of sand. WCL is also selling overburden for road construction at a cheaper price to NHAI & others.

In this effort, Coal/Lignite PSUs has commissioned four OB processing plants and five OB to M-Sand Plants. Five such plants are in the different stages of development in the Coal/Lignite PSUs. This effort will not only help the society at large but will also help in minimizing river bed mining of sand.

Status of Existing OB to M-Sand Plants & OB Processing Plants in Coal/Lignite PSUs:

Sl. No.	Company	Name of Plant	Capacity (cum/day)
1.	WCL	Bhanegaon	250
2.		Gondegaon	2000
3.		Ballarpur	2000
4.	NCL	Amlohri	1000
5.	ECL	Kajora	1000
6.	SCCL	Medapalli	3000
7.		Bhupalapalli	3000
8.		Srirampur	3000
9.		Ramagundam	5000

Proposed OB to M-Sand Plants & OB Processing Plants in Coal/Lignite PSUs:

S.No.	Company	Name of Plant	Capacity (cum)
1.	CCL	Kathara	500
2.	SECL	Manikpur	1000
3.	BCCL	Barora area	1000
4.	WCL	Chandrapur Area	1000
5.	NLCIL	M-Sand Pilot Project in Mine-IA	850

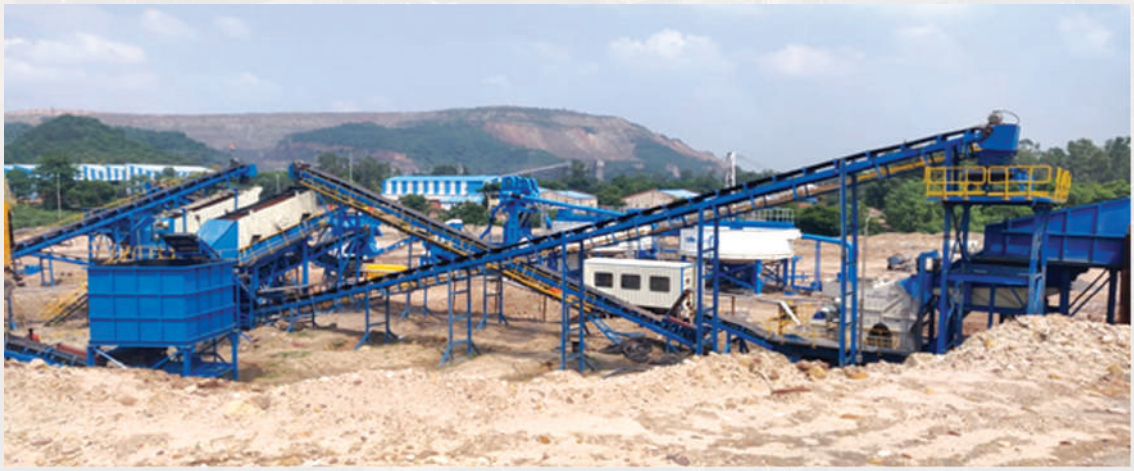
Performance of existing OB to Sand Plants:

Company (Name of Plants)	OB Processed (m3)	Sand Produced (m3)	Revenue Generated	Uses
WCL (Bhanegaon & Gondegaon)	4,10,000	2,11,594	INR 12.23 Crores	(i) Sold to Nagpur Improvement Trust (NIT) for construction of Houses under PMAY (ii) Sold to MOIL for Sand Stowing
ECL (Kajora Area - Commissioned on 16 Sep 2022)	1,20,000	59,062	-	Used for Underground Stowing
NCL (Amlohri Project) Commissioned on 13 Jan 2023	76,000	38,200	-	e-auctioning under process for selling in market
Total	**6,06,000**	**3,08,856**	**INR 12.23 Crores**	

Sand Production expected from all these plants is 29 Lakh m3 per annum by processing approximately 60 Lakh Cum OB.

Kajora Plant, ECL

Gondegaon Plant, WCL



Amlohri Plant, NCL

To expedite OB to Sand Initiative, CIL has prepared a Model Bid Document for installing more nos. of such plants across subsidiaries in which terms and conditions have been modified for wider participation. The successful bidder shall have liberty to decide sale price and marketability of Sand produced.

Other Uses of OB: Apart from OB to sand initiative, WCL has utilized 3,68,747 m3 of OB for road construction, formation for Railways, land base levelling and other uses, and earned Rs. 6.84 Cr. SECL has also used 14,10,000 m3 of OB for Railway Siding and FMC Projects. Other Subsidiaries of CIL are also taking similar initiatives to utilise OB for other purposes.

Chapter : II REGULATION OF MINERALS

2.0 Regulation of Minerals

For gainful utilization of OB generated during the coal mining, it is essential to undertake characterization of OB to understand the valuable minerals present in it. Various minerals such as quartz, kaolinite, gypsum, etc. were identified in the OB material. The overburden samples contain considerable amounts of rare earth elements. The presence of abundant minerals and rare earth elements opens up a new avenue for the gainful and sustainable utilization of such waste materials. Such minerals can simultaneously be mined in economic interest of the nation and the portion of OB which have no economic value can be utilized for filling of low-lying areas, in construction of highways, lining of railways' production of M-sand, etc. Therefore, there is need to consider the concept of WHOLE Mining for better utilization of OB and reduce the impact on account of OB dumping. The entire framework of regulation of minerals therefore needs to be aligned to the concept of WHOLE Mining.

Management of mineral resources is the responsibility of both the Central and State governments in terms of entry 54 of the Union List (List I) and entry 23 of the State List (List II) of the Seventh Schedule of the Constitution of India.

Coal comes under union list and being regulated accordingly. There is a possibility that a number of economic mineral present in the OB will fall under State list and hence will be governed by State governments. Thus, there will be a need for a proper legal framework to provide for the assessment, development and utilization of mineral resources present in OB to the maximum extent practicable consistent with sound economic and land use management practices.

The Coal Bearing Area (Acquisition & Development) Act, 1957 was promulgated with the sole objective to establish in the economic interest of India's greater public control over the coal mining industry and its development by providing for the acquisition by the State of unworked land containing or likely to contain coal deposits or of rights in or over such land, for the extinguishment or modification of such rights accruing by virtue of any agreement, lease, license or otherwise, and for matters connected therewith.

Coal Bearing Area (Acquisition & Development) Act, 1957 vests the right of mining only for coal and is silent about any other minerals present in the overburden / interburden.

The Coal Mines (Nationalization) Act, 1973 primarily focuses on the acquisition and transfer of rights related to coal mines.

As per the Mines and Minerals (Development and Regulation) Act, 1957, Section-18 on Mineral Development states that the Central Government has the duty to *take all such steps as may be necessary for the conservation and systematic development of minerals* in India and for the protection of environment by preventing or controlling any pollution which may be caused by prospecting or mining operations and notify rules as it deems fit.

As per Section-18A of the MMDR, Geological Survey of India, or similar agencies may also be authorized to make investigations to collect precise information w.r.t any mineral available in or under any land in relation to which any prospecting license or mining lease has been granted, in consultation with State Government as the case may be.

On the issue of authorization under Section 18(A), subsection (1), it shall be lawful for the Geological Survey of India or the specified authority or agency, and its servants and workmen

a) to enter upon such land,

b) to dig or bore into the sub-soil,

c) to do all other acts necessary to determine the extent of any mineral available in or under such land

2.1 Concept of WHOLE MINING

The WHOLE MINING concept is a holistic approach to mining that takes into account the entire value chain, from exploration and extraction to processing, refining, and transportation. It also considers the environmental and social impacts of mining, and seeks to minimize these impacts while maximizing the benefits to society. However, there is no specific guidelines or policy related to "The WHOLE MINING" in India. The WHOLE MINING concept is based on four pillars:

- **Whole Value Chain:** WHOLE MINING considers the entire mining value chain, from exploration and extraction to processing, refining, and transportation. This allows for a more efficient and sustainable use of resources, and reduces the environmental impact of mining.
- **Whole Life Cycle:** WHOLE MINING takes into account the entire life cycle of a mine, from exploration to closure and reclamation. This ensures that mines are operated in a responsible and sustainable manner, and that the land is restored to its original state or better after the mine is closed.
- **Whole Community:** WHOLE MINING recognizes that mining has a significant impact on local communities. It is important to engage with communities early and often, and to work with them to mitigate the negative impacts of mining while maximizing the benefits.
- **Whole Planet:** WHOLE MINING recognizes that mining has a global impact. It is important

to minimize the environmental impact of mining, and to ensure that the benefits of mining are shared equitably around the world.

The WHOLE MINING concept is still in its early stages of development, but it has the potential to revolutionize the mining industry. By taking a holistic approach to mining, one can minimize the environmental and social impacts of mining while maximizing the benefits to society. Here are some examples of how the WHOLE MINING concept is being applied in practice:

- Mining companies are working with local communities to develop and implement benefit-sharing agreements. These agreements ensure that communities receive a fair share of the benefits of mining, such as jobs, training, and infrastructure development.
- Mining companies are working with governments to develop and implement sustainable mining policies. These policies help to ensure that mining is conducted in a responsible and sustainable manner.
- Mining companies are developing new technologies to reduce waste and water consumption. This helps to protect the environment and conserve resources.

The WHOLE MINING concept is a promising new approach to mining that has the potential to reduce the environmental and social impacts of mining while maximizing the benefits to society. In order to achieve the gainful utilization OB and elements present in it, the following framework is being suggested:

i. For gainful utilisation of overburden or waste rock in the coal mining, all the minerals in the overburden will be systematically explored, and digital documentation will be made and maintained, the cost of the same may be borne from the NMET fund.

ii. For exploration policy for gainful utilisation of over burden in coal sector, it is proposed that "for one bore hole per 10 sq. kms.[1] area, complete strata will mandatorily be analysed for all minerals, coal shale, CBM etc. for all further coal exploration including regional and detailed exploration undertaken henceforth. In addition, wherever prima facie potential is available w.r.t shale gas and/or CBM, exploration should also be done @ 1 borehole per 50 sq.km and the strata must be analyzed for shale gas and CBM. The additional cost of such investigation is to be covered under CSS funding (for non-CIL blocks) and by CIL funding for blocks allotted to CIL.

iii. The outcome of the complete analysis of such boreholes will be submitted to CMPDIL along with coal and lignite resources. This analysis of occurrence of any economic mineral in the OB will form an integral part of any regional geological reports or detailed geological reports.

[1] These figures are suggestive and may be revised upon further deliberations

iv. The mining rights of such minerals shall be vested with the owner of the coal mines for proper planning along with the Mining Plan for coal. The same shall be approved by the approving authority as for coal, and systematic mining, processing, selling of all the minerals of commercial value and proper disposal of the remaining material shall be undertaken by mine owner. [2]

v. The extraction/processing of such minerals by departmental/outsourcing mode shall be decided by mine owner within the framework of approved mining plan.

vi. In order to achieve the above objectives, it is imperative to have formulation of guidelines / policies which further the extraction of other minerals if found feasible. It is also desired to incorporate requisite amendments under the existing legal provisions like CBA, CM(N)A, MMDR to facilitate exploration and mining of other minerals in OB strata including provisions for transportation of ore / OB strata for ex-situ extraction.

vii. In case of integrated mining plans prepared for multi-mineral mining, it will also be imperative to include adequate environmental management strategies to ensure adherence with applicable statutory mandates. MoEF&CC may be requested to issue standard EC conditions for extraction and processing of such minerals.

[2] The Mining Plan prepared for any valuable mineral (other than coal) found in the coal bearing strata will be submitted to IBM / State Government (as applicable for the respective mineral) for comments and the lessee or mine owner will incorporate those comments and submit the revised Mining Plan to the CCO, MoC.

Chapter : III ASSESSMENT OF DEMAND OF MINERALS

3.0 Assessment of Demand of Minerals

The extraction of mineral from OB shall be linked with demand in the market and would require region-wise assessment of its demand. Assessing the demand for minerals involves a systematic methodology that considers various factors such as economic trends, technological advancements, geopolitical factors, and industry-specific requirements. A general methodology that can be employed for conducting a demand assessment of minerals includes the following:

1. **Scope and Objectives:**
   - o Specify the minerals of interest and its geographical coverage.
   - o Analyse historical demand trends and identify key drivers and constraints.
2. **Economic Analysis:**
   - o Examine macroeconomic indicators such as GDP growth, industrial production, and infrastructure development.
   - o Consider regional and global economic trends that may impact mineral demand.
3. **Technological Trends:**
   - o Evaluate emerging technologies that may influence mineral demand (e.g., renewable energy, electric vehicles, advanced manufacturing).
   - o Assess the impact of innovation on the use of minerals in existing and new applications.
4. **Industry Analysis:**
   - o Study specific industries that heavily depend on the minerals in question (e.g., automotive, electronics, construction).
   - o Analyse industry growth forecasts, production trends, and key players.
5. **Geopolitical Factors:**
   - o Consider geopolitical factors that may affect the supply chain and demand for minerals (e.g., trade policies, sanctions, geopolitical tensions).
   - o Evaluate the stability of key mineral-producing regions.

6. **Regulatory Environment:**
   - o Investigate environmental regulations, mining policies, and trade restrictions that could impact the availability and demand for minerals.

7. **Supply Chain Analysis:**
   - o Assess the current and potential future supply of minerals, including exploration projects and mining developments.
   - o Identify any supply chain vulnerabilities or constraints.

8. **Scenario Analysis:**
   - o Develop different demand scenarios based on varying economic, technological, and geopolitical conditions.
   - o Assess the sensitivity of demand to changes in these factors.

9. **Engage Stakeholders:**
   - o Consult with industry experts, government agencies, and other relevant stakeholders to gather insights and validate assumptions.

10. **Modelling and Forecasting:**
    - o Use mathematical models, statistical tools, and forecasting techniques to project future demand based on the identified drivers.

11. **Risk Assessment:**
    - o Identify and assess risks associated with the demand assessment, such as geopolitical instability, supply chain disruptions, or unexpected technological shifts.

A separate agency may be entrusted to undertake assessment of demand of minerals, which are likely to occur in the OB from the coal mines of the region. Further action on extraction of minerals and processing of material shall depend upon the demand of target minerals and economics of the same.

3.1 Construction Industries and its demand

The construction industry is the largest consumer of raw materials globally (World Economic Forum (WEF) and The Boston Consulting Group 2016), consuming around 3000 MT per year, which is around 50% of the total by weight (Pacheco-Torgal and Labrincha 2013), Constructed objects account for 25-40% of total global carbon emissions.

Construction consists mainly of residential housing (38%), transport, energy and water

infrastructure (32%), institutional and commercial buildings (18%), and industrial sites (13%). In developing countries, the construction industry can account for more than 8% of GDP (v. 5% in developed countries). Currently, more than 100 million people are working in construction around the world. The industry is expected to undergo significant growth in the coming years (World Economic Forum (WEF) and The Boston Consulting Group 2016). The projected growth between 2018 and 2023 was 4.2% per year. Urbanization and population growth drive this increase, with an estimated 75% of the infrastructure that will be in place in 2050 still having to be built (IFC and CPLC 2018). (Ref. **Annexure II**). The minutes of the 1st and 2nd meeting of the HPEC is attached as **Annexure – III**.

Even basalt is increasingly finding application in the construction materials sector. Whereas, with regard to sand, the market size was reported as nearly 1006.22 million tonnes with a projection of 6.50% annual growth increase for the forecast period from 2024-2030.[3] The increase in demand of sand will have incremental pressure on riverine ecosystems and hence convergence of OB to sand will be desirable.

[3] India Sand Market Size, Share, Trends, Analysis, Forecast: https://www.expertmarketresearch.com/reports/india-sand-market#:~:text=India%20Sand%20Market%20Outlook,forecast%20period%20of%202024%2D2032

Chapter : IV GLOBAL EXPERIENCE/PRACTICES

4.0 International Studies for Rare Earth Minerals in Coal Bearing Strata

Efforts are on globally for study related to extracted rare earth elements and critical mineral fractions from the OB. Some of the references are:

- Rare Earth Element (REE) and Critical Mineral Fractions of Central Appalachian Coal-Related Strata Determined by 7-Step Sequential Extraction (2022) by Arbuzov et al.
- Leaching Process of Rare Earth Elements, Gallium and Niobium in a Coal-Bearing Strata-Hosted Rare Metal Deposit—A Case Study from the Late Permian Tuff in the Zhongliangshan Mine, Chongqing (2023) by Liu et al.
- Rare Earth Elements in Coal and Coal Byproducts (2013) by U.S. Department of Energy
- Coal and Coal Waste as an Alternative Resource for Rare Earth Elements (2013) by Stuckman and Ziemkiewicz
- Rare Earth Elements from Coal, Kentucky Geological Survey by Kentucky Geological Survey
- Study for extraction of REE at concentration of 300 ppm or higher in North Eckley Mine site and Highland mine site in Pennsylvania, USA (Reference: Rusty Sutterlin, Ph.D, Chief Science Officer)
- Recovery of Rare Earth Elements from Acid Mine Drainage by Paul Ziemkiewicz, PhD, Director Water Research Institute, West Virginia University, USA

These studies cover the occurrence, distribution, and recovery of rare earth elements in coal-bearing strata. They also discuss the potential for coal and coal by-products to be used as a source of rare earth elements. However, the references available is only for pilot scale and no detailed information is available for mining of such minerals.

Additionally, here are some specific examples of coal-bearing strata that contain rare earth elements:

- Antaibao mining district, China
- Rakovka depression, Primorsky Krai, Russia
- Central Appalachian coal basin, USA

- Chongqing, China
- Kentucky, USA

It may, therefore, be concluded that global efforts are underway for recovery of REE and critical minerals from the OB and also from the acid mine drainage from coal mines.

Rare earth elements are typically found in coal-bearing strata in the form of minerals such as monazite, xenotime, and bastnaesite. These minerals are often concentrated in the coal seams themselves, as well as in the surrounding rocks.

The recovery of rare earth elements from coal-bearing strata is still in its early stages of development. However, a number of promising technologies have been developed, and the potential for coal and coal by-products to be used as a source of rare earth elements is significant.

4.1 Coal Bearing Strata as Building Material

Sandstone

- o Sandstone from the coal-bearing strata of the Appalachian Mountains has been used for centuries to build houses, barns, and other structures.
- o In Pennsylvania, sandstone from the coal-bearing strata is being used to build a new bridge over the Susquehanna River.
- o In India, sandstone from the coal-bearing strata of the Damodar Basin is being used to build a new airport in Ranchi.

Basalt

- o In China, basalt from the coal-bearing strata of the Ordos Basin is being used to build dams and other water control structures.
- o In the United States, basalt from the coal-bearing strata of the Columbia River Plateau is being used to build wind farms and solar power plants.

In addition to sandstone and basalt, other types of rocks from coal-bearing strata can also be used as building materials. For example, shale from coal-bearing strata can be used to make bricks and tiles. Limestone from coal-bearing strata can be used to make cement. And gypsum from coal-bearing strata can be used to make plasterboard.

Chapter : V SURVEY, EXPLORATION AND DATABASE OF MINERAL RESOURCES IN OB

5.0 Survey and Exploration

The Geological Survey of India is the principal agency for geological mapping and regional mineral resource assessment of the country including coal. Geological Survey of India is providing regional exploration reports which are further developed in the detailed geological report by the lessee of the coal blocks. Central Sector Scheme funding for detailed exploration of coal blocks is available from financial year 1998-99. CMPDIL, MECL, Department of Geology and Mining of state governments are the agencies in public sector and private agencies are also carrying out coal exploration work through CMPDI.

The Indian Standard Procedure (ISP) is the national norm for classification of coal resources into "Proved, Indicated and inferred category CGPD Committee-V is the organization for providing and modifying the classification norms.

The inventory of mineral resources is being maintained by Indian Bureau of Mines (IBM) and for coal and Lignite resources, by GSI.

The prognosticated area in India, having possibility of coal resources, is 32902 square kms. About 20448 sq. kms area has been regionally explored and detailed exploration, including the partly explored area, covers an area of about 10470 sq. kms.

The state-wise distribution of these resources is given in Table-1 and Table-2.

Table-1: State wise Distribution of Regionally Explored Area

State	Approximate Regionally Explored Area (Sq.km)
Jharkhand	3118
West Bengal	1671
Bihar	161
Odisha	1687
Chhattisgarh	5195
Madhya Pradesh	3617
Uttar Pradesh	34
Maharashtra	2641
Andhra Pradesh	97
Telangana	2005

State	Approximate Regionally Explored Area (Sq.km)
Sikkim	77
Assam	59
Meghalaya	4
Arunachal Pradesh	4
Nagaland	78
Total	**20448**

Source: *Exploration Division, CMPDI*

Note: *Since the state boundaries, used for the estimation, are tentative, state wise distribution of regionally explored area is also tentative.*

In such a large area, the chances of occurrence of other valuable minerals are very high, which will require systematic exploration, documentation, mining, processing and utilization of such minerals wherever they are of commercial grade and scale.

The present exploration practice, in coal bearing areas, is only to focus on occurrence of coal. In some cases, occurrence of fire clay etc. is reported in the overlying strata but systematic process for analyzing mineral of commercial value in it is not there. During opencast mining such broken strata is being treated as Over Burden (OB), is either filled in the void created by opencast mining or stacked outside as overburden dump. In underground mining, only coal is extracted, leaving the overlying strata.

Overburden is the material that lies above the coal deposit being mined in opencast mining. It typically consists of soil, rock, and other materials that must be removed in order to access the coal deposit. Overburden removal can be a significant cost and environmental impact of opencast mining.

However, overburden can also be a valuable resource. It can be used for a variety of purposes, including building materials, road construction, and land reclamation. The use of overburden for building materials can reduce the need for virgin resources, such as sand and gravel, and can also help to reduce the environmental impact of mining.

In order to effectively utilize overburden for building materials, it is important to first understand its composition and properties. This can be done through a detailed analysis of the overburden, which should include physical and chemical testing. Once the composition and properties of the overburden are understood, it can be classified and matched to specific applications.

For example, overburden that is high in clay content may be suitable for use in brick making, while overburden that is high in sand and gravel content may be suitable for use in concrete or asphalt. Overburden can also be used to produce other building materials, such as aggregates, road fill, and landscaping materials. Additionally, there is also potential for usage of OB as a

landfilling material for levelling, including highways construction.

Benefits of use of OB as building material & other uses

The use of overburden for building materials & other uses can offer a number of benefits, including:

- **Reduced environmental impact:** The use of overburden can reduce the need for virgin resources, such as sand and gravel, which can help to conserve natural resources and reduce pollution.
- **Reduced costs:** The use of overburden can be more cost-effective than using virgin resources, especially in areas where overburden is readily available.
- **Improved performance:** Overburden can be used to produce high-quality building materials that meet or exceed industry standards.
- **Job creation:** The development and use of overburden can create new jobs and economic opportunities in mining communities.

Considerations for analysis and utilization of OB

The following are some key considerations for the analysis and utilization of overburden in opencast mining for building material:

- **Composition and properties:** The composition and properties of the overburden should be carefully analysed to determine its suitability for specific applications.
- **Classification and matching:** The overburden should be classified and matched to specific applications based on its composition and properties.
- **Processing and manufacturing:** The overburden may need to be processed or manufactured to produce building materials. The processing and manufacturing requirements will vary depending on the type of building material being produced.
- **Transportation and storage:** The overburden will need to be transported to and stored at the processing and manufacturing facility. The transportation and storage requirements will vary depending on the type and volume of overburden being handled.
- **Environmental impact:** The environmental impact of the overburden removal, processing, and manufacturing activities should be assessed and minimized.

By carefully considering the above factors, the use of overburden for building materials can be an effective way to reduce the environmental impact and cost of opencast mining, while also creating new jobs and economic opportunities.

REE from OB and/or fly ash

CMPDI also has an ongoing R&D project (Appraisal of Gondwana (Coal, Clay, Shale, Sandstone) for Trace Elements & REE concentration in the Singrauli coalfields) with an objective to generate regional geochemical database of Gondwana sediments present in Singrauli Coalfield area. Sampling was done consisting core samples for coal & non-coal from boreholes and also from exposed faces of overburden strata and coal seams from operational coal mines of the Northern Coalfields Limited (NCL). 90 Bed Rock samples (BRS) covering the entire coalfields area were collected for Geochemical characterization of REE & Trace Elements in Gondwana sediments deposited in Singrauli coalfields.

The average concentration of REE were 250 ppm in the coal samples & 400 ppm in the non-coal samples. In the absence of experimental data for Indian Coals and considering the general nature of ash content in coal, demand of REE in future, criticality of REE elements in Indian context and future technological advancement, it is expected that for Indian coals, coal seam with REE content of ≈250 ppm or more on whole coal basis and sediments other than coal having REE content of 400 ppm or more can be potential materials for recovery/ extraction of REE. However, the economical extraction of the REE is subject to technical advancement and economy of scale.

Additionally, evaluation of feasibility of extraction of REE resource from fly ash is also an emerging area which must be explored by power sector.

Exploration policy proposed:

For exploration policy for gainful utilisation of over burden in coal sector it is proposed that:

For one bore hole per 10 sq. kms.[4] *complete strata including all minerals, coal shale, CBM etc. will mandatorily be analysed for all further coal exploration including regional and detailed exploration and the outcome of the complete analysis of such boreholes will be submitted to CMPDIL along with coal and lignite resources. In addition, wherever prima facie potential is available w.r.t shale gas and/or CBM, exploration should also be done @ 1 borehole per 50 sq.km for availability of shale gas and CBM and the database must be maintained. This analysis of occurrence of any economic mineral in the OB will form an integral part of any regional geological reports or detailed geological reports.*

5.1 Database of Mineral Resource Present in the Overburden

i. The exploration agencies shall be mandated to take comprehensive analysis of strata of one representative bore hole/10 sq. kms.[5] of the area for all the minerals, coal shale,

[4] These figures are suggestive and may be revised upon further deliberations

[5] These figures are suggestive and may be revised upon further deliberations

CBM etc. and analysis of shale gas/CBM for one representative borehole/50 sq.kms. of the area. The additional cost of such investigation is to be covered under CSS funding (for non-CIL blocks) and by CIL funding for blocks allotted to CIL.

ii. The national inventory of mineral resources obtained from analysis of such boreholes will be maintained by CMPDIL.

iii. CMPDI shall be responsible for storing, classifying, safety and distribution of such data as per the policies made for such purposes by MoC/ IBM.

iv. The cost for creation of infrastructure for digital storage of such data shall be made available through NMET fund.

v. The data of available mineral resources shall be shared to agencies along with the Geological Report for mine planning and further action.

Chapter : VI STRATEGY OF MINERAL DEVELOPMENT AND FINANCIAL IMPLICATIONS

6.0 Strategy of Mineral Development

i. The general strategy for development of any mine will take into consideration the extraction all the economic minerals present in OB in addition to the coal mine.

ii. The MoU and Article of Association of coal companies should accordingly be modified to provide clear mandate to coal companies for extraction of all valuable minerals like REE and critical minerals apart from coal.

iii. The feasibility of conversion of OB to sand shall also be determined for processing of OB, its utilisation in mine stowing and as construction material.

iv. The feasibility of use of OB strata as a material for stowing / landfilling media in construction / highway projects shall also be determined.

v. A regional level market survey shall be conducted to assess the demand of minerals and establish the linkage with minerals produced from coal and mineral mines.

vi. The exploration agencies shall be mandated to explore all the minerals present in at least one bore-hole strata for every 10 sq. kms. of exploration areas for creation of database of valuable minerals present and composition of OB. Additionally, it they should also explore shale gas/CBM for one representative borehole/50 sq.kms. where ever the occurrence of such gases is expected. Accordingly, coal prospecting agencies shall be notified to undertake exploration of mineral while prospecting for coal.

vii. The protocol for exploration i.e. depth of the borehole, analysis of minerals etc. shall be frozen. The exploration database shall be maintained by CMPDI in digital format.

viii. During preparation of the mining plan, the possibility of exploiting minerals present in OB will be taken into consideration and the process of approving of the mining plan will take into consideration the utilisation of these minerals along with the coal.

ix. IBM / State Government shall be informed in case mining of non-coal minerals are taken up by coal companies, as the case may be.

x. The nearby small mine owners, processing plants owners shall be employed for extraction of valuable minerals/processing of OB to lessen the socio-economic impacts.

xi. Feasibility shall also be undertaken to utilise the available materials for construction of highways, filling the low-lying areas etc.

xii. The mine plan preparing agencies (MPPA) shall also be accredited for preparation of composite mining plan for coal as well as mineral. Therefore, the accreditation for MPPA shall be unified for mining which shall be valid for coal and mineral sectors both.

6.1 Financial Implications

The mandated exploration of the economic minerals present in the OB will put additional financial liability on the coal lease holder and analysis of these minerals will be time consuming also. It is proposed that for pending analysis of the economic mineral present in the OB, the coal block lease holder may go ahead with the preparation of Geological Report for coal as well as the mining plan without including the mining provisions for economic minerals present in OB. As it takes considerable time to develop a coal block before actual mining of the coal, these reports can be submitted to MoC with the plan to exploit or exclude such minerals.

However, for all the future exploration activities, it shall be mandated that strata of one borehole in every 10 sq. kms.[6] shall be subjected to comprehensive analysis of coal, REE, critical minerals, CBM etc. The following financial support will be needed:

i. The additional expenditure for comprehensive analysis of strata will be borne through the funding by MoC.

ii. The expenditure required for creation and maintenance of digital inventory of exploration data by CMPDI shall be borne through NMET funding.

[6] These figures are suggestive and may be revised upon further deliberations

Chapter : VII SEGREGATION OF ECONOMIC MINERALS FROM OB AND MINE SAFETY

7.0 Segregation of economic minerals presents in overburden

In coal mining through Opencast mining methods, the coal block lease holder will ensure that during overburden removal, the economic minerals are segregated/processed as per the approved mining plan. While considering the economic exploration of the minerals, the present overburden, the requirement of additional land needs to be assessed carefully as land acquisition is a complex process involving rehabilitation issues. It needs to be ensured that the economic gain from the exploitation of minerals clearly outweighs the cost of land acquisition and habitation.

For preparation of schemes and feasibility of mineral segregation, premiere Technical and Research Institutions like Building Material and Technology Promotion Council (BMTPC) etc. shall be engaged.

Such studies shall be carried out for categorization of the available overburden material along with the technical solutions vis-à-vis the end product and for promoting the manufactured building material from overburden.

Cost of preparing such schemes shall be a part of the mining plan and will be funded by mine owners.

7.1 Mine Safety

Mining operations are hazardous in nature and effort must be directed towards development of adoption of mining methods which would ensure safety of the workers and reduce the accidents. The segregation of processing of minerals in some cases may pose additional safety challenges. It shall be ensured that all the additional safety hazards are clearly identified and remedial measures are adequately provided in the mining plan.

Chapter : VIII MINE CLOSURE FRAMEWORK

8.0 Existing Mine Closure Financing Mechanism

The existing mine closure guidelines aim to restore the area back to its original as far as practicable or to an improved condition. Every Mine Closure Plan (MCP) has two parts:

- Progressive MCP addressing mine closure activities during mining – reviewed every 5 years
- Final MCP addressing mine closure activities towards the end of mine life, till completion of restoration – to be revised and approved at least 5 years before end of mine life.

The post-closure period is considered as 3 years for UG & small OC mines and 5 years for major OC mines (stripping ratio > 6 m3/tonne). The final MCP is treated as complete, and the certificate is issued by CCO after the completion of final closure activities and audit by third party.

Additionally, guidelines were also recently issued on 28.10.2022 for mines discontinued/ abandoned/closed before 2009:

- To ensure the scientific closure of such mines,
- To ensure benefits to coal dependent communities,
- Prevent illegal mining & ensure safety,
- Repurposing of the mined-out land

8.1 Alignment of Existing Mine Closure Mechanism

Segregation of minerals, processing of OB and its subsequent utilisation shall have impact on the progressive/final closure activities. Such activities need to be incorporated in the existing mine closure framework and subsequent change in land use. This will also form part of the EIA/EMP document.

Chapter : IX CONCLUSIONS & RECOMENDATIONS

9.0 Conclusions

There is a vast potential for gainful utilisation of overburden from coal mines as overburden may contain valuable building material, armour stone, rare earth, limestone, fire clay, sand, brick clay, kaolin, pegmatite, basalt etc. and use of OB in other sector as railways and road construction, etc.

Major minerals likely to be obtained from OB will be building material including processed sand and also processed OB for landfilling and/or stowing. The pressure on the river system due to sand mining is creating an ecological hazard. Mitigation of exploitation of sand from rivers will come a long way in restoring the health of Indian river system by providing an alternative building memorial which otherwise may have been wasted in the OB.

Given the emerging importance of REE and critical minerals, policy framework and working guidelines also need to be defined for exploration and feasible extraction of such resources from the OB strata.

Coal comes under union list and is being regulated accordingly. There is a possibility that a number of economic minerals present in the OB will fall under State list and hence will be governed by State governments. Thus, there will be a need for a proper legal framework to provide for the assessment, development and utilization of mineral resources present in OB to the maximum extent practicable consistent with sound economic and land use management practices. Further, the recovery of rare earth elements from coal-bearing strata is still in its early stages of development. However, a number of promising technologies have been developed, and the potential for coal and coal by-products to be used as a source of rare earth elements is significant. With this framework, natural resources present in overburden will be creating wealth as well as create a positive effect on the environment.

9.1 Recommendations

The following recommendations propose modifications to acts, rules, and regulations, along with technical adjustments in the planning process. These changes aim to facilitate the systematic and beneficial utilization of Overburden (OB) and the extraction of valuable minerals within coal mines.

Recommendations related to Modification/amendment Existing Acts, Rules, Regulations, and guidelines:

i. It is suggested to obtain requisite permissions wherever required, to integrate the gainful utilization of Overburden (OB) and extraction REE/Critical minerals (major as well as minor minerals).

ii. Forest Clearance may include diversion for coal & other available minerals instead of specific clearance solely for coal.

iii. System for exploration, reporting and maintaining data-base and planning shall be mandated by revision of existing prospecting guidelines.

iv. Necessary changes in MMDR Act, 1957 and its subsequent amendment, for preparation of mining plan and project reports having provision to extract useful minerals present in OB dumps from the coal mining area with prior information to Indian Bureau of Mines (IBM) / State Government (as applicable for the respective mineral)[7].

v. The mining rights for mining of minerals (other than coal) shall be vested in the owner of the coal mine for proper planning along with the Mining Plan for coal, will be approved along with or separately by the same approving authority, and systematic mining, processing, selling of all the minerals of commercial value and proper disposal of the remaining material.

vi. Acceptance of building material produced/OB as construction material through appropriate regulations from concerned Ministries to ensure self-regulation.

vii. Ministry of Environment, Forest & Climate Change (MoEF&CC) may issue or amend guidelines related to Environment Clearance (EC) and Forest Clearance to integrate the gainful utilization of Overburden (OB) in coal mining and may include a standard EC condition for the same.

viii. MoEF&CC may also develop comprehensive guidelines for the preparation of EIA/EMP for overburden processing units as integral part of existing guidelines for preparation of EIA/EMP of coal mining projects. This should focus on assessing and mitigating potential environmental impacts, ensuring sustainable practices in overburden utilization.

ix. Establish a clear legal framework/guideline for overburden processing units, outlining the necessity for obtaining Environmental Clearance (EC), Consent to Establish (CTE), Consent to Operate (CTO), royalty payments, and permissions from State Governments to ensure strict compliance with environmental regulations and standards, emphasizing penalties for non-compliance to deter any potential environmental harm.

x. The WHOLE MINING concept is still in its early stages of development, but it has the

[7] The Mining Plan prepared for any valuable mineral (other than coal) found in the coal bearing strata will be submitted to IBM / State Government (as applicable for the respective mineral) for comments and the lessee or mine owner will incorporate those comments and submit the revised Mining Plan to the CCO, MoC.

potential to revolutionize the mining industry. By taking a holistic approach to mining, the WHOLE MINING concept can minimize the environmental and social impacts of mining while maximizing the benefits to society. Ministry of Mines may develop guidelines for WHOLE MINING concept.

xi. The coal companies can be mandated to practice mining of other minerals present in OB strata or gainful utilization of OB for economic value rather than mining of coal only. For this purpose, the Memorandum and Articles of Association may accordingly be modified, if needed.

Recommendations related Technical and Planning Process:

i. Ministry of Coal in consultation with Ministry of Mines may mandate to regulate the exploration and extraction of Rare Earth Element (REE), critical minerals and processing of sand from OB. Ministry of Coal may accordingly issue guidelines for coal companies for systematic exploration of entire strata, approval of mining plan, extraction and processing of minerals along with coal.

ii. For one bore hole per 10 sq. kms. complete strata including all minerals, coal shale, CBM etc. will mandatorily be analysed for all further coal exploration including regional and detailed exploration and the outcome of the complete analysis of such boreholes will be submitted to CMPDIL along with coal and lignite resources. In addition, wherever prima facie potential is available w.r.t shale gas and/or CBM, exploration should also be done @ 1 borehole per 50 sq.km for availability of shale gas and CBM and the database must be maintained. This analysis of occurrence of any economic mineral in the OB will form an integral part of any regional geological reports or detailed geological reports. The exploration should undertake comprehensive analysis of entire strata of one borehole per 10 sq. kms. of exploration area; and in areas having prima facie potential w.r.t shale gas / CBM, exploration must be done @ 1 borehole per 50 sq.km and data of such boreholes shall be maintained by CMPDI in digital form. The additional cost of such investigation is to be covered under CSS funding (for non-CIL blocks) and by CIL funding for blocks allotted to CIL

iii. It is suggested to commence sample testing for comprehensive borehole exploration & characterization in already operational mines as well, to establish a data bank for presence of minerals, coal shale, CBM etc. Funding for the same shall be met through CIL.

iv. Based on outcome of exploration, the potential areas having REE and critical mineral occurrences may be identified for taking up planning and implementation of projects on priority.

v. Requisite laboratory facilities with state-of the art equipment, shall be developed by the counterpart institutions for analysis of REE and critical minerals.

vi. The additional cost for strata analysis and data storage/retrieval etc. may be met from Ministry of Coal through NMET fund.

vii. Approval of mine plan shall be inclusive of minerals for which viability can be ascertained at the time of preparation of Mining Plan in accordance with the comprehensive analysis of entire strata. Such approval may be intimated to IBM and State Government. The MPPA shall be accredited for mining (both for coal and mineral mining). Minerals in traces or minerals which can't be economically mined shall be considered as part of the waste and if viability occurs at later stages, segregation of such minerals from waste, their processing and sale can be done with requisite permissions at that stage.

viii. The useful minerals/OB may be stacked separately as external dumps for further utilization. The remaining OB may be used for internal backfilling. The mining plan should accordingly mention internal dumping area, external dumping area, plantation etc.

ix. The mine closure plan shall accordingly be modified/prepared to take into account the utilization of OB from coal mining following safety regulations.

x. The mine owners could be permitted to process Overburden (OB) for sand, which can be utilized as a building material, for stowing, and other internal needs to reduce the impact on other natural resources. Additionally, to meet the demand for sand from manufactured sand (M-sand), the extraction of river sand may be regulated accordingly.

xi. A separate agency may be entrusted to undertake assessment of demand of minerals, which are likely to occur in the OB from the coal mines of the region. Further action on extraction of minerals and processing of material shall depend upon the demand of target minerals and economics of the same.

xii. For preparation of schemes and feasibility of mineral segregation, premiere Technical and Research Institutions like Building Material and Technology Promotion Council (BMTPC) etc. may be engaged. Such schemes and feasibility shall be carried out for categorization of the available overburden material along with the technical solutions vis-à-vis the end product and for promoting the manufactured building material from overburden. Cost of preparing such schemes shall be a part of the mining plan and will be funded by mine owners.

xiii. Promote self-regulation among stakeholders involved in overburden utilization, including OB providers, processing unit owners, buyers of alternate construction materials, builders, real estate owners, and developers. Facilitate collaborative initiatives to ensure a coordinated approach towards the acceptance and utilization of manufactured building materials from overburden. This can involve creating industry-led standards and best practices.

xiv. Conduct awareness programs and outreach initiatives to educate stakeholders about the benefits of utilizing overburden for construction materials. This can include highlighting the positive environmental impact, cost-effectiveness, and potential for innovation in the construction sector.

xv. Introduce incentives for overburden processing units that adopt environmentally friendly and sustainable practices. This could include tax benefits, subsidies, or other financial incentives to encourage the adoption of eco-friendly technologies.

xvi. Facilitate collaboration between overburden processing units and the construction industry to create a market for the acceptance of building materials derived from overburden. Foster partnerships that promote the use of these materials in construction projects.

xvii. Implement robust monitoring and reporting mechanisms to track the environmental performance of overburden processing units. Regular audits and reporting can help ensure adherence to environmental standards and encourage continuous improvement.

xviii. Subsequent to this report on policy framework, potential areas of concentration of valuable minerals should be identified based on available geological data.

xix. Invest in capacity building programs for stakeholders involved in overburden utilization. This can include training programs, workshops, and skill development initiatives to enhance the knowledge and expertise in sustainable overburden processing and utilization.

Lastly, considering that the gainful utilization of OB is an emerging area, it is suggested that the policy frameworks established hereunder must be reviewed every 5 years to evaluate the outcomes from exploration and resource extraction potential and incorporate necessary modifications in the legal and administrative mandates.

ANNEXURES

F. No. SDC/1/2023-SDC
Government of India
Ministry of Coal
(SDC & JT Section)
****

Shastri Bhawan, New Delhi
Date : 03.03.2023

MEETING NOTICE

Subject: 1st meeting of the High-Powered Expert Committee on Gainful Utilization of Overburden in Coal Sector – reg.

The undersigned is directed to refer to Ministry of Coal's OM of even number dated 22.02.2023 (copy enclosed) and to convey that 1st meeting of the High Powered Expert Committee is scheduled to be held on 10.03.2023 at 12:30 PM under the Chairmanship of Shri B.P. Pati, Joint Secretary, Ministry of Coal at Room No. 321, A Wing, Ministry of Coal, Shastri Bhawan, New Delhi.

2. It is requested to nominate suitable officers (not below the rank of Director) on the Committee and advise them to attend the aforesaid meeting. Nomination in this regard may kindly be have sent in advance at manish.uniyal38@nic.in and latest by 06.03.2023 positively.

Encl.: as above.

(Manish Uniyal)
Under Secretary to the Govt. of India.
Email: manish.uniyal38@nic.in
Tel. No. 23384106

To,

1. CEO, NITI Aayog
2. Secretary, MoEFCC
3. Secretary, Ministry of Railways
4. Secretary, MoRTH
5. Secretary, MoHUA – with a request to nominate an expert from BMTPC
6. Joint Secretary, Sustainability & Just Transition Division, MoC
7. Director (Technical), CIL
8. CMD, CMPDI
9. Advisor (Projects), MoC
10. Deputy Secretary, Sustainability & Just Transition Division, MoC

Copy to:

1. CMD, CIL
2. PPS to Secretary (Coal)
3. SO (Admin), MoC - with a request to make arrangements of High Tea and lunch for the meeting.

File No. SDC/1/2023-SDC (Computer No. 355494)
2515209/2023/O/o US(SDC/NA/Just Transition)

F. No. SDC/1/2023-SDC
Government of India
Ministry of Coal
(SDC & JT Section)
....

Shastri Bhawan, New Delhi
Dated the 22nd February, 2023

OFFICE MEMORANDUM

Subject: Constitution of High-Powered Expert Committee (HPEC) for Gainful Utilization of Overburden (OB) in Coal Sector – reg.

The undersigned is directed to say that a High-Powered Expert Committee (HPEC) under the Chairmanship of Joint Secretary, Sustainability & Just Transition (S & JT) Division, MoC is hereby constituted with the approval of Hon'ble Minister of Coal for Gainful Utilization of Overburden (OB) in Coal Sector. The composition of the committee is as follows:

Sl. No.	Name, Designation & Organization	Role
1	Joint Secretary, S & JT Division, MoC	Chairman
2	Advisor (Projects), MoC	Member
3	Director (Technical), Coal India Limited	Member
4	Chairman-cum-Managing Director, CMPDI	Member
5	JS or Director Level officer from NITI Aayog	Member
6	JS or Director Level officer from MoEF&CC	Member
7	JS or Director Level officer from Ministry of Railways	Member
8	JS or Director Level officer from MoRTH	Member
9	Expert from BMTPC, MoHUA	Member
10	Deputy Secretary, S & JT Division, MoC, Division, MoC	Member Secretary

2. The Terms of Reference (ToR) of the HPEC are as follow:

i. To make a policy framework in order to create a conducive environment for promoting the production of alternative/substitute construction materials from the overburden of coal mines so that our natural resources presently being used for construction materials, ballasts, etc. may be saved.

ii. Suggestions for a Regulatory/Advisory framework to introduce the concept of WHOLE MINING which will direct the exploration agencies to include the quantification of all the

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minerals, building materials, etc. present in the total strata in their Geological Reports and a similar system of pre-feasibility examination of uses of such materials, in the Mining Plan.

iii. System of region-wise assessment of demand for building material, minerals, ballasts, etc., and a possible supply of it from the processed overburden material.

iv. To prepare a policy framework, for engaging the premiere Technical and Research Institutions like Building Materials and Technology Promotion Council (BMTPC), etc., in carrying out studies for categorization of the available overburden materials along with the technical solutions vis-à-vis the end product and for promoting the manufactured buildings materials from overburden.

v. Guidelines for Preparation of EIA/ EMP for overburden processing units considering the overall positive impact on the environment.

vi. Promoting self-regulation of the stakeholders i.e. OB providers, OB processing unit owners, alternate construction material buyers, builders, real estate owners, developers, etc, so that acceptance of manufactured building materials from overburden may be adopted in the fast phase.

vii. Suggestive legal framework for OB Processing Units such as the need for EC, CTE, CTO, Royalty, permissions from state governments, etc.

3. NITI Aayog, MoEFCC, Ministry of Railways, MoRTH and MoHUA are requested to nominate a Joint Secretary or Director level officer who is well versed with the subject matter and kindly send the name to this ministry within a weeks' time so that the first meeting of the HPEC may be conveyed in the 1st week of March, 2023.

4. The approved concept note on the Gainful utilization of OB in Coal Sector to prepare a comprehensive report within three months' time is also enclosed for reference.

(Manish Uniyal)
Under Secretary to the Govt. of India.
Email: manish.uniyal38@nic.in
Tel. No. 23384106

To:

1. CEO, NITI Aayog
2. Secretary, MoEFCC
3. Secretary, Ministry of Railways
4. Secretary, MoRTH
5. Secretary, MoHUA – with a request to nominate an expert from BMTPC
6. Joint Secretary, Sustainability & Just Transition Division, MoC

File No. SDC/1/2023-SDC (Computer No. 355494)
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7. Director (Technical), Coal India Limited
8. Chairman-cum-Managing Director, CMPDI
9. Advisor (Projects), MoC
10. Deputy Secretary, Sustainability & Just Transition Division, MoC

Copy to:

1. Secretary, MoC
2. Chairman-cum-Managing Director, Coal India Limited

File No. SDC/1/2023-SDC (Computer No. 355494)
2515209/2023/O/o US(SDC/NA/Just Transition)

Concept Note & Terms of Reference for the Proposed HPEC for Gainful Utilization of Overburden (OB) in the Coal Sector

1.0 Background

Sand, the basic building material which is necessary for any civil works in housing, urban expansion, infrastructure development, industrial development, etc., and in turn overall growth in the country. The increased demand for sand has resulted in the over-exploitation of rivers sand and has affected adversely the ecosystem of rivers. Sand is classified as a "minor mineral", under The Mines and Minerals (Development and Regulations) Act, 1957 (MMDR Act), and administrative control over minor minerals vests with the State Governments, accordingly, regulated through State specific rules. Due to high demand, regulated supply, and a complete ban on sand mining during monsoon to protect the river ecosystem, finding alternatives to river sand became necessary. Sand Mining Framework (2018) prepared by the Ministry of Mines, Government of India, envisages alternative sources of sand in the form of M-Sand from crushed rock fines (crusher dust), and sand from Overburden (OB) of coal mines.

During Opencast mining the overlying soil and rocks are removed as waste to extract coal and the fragmented rock (Overburden or OB) is heaped in dumps. Most of the waste is disposed off at the surface which occupies a considerable land area and requires extensive planning and control to minimize the environmental impact of mining. CIL has envisaged processing of Overburden rocks for Sand Production in mines where OB material contains about 60% Sandstone by volume which is harnessed through crushing & processing of Overburden.

In Surface coal mining, overburden (Topsoil and rock lying above the coal seam) is removed to exploit the coal seam. The topsoil is dumped separately for future reclamation processes. After the coal seam is exposed, it is mined out and overburden is backfilled in the mined-out area. The excess overburden is stacked near pit boundaries as external dumps.

India produced about 745 million tons of coal in 2021-22, more than 90% of which came from opencast mines. More than 2045 million cubic meters of overburden was removed with an average stripping ratio of 2.75 in the year 2021-22.

About 75-80 % of the overburden removed is backfilled in the de-coaled area in the mine and the remaining 20-25 % is dumped outside the pit. The total volume of OB swells by about 20% post-excavation. With the present production rate of 745 million tons of coal, about 600-700 ha of land is required every year for external dumps for the waste rock.

The amount of waste rock (overburden) produced is increasing year by year due to increased demand for coal and increasing stripping ratio. Earlier, the deposits with low stripping ratios were only mined by the open-cast method, now the open-cast mines are being planned for a stripping ratio as high as 20. It is always the interest of mining companies to generate additional revenue as well as save space for dumping OB.

2.0 Construction Industries and its Demands

The construction industry is the largest consumer of raw materials globally (World Economic Forum (WEF) and The Boston Consulting Group 2016), consuming around 3000 MT per year, which is around 50% of the total by weight (Pacheco-Torgal and Labrincha 2013). Constructed objects account for 25-40% of total global carbon emissions.

Construction consists mainly of residential housing (38%), transport, energy, and water infrastructure (32%), institutional and commercial buildings (18%), and industrial sites (13%). In developing countries, the construction industry can account for more than 8% of GDP (v. 5% in developed countries). Currently, more than 100 million people are working in construction around the world. The industry is expected to undergo significant growth in the coming years (World Economic Forum (WEF) and The Boston Consulting Group 2016). The projected growth between 2018 and 2023 was 4.2% per year. Urbanization and population growth drive this increase, with an estimated 75% of the infrastructure that will be in place in 2050 still having to be built (IFC and CPLC 2018).

3.0 Road to Sustainable Development

The United Nations Sustainable Development Goals (SDGs) adopted by 193 countries at the Paris Accord (COP21) encompass the pressing issues of sustainability, to be addressed holistically on the social, environmental, and economical fronts. Goal 15 is about conserving life on land. It is to protect and restore terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and stop biodiversity loss. To achieve the goal of restricting land degradation, it is imperative that stone and sand quarrying for construction activities has to be curbed to the extent possible. There have been various judicial interventions with Supreme Court (SC) and National Green Tribunal (NGT) stepping in. The Ministry of Environment, Forest and Climate Change (MoEFCC) has released the guidelines "Sustainable Sand Mining Management Guidelines, 2016" to promote the scientific mining of sand and encourage environment-friendly management practices in order to restore and maintain the ecology of the rivers.

There are trends in transitioning towards a low-carbon construction industry (IFC and CPLC 2018). The Organization for Economic Cooperation and Development (OECD) projects recycling of materials to become more competitive in comparison to the extraction of primary materials, due to technological developments and changes in the relative prices of production inputs (OECD 2018).

4.0 Potential Areas of OB Utilisation

Common OB Materials as found in Indian Coalfields are as follows:

A. Predominant constituents:

- Sandstone
- Shale

B. Other constituents:

- Clay
- Thin Coal Bands
- Traps (Igneous Basalt Rock)
- Dyke & Sills (Dolerite, Mica-Peridotite etc.)
- Fire Clay
- Ironstone Clay/Shales

1. Sandstone: The percentage of sandstone may be as high as up to 85% of the total volume of the waste rock generated (Verma & Deb, 2006). Sandstone is the rock formed by cementing of sands composed largely of quartz and silicate minerals. The cement that binds the clasts

may be argillaceous, calcareous, siliceous, or ferruginous (Singh, 1997). Sandstone found with coal seam is generally argillaceous and hence sand and cementing material can be easily segregated by simple crushing and washing. Sandstones from OB have the following potential uses:

a. Extraction of M-Sand: River sand remains the most consumed source of sand nationwide. Since river sand mining is now being strictly regulated and only specific identified zones can be mined under strict stipulations, its availability is going to diminish. Alternative sources of sand like sand from OB being eco-friendly can ensure uninterrupted supply to meet demand from India's burgeoning infrastructure sector. Coal Mining Company has started crushing and washing sandstone from its waste dumps which are being used for the construction of roads and structures. Researchers have found that stones of different maturity from OC mines can be used in different types of concrete as well as for concrete pavement blocks.
b. For Filling of Underground mine voids: Underground mining which accounts for about 15% of total coal production in India produces huge mine voids simultaneously. Such Mine voids created during the underground mining should be filled, otherwise, it may cause land subsidence owing to the collapse of the upper strata. Thus, to provide ground supports to minimize the land subsidence problems and mine safety aspects, backfilling with sand made from OB instead of river sand may be a cost-effective sustainable solution.
c. Production of Silica Sand for use in Glass, Ceramic & Paint industries.
d. Filling material for earthworks in road construction: The coal industry is already using such material for a base course in its haul roads through its CBRI-vetted Guidelines for Haul roads. There exists huge potential for using OB in Highways and railways. Sandstone with higher maturity may be used to produce road metals/Stone chips.
e. Sandstone with higher maturity may also be used for decorative stone, and stone blocks in building construction (e.g. Kamti Sandstone).
f. As coarse aggregates in making Low strength concrete.

2. Shale, Clay & thin coal bands: In the surface mining method it is possible to mine bands like clay separately and then use them for making bricks, stemming material, and pottery. As a Possible source of Rare earth elements: GSI has covered a large area covering Gondwana sediments under NGCM due to its OGP category. In many of these areas stream sediment geochemistry has brought out the enrichment of REE and also it has been seen many topsoils (regolith) components are enriched with large lithophile elements.

3. Trap/Dyke/Sills: Trap, Dyke & Sills are igneous rocks that frequently occur in Indian Coalfields, especially in Gondwana coalfields. The thickness of these igneous layers in coalfields varies from a few meters to 100 meters. These rocks may be used for producing stone chips as building & construction materials.

4. Ironstone Clay/Shales: Ironstone clay/shales are mainly associated with the Barren measure Formation of Damodar valley coalfields. The Raniganj Coalfield is reported to have deposits of Clay-Ironstones, from which iron is being extracted by mixing it with high-grade iron ore in the blast furnace of Kulti iron works.

5. Fire Clay: Fire clay is resistant to high temperatures, having fusion points higher than 1,600°C (2,910°F); therefore it is suitable for lining furnaces, as fire brick, and for the manufacture of utensils used in the metalworking industries, such as crucibles, saggars, retorts, and glassware.

i. Good quality fire clay with limited occurrences is reported in Damodar valley coalfields.
ii. A preliminary screening of Fire clay deposits in Jharkhand state, ECL command area was made and observations were as follows:

a. **Baetna Chapapur C Block:** In the Mugma area, as per GR of the block one borehole) Encountered fireclay deposit of 1.2m thick.
b. **Pirpanti Serand Block:** In Rajmahal Coalfield this block shows Fire clay in 4 Boreholes Thickness varies from 0.50m to 2.50m.

5.0 Benefits of Overburden to M-Sand:

Manufactured Sand (M-Sand) from the overburden of coal mines has several benefits in terms of economic and environmental sustainability, including:

- Cost-effectiveness: Using manufactured sand can be more cost-effective than using natural sand, as it can be produced in large quantities at a lower cost.
- Consistency: Manufactured sand can have a consistent grain size and shape, which can be beneficial for construction projects that require a specific type of sand.
- Environmental benefits: Using manufactured sand can help to reduce the need for mining natural sand, which can have negative environmental impacts. Additionally, using the overburden from coal mines can help to repurpose materials that would otherwise be considered waste.
- Reduced water consumption: Using manufactured sand can help to reduce the amount of water required for construction projects, as it does not require washing before use.
- Better workability: Manufactured sand is more angular and has a rougher surface, which makes it more workable for construction projects.
- The land occupied by OB dumps can be freed for alternative useful purposes
- Recovery of sand from waste overburden is the best out-of-waste product
- Commercial sale of produced sand can generate additional revenue for coal companies
- Apart from commercial use, sand produced shall also be consumed for sand stowing in Underground Mines enhancing safety & conservation
- Lesser Sand extraction from rivers will reduce erosion of channel beds & banks and protect the water habitat
- Help in maintaining the water table

6.0 Need for a Systematic Approach: Proposed Terms of References for the HPEC

It is clear from the above that, on one hand, there is an urgent need to chart out ways and means to promote alternative use of overburden material of coal mines, and on the other hand, the construction industry is in dire need of alternative materials for sustainable growth. In view of the gainful utilization of OB, the Ministry of Coal is going to constitute a High-Powered Expert Committee (HPEC) with the following Terms of References (ToR):

i. To make a policy framework in order to create a conducive environment for promoting the production of alternative/substitute construction materials from the overburden of coal mines so that our natural resources presently being used for construction materials, ballasts, etc. may be saved.

ii. Suggestions for a Regulatory/Advisory framework to introduce the concept of WHOLE MINING which will direct the exploration agencies to include the quantification of all the minerals, building materials, etc. present in the total strata in their Geological Reports and a similar system of pre-feasibility examination of uses of such materials, in the Mining Plan.

iii. System of region-wise assessment of demand for building material, minerals, ballasts, etc., and a possible supply of it from the processed overburden material.

iv. To prepare a policy framework, for engaging the premiere Technical and Research Institutions like Building Materials and Technology Promotion Council (BMTPC), etc., in carrying out studies for categorization of the available overburden materials along with the technical solutions vis-à-vis the end product and for promoting the manufactured buildings materials from overburden.

v. Guidelines for Preparation of EIA/ EMP for overburden processing units considering the overall positive impact on the environment.

vi. Promoting self-regulation of the stakeholders i.e. OB providers, OB processing unit owners, alternate construction material buyers, builders, real estate owners, developers, etc, so that acceptance of manufactured building materials from overburden may be adopted in the fast phase.

vii. Suggestive legal framework for OB Processing Units such as the need for EC, CTE, CTO, Royalty, permissions from state governments, etc.

The HPEC will prepare a comprehensive report within three months' time including guidelines for optimum and gainful utilization of OB in the coal sector.

7.0 Proposed Composition of the HPEC

The Ministry of Coal is proposing the following members for the envisaged HPEC for the Gainful Utilisation of OB:

Sl. No.	Name, Designation & Organization	Role
1	Joint Secretary, Sustainability & Just Transition Division, MoC	Chairman
2	Advisor (Projects), MoC	Member
3	Director (Technical), Coal India Limited	Member
4	Chairman-cum-Managing Director, CMPDI	Member
5	JS or Director Level officer from NITI Aayog	Member
6	JS or Director Level officer from MoEFCC	Member
7	JS or Director Level officer from Ministry of Railway	Member
8	JS or Director Level officer from MoRTH	Member
9	Expert from BMTPC, MoHUA	Member
10	Deputy Secretary, Sustainability & Just Transition Division, MoC	Member Secretary

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F.No. SDC/1/2023-SDC
Government of India
Ministry of Coal
(Sustainability & Just Transition Division)
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Shastri Bhawan, New Delhi
Dated : the 26th May, 2023

OFFICE MEMORANDUM

Subject : Minutes of the 2nd meeting of High-Powered Expert Committee (HPEC) on Gainful Utilization of Overburden in Coal Sector held under the chairmanship of JS (BPP) on 23.05.2023 - reg.

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The undersigned is directed to refer to the above-mentioned subject and to enclose herewith minutes of the 2nd meeting of HPEC held on 23.05.2023.

2. ATR on the aforesaid minutes of the meeting may kindly be submitted to this Ministry latest by 05.06.2023 positively.

(Manish Uniyal)
Under Secretary to the Govt. of India
manish.uniyal38@nic.in
Tel. No. 23384106

To,

1. Shri B.P. Pati - Chairperson/JS, MoC
2. Dr. B. Veera Reddy, Director (T), CIL
3. Advisor (P), MoC
4. CMD, CMPDIL
5. Shri Marapalli Venkateshwarlu, Director (T), MoC
6. Shri S. Nagachari, Director (T/ES), CMPDIL
7. Shri C.N. Jha, Dy. Chief BMTPC, MoHUA
8. Shri Munna Shah, Scientist D, MoEFCC
9. Shri A.K. Kushwaha, S.E. (S&R), MoRTH
10. Shri Jawahar Lal, Dy. Chief Engineer, NITI Aayog
11. Shri Tushar Saraswat, JDTT (POL), Ministry of Railways
12. Shri D.K. Solanki, Deputy Secretary (S&JT)

Copy for information to:

1. CEO, NITI Aayog
2. Secretary (Coal)
3. Secretary (MoEFCC)
4. Secretary (Ministry of Railways)
5. Secretary (MoRTH)
6. Secretary (MoHUA)
7. CMD, CIL

Minutes of the 2nd meeting of High-Powered Expert Committee (HPEC) on Gainful Utilization of Overburden in Coal Sector held on 23.05.2023 under the chairmanship of JS (BPP)

1. List of Officers present is annexed.

2. At the outset, JS (BPP) welcomed all the committee members and participants to the 2nd meeting of HPEC on Gainful Utilization of Overburden (OB) in Coal Sector and briefly talked about the background of the meeting. A presentation was made by CMPDI on Broad Policy Framework consisting of ten chapters namely Preamble, Regulation of minerals, Survey and Exploration, Database of mineral resources present in OB, Strategy of mineral development, Financial Support, Segregation of economic minerals present in OB, Mine Safety, Mine Closure, Conclusion.

3. NITI Aayog submitted that a framework for assessment of cess/duties applicable on overburden is necessary. CMPDI submitted that royalties are earned by state governments and in most of the cases, royalties for both major and minor minerals are defined state-wise.

4. D (T), CIL submitted that global experiences should be referred for analyzing feasibility of economic extraction of other minerals present in the overlying strata and its possibility w.r.t. Indian conditions. JS (BPP) directed CMPDI to add a chapter on Global Experiences/Practices being carried out for the same.
   It was also submitted that analysis of any economic minerals found in OB must be included in regional or detailed geological reports for the new mines.

5. JS (BPP) mentioned that Chapter 6 only takes into account the financial ramifications of exploration of economic minerals from OB, however, various other factors may also have financial implications and must be considered as sub-chapters such as borehole data collection, processing, transportation, environment considerations among others. Further, the name of chapter 6 to be renamed to Financial Implications.

6. CMPDI submitted that it is imperative that economic gain from the exploitation of minerals must unequivocally outweigh the cost of land acquisition and rehabilitation. As such, the decision of exploitation of minerals from OB may lie in the purview of coal block lease holder. JS (BPP) mentioned that the objective of HPEC is to further the gainful utilization of OB and provide a push for bulk marketing of OB. We may not recommend complete segregation or exploitation of minor minerals from OB except that for sand, fire clay or basalt etc. It was further directed to look into the international practices as well as methods being adopted in iron/ limestone mines for management of their OB.

7. D (T), CIL submitted that after evaluation of overlying strata, the dump composed of useful minerals shall be used for external dumping and remaining may be used for internal dumping. The guidelines should include stages of sequential mining process mentioning internal dumping, external dumping, plantation etc.

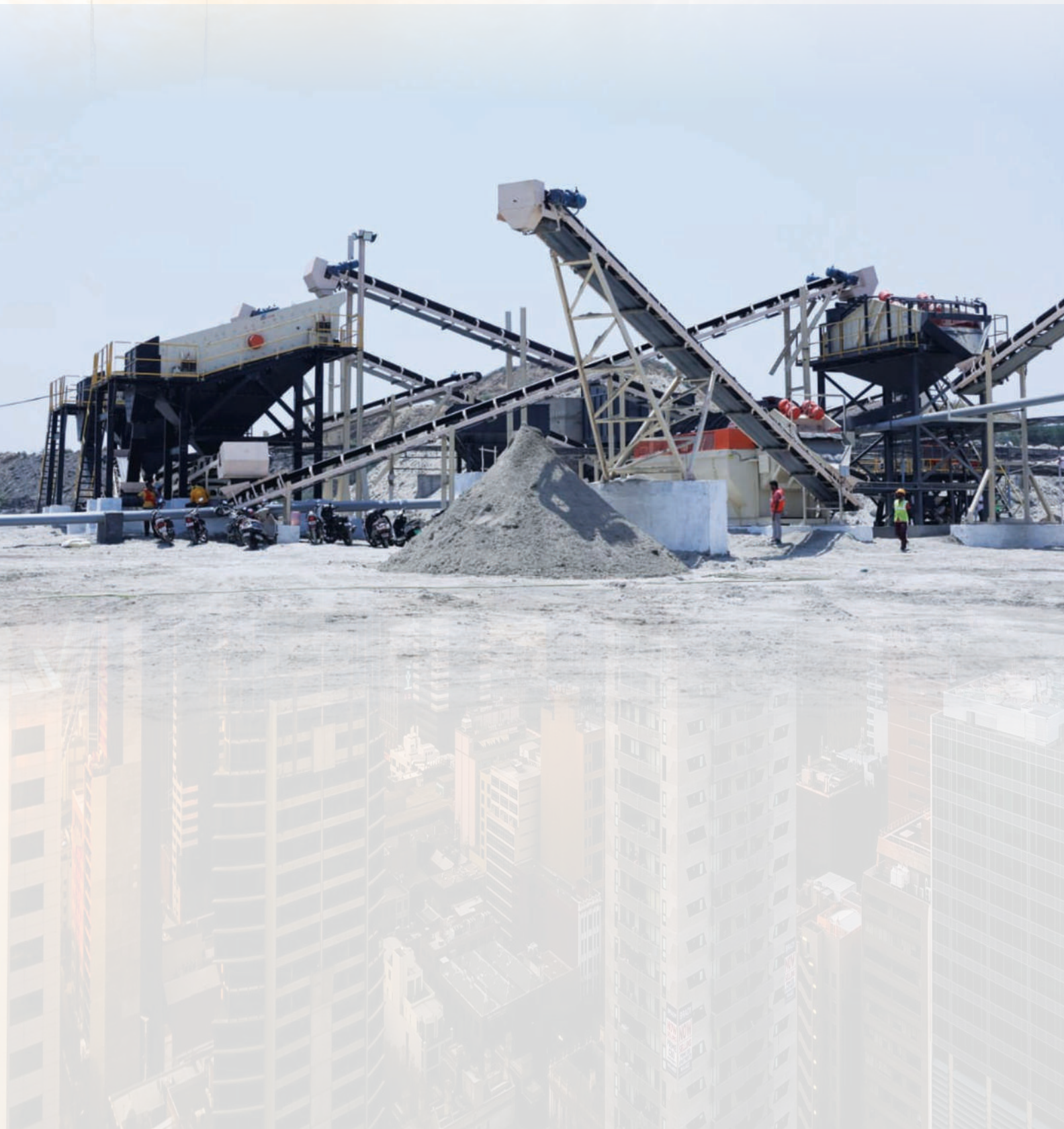
8. A chapter of highlighting recommendations of HPEC to be added in the report. JS (BPP) directed CMPDI to reframe the broad presentation/ guidelines and share the same in a weeks' time.

9. No officer from MoEFCC & MoRTH attended the meeting.

Meeting ended with thanks to the chair.

Annexure: List of participants in the 2nd meeting of HPEC on Gainful Utilization of Overburden in Coal Sector held on 23.05.2023

Sl. No.	Name	Office
Committee Members		
1.	Shri B.P. Pati	JS, MoC
2.	Dr. B. Veera Reddy (through VC)	D (T), CIL
3.	Shri S. Nagachari (through VC)	DT (T/ES), CMPDI
4.	Shri C.N. Jha (through VC)	Dy. Chief, BMTPC, MoHUA
5.	Shri Jawahar Lal (through VC)	Dy. Chief Engineer, NITI Aayog
6.	Shri Tushar Saraswat (through VC)	JD, Ministry of Railways
7.	Shri D.K. Solanki	DS, S & JT, MoC
In Attendance		
1.	Shri A K Rana (through VC)	Sr. Advisor (Mining), CMPDI
2.	Shri C. Jayadev (through VC)	GM (Environment), CIL
3.	Shri Anjani Kumar (through VC)	GM (NI), CIL
4.	Shri K.A.Pandian (through VC)	GM (Civil), CMPDI
5.	Dr. Rakesh Dwivedi (through VC)	GM (Environment), CMPDI
6.	Shri V. K. Pandey (through VC)	GM (Environment), CMPDI
7.	Shri S.K. Bhawaria	Manager, S & JT, MoC
8.	Shri Ravi Kumar	Dy. Manager, S & JT, MoC
9.	Shri Rohan Mishra	YP, S & JT, MoC



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MINISTRY OF COAL
GOVERNMENT OF INDIA