

CHAPTER

9



PROMOTIONAL AND DETAILED EXPLORATION

ANNUAL REPORT 2019-20

PROMOTIONAL AND DETAILED EXPLORATION

Promotional Exploration

Mineral Exploration Corporation Limited (MECL), State Governments and CMPDI are conducting Promotional Exploration under the Ministry of Coal's Plan scheme of

"Promotional Exploration for Coal & Lignite". The summary of Promotional Drilling carried out in coal & lignite during the period 2016-17, 2017-18, 2018-19 and 2019-20 (April'19-Dec'19 Actual and Jan'20-Mar'20 Projected) is given below:

(Drilling in Metre)

Command Area	2016-17 Actual	2017-18 Actual	2018-19 Actual	2019-20 (Apr'19-Dec'19) Actual	Jan'19-Dec'19 Actual	2019-20 (Jan'20-Mar'20) Projected
Drilling in CIL Command Area	49043	92787	91238	55202	85988	34000
Drilling in SCCL Command Area	0	0	4747	9075	13009	500
Drilling in Lignite Areas	55624	41894	43023	23983	34489	12500
Total	104567	134681	139008	88259	133486	47000
Growth%	-6%	28%	3%			

*Achievement of target depends upon timely availability of forest clearance to take up drilling in forest areas, local support and occurrence of lignite in identified blocks.

Detailed Drilling in Non-CIL Blocks

CMPDI carries on Detailed Exploration in CIL and Non-CIL blocks as per strict timelines to bring resources falling in **indicated** and **inferred** category into the **measured** (proven) category. The exploratory drilling in non-CIL/captive Mining blocks is taken

up under the Ministry of Coal's Plan scheme of "Detailed Drilling in Non-CIL Blocks".

The details of actual drilling in Non-CIL/Captive Mining Blocks during the period 2016-17, 2017-18, 2018-19 and 2019-20 (Apr.'19–Dec.'19) and projected achievement for 2019-20 (Jan.'20-Mar.'20) are given below:

(Drilling in Metre)

Command Area	2016-17 Actual	2017-18 Actual	2018-19 Actual	2019-20 (Apr'19-Dec'19) Actual	Jan'19-Dec'19 Actual	2019-20 (Jan'20-Mar'20) Projected
CMPDI (Departmental)	57663	113228	140683	110882	145624	140000
Outsourcing by CMPDI	251044	372661	342926	312316	406126	160000
Total	308070	485889	483609	423198	551750	300000
Growth %	7%	57%	0%			

CMPDI has substantially improved its capacity of drilling during the XI & XII plan period. As against the achievement of 2.09 lakh metre in 2007-08, CMPDI achieved 4.98 lakh metre in 2011-12, 13.60 lakh metre in 2018-19 and 8.90 lakh metre in 2019-20 upto Dec'19 (Projected drilling from Apr.'19-Mar.'20 is 14.00 lakh metre) through Departmental resources and outsourcing. For capacity expansion through modernization of departmental drills, 39 new Mechanical drills & 26 Hydrostatic drills have been procured since 2008-09, out of which 15 have been deployed as additional drills and 33 as replacement drills. CMPDI has also replaced 38 mud pumps and 74 trucks in last nine years.

To meet the increased work load, recruitment has been taken up through campus interviews/open examinations. 259 Geologists, 34 Geo-physicists and 20 Mechanical Engineers as drilling Engineers have joined CMPDI since 2008-09. About 1240 non-executive staffs have also been inducted for exploration work. Out of this, 45 Geologists, 7 Geo-physicists, 5 Mechanical Engineers & 14 non-executives have resigned.

During 2019-20 (April'19 to December'2019), a total of about 3.21 lakh metre drilling was carried out through Departmental resources, about 5.69 lakh metre drilling was carried out through outsourcing, out of which 2.42 lakh metre drilling was carried out through tendering & 3.26 lakh metre drilling through MoU with MECL.

Drilling Performance in 2019-20:

CMPDI deployed its departmental resources for detailed exploration of CIL/Non-CIL blocks whereas State Govt. of Odisha deployed resources in CIL blocks only. In addition, seven other contractual agencies have also deployed resources for detailed drilling/exploration in CIL/Non-CIL blocks. A total of 130 to 150 drills were deployed in 2019-20, out of which, 71 were departmental drills.

Apart from the above, CMPDI continued the technical supervision of Promotional (Regional) Exploration work undertaken by MECL in coal Sector in 14 blocks, DGM (Nagaland) in 1 block & Outsourced Agencies in 2 blocks. CMPDI has also taken up promotional drilling in 2 blocks. Promotional Exploration work was undertaken by MECL in Lignite Sector in 6 blocks. A total of about 0.88 lakh metre of Promotional (Regional) drilling was carried out in Coal (0.64 lakh metre) & Lignite (0.24 lakh metre) during 2019-20 (April'19 to December'2019).

In 2019-20, CMPDI and its contractual agencies took up exploratory drilling in 114 blocks/Mines of 19 coalfields situated in 14 States. Out of 114 blocks/mines, Departmental drills of CMPDI took up exploratory drilling in 57 blocks/mines, whereas, contractual agencies took up exploratory drilling in 57 blocks.

The overall performance of exploratory drilling during 2019-20 (upto Dec.'19) is given below:

Agency	ACHIEVEMENT DURING APR.'19-DEC.'19 (lakh metre)			Achieved Apr'18-Dec'18	Growth (%)
	Target	Achiev.	Achiev. (%)		
Detailed Drilling undertaken by CMPDI :					
I. Departmental (CIL, Consultancy & Non-CIL)	3.562	3.211	90%	3.258	-1%
St. Govts. (CIL)	0.006	0.013	237%	0.01	31%
MECL-MOU(CIL/Non-CIL)	2.619	3.257	124%	3.245	0%
Tendering(CIL/Non-CIL)	3.133	2.421	77%	2.799	-14%
Sub-Total Outsourcing:	5.757	5.691	99%	6.054	-6%
Grand Total	9.319	8.902	96%	9.312	-4%

Promotional Drilling by MECL, GSI, DGM (Nagaland) & DGM (Assam)					
I. COAL SECTOR					
MECL	0.65	0.54	83%	0.53	2%
DGM(Nagaland)	0.01	0.005	50%	0.01	-50%
DGM (Assam)	0.03	0	0%	0	
CMPDI	0.09	0.1	111%	0.07	43%
Total COAL	0.77	0.64	83%	0.61	5%
II. LIGNITE SECTOR					
MECL	0.26	0.24	92%	0.33	-27%
OVERALL ACHIEV.	1.03	0.88	85%	0.94	-6%

In 2019-20 (upto Dec.'19), CMPDI achieved 96% of its overall drilling targets. The shortfall is mainly due to local law & order problem, pending forest permission & no bid/ high rate in tendering. MECL and CMPDI could not achieve the targets of Promotional (Regional) drilling due to less deployment of drills because of priority in detailed drilling and DGMs (NER) could not deploy its rigs due to adverse law & order condition, forest cover & special tenancy Act.

Progress of 2D & 3D seismic survey

CMPDI has taken up 2D seismic survey on large scale and data acquisition with depth range about 1000 metre. Data acquisition for North of Piparwar PH- II block (20.68 sq km), NKCF with Paradigm Software (High speed seismic data processing) has been completed and Interim Report submitted during 2019-20. In addition to this, data acquisition in 2 blocks i.e. Northern Part of North of Arkhapal, Talcher CF & Nigwani-Bakeli-A, Sohagpur CF have been taken up during 2019-20. Tentatively, 29 blocks have been identified for undertaking detailed exploration of Coal & Lignite by integrating 2D/3D seismic survey along with drilling covering an area of about 666 sq km in G1/G2 level of exploration with borehole density of 2-4 boreholes/sq km in 2020-21 & 2021-22.

A Worksop on **“Modern Technologies for Coal/Lignite Sector to expedite current pace of Exploration”** was organised by CMPDI at Scope Convention Center, New Delhi under the aegis of Ministry of Coal in which a number of papers were presented by experts for use of seismic survey

for Coal/Lignite exploration by CMPDI, MECL, ONGC & other stakeholders. After detailed deliberations with all the experts & stakeholders a roadmap was prepared and submitted to MoC for implementation of modern technologies in Coal/Lignite exploration.

A project has been taken up in association with NGRI, Hyderabad on **“3-D Seismic survey for coal in Belpahar sector of IB valley Coalfield”**. The primary objective is to identify Lay and desposition of coal seams in the surveyed area. The outcome of project will help in evaluating 3-D seismic technology for coal exploration in Indian scenario and its implementation in CMPDI. The Interim Report submitted and vetting comments submitted to NGRI for finalization of Report.

Geological Reports

In 2019-20(upto Dec.'19), 12 Geological Reports were prepared on the basis of detailed exploration conducted in previous years. About **6.428 Billion Tonnes** of additional coal resources under Measured (Proven) category were added. About 14 GRs expected to be submitted during Jan.'20-Mar.'20 with estimated resource of about 4.0 billion tonnes.

Geophysical Studies

HRSS Survey has been carried out in the Dipside of Sakhigopal 'A' block, Talcher Coalfield, Bartara block in Sohagpur Coalfield and the survey is under progress in North of Piparwar Phase-II block, N.K. area. A sum total of 80 line km. survey has been carried out. Vibroseis imported from M/s SERCEL, France was commissioned

and deployed in North of Piparwar Phase-II block. Interim report submitted.

Disposal of 24 Km of disused radiation source have been completed with M/s AFRB, BARC, Mumbai. All the disused radiation sources were accumulated for the last 30 years. Two lakh meter of Geophysical logging were carried out departmentally especially for complimenting non-coring drilling.

Hydrogeological Studies

Hydrogeological studies of 15 numbers of mining projects/ mines were taken up for preparation of 'Groundwater Clearance Application' for CGWA approval and EMP Clearance. CMPDI is carrying out groundwater monitoring of MOEF cleared projects (74 nos. of mines of WCL area and 15 nos. Cluster of Mines in BCCL area). Water level monitoring in other areas of ECL,

CCL, SECL, NCL and MCL are also in progress. Total 90 nos. of Hydrogeological studies on GR/PR/Piezometers and others have been completed.

Hydrogeological studies in 5 projects have been carried out for water supply arrangements to mines, colony and villages.

COAL RESOURCES

Inventory of Geological Resources of coal in India

As a result of exploration carried upto the maximum depth of 1200m by the GSI, CMPDI, SCCL and MECL, a cumulative total of 326.496Billion tonnes of geological resources of coal have so far been estimated in the country as on 01.04.2019. The details of State-wise geological resources of coal are given below:

STATEWISE GEOLOGICAL RESOURCES OF COAL IN INDIA AS ON 01.04.2019

STATE	Category-wise Coal Resources (in Million Tonnes)				
	Measured	Indicated	Inferred	Inferred	Total
	(Proved)		(Exploration)	(Mapping)	
WEST BENGAL	14219	12847	4624		31690
BIHAR	310	1513	11		1834
JHARKHAND	48032	30400	6074		84506
MADHYA PRADESH	12182	12736	3875		28793
CHHATTISGARH	21446	36260	2202		59908
UTTAR PRADESH	884	178	0		1062
MAHARASHTRA	7573	3257	1847		12677
ODISHA	39654	33473	7713		80840
ANDHRA PRADESH	97	1078	432		1607
TELANGANA	10622	8565	2652		21839
SIKKIM	0	58	43		101

STATE	Category-wise Coal Resources (in Million Tonnes)				
	Measured	Indicated	Inferred	Inferred	Total
	(Proved)		(Exploration)	(Mapping)	
ASSAM	465	57	1	3	525
ARUNACHAL PRADESH	31	40	13	6	90
MEGHALYA	89	17	28	443	576
NAGALAND	9	22	118	298	446
GRAND TOTAL	155614	140501	29631	750	326496

Source: Geological Survey of India's Inventory of Geological Resources of Indian Coal as on 1.4.19. The inventory did not take into account the mined out reserves.

Categorization of Resources

The coal resources of India are available in older Gondwana formations of peninsular India and younger tertiary formations of north eastern region. Based on the results of Regional/Promotional Exploration, where the boreholes are normally placed 1-2 Km apart, the resources are classified into 'Indicated' or Inferred' category. Subsequent Detailed Exploration in selected blocks, where boreholes are less than 400 meter apart, upgrades the resources into more reliable 'Proved' category. The formation-wise and Category-wise coal resources of India as on 1.4.2019 are given in table below:

(In MT)

Formation	Proved	Indicated	Inferred	Total
Gondwana Coals	155021	140379	29472	324872
Tertiary Coals	594	121	909	1624
Total	155614	140501	30381	326496

The Type and Category-wise resources of India as on 1.4.2019 are given in table below:

(In MT)

Coal Type	Proved	Indicated	Inferred	Total
Prime Coking	4668	645	0	5313
Medium Coking	14876	11245	1863	27984
Semi Coking	519	995	193	1708
Sub-Total of Coking	20063	12885	2056	35004
Non-Coking	134958	127494	27416	289868
Tertiary Coal	594	121	909	1624
Grand Total	155614	140501	30381	326496

Exploration by SCCL

Drilling for coal exploration and achievements by SCCL, Telangana State from 2014-15 are as follows.

(In MT)

Year	No. of Drills	Metreage Drilling (target)	Metreage Drilling (actual)	Exploration Cost (in Crores)	Reserves Proved (mt) G1 stage
2014-15	31	1,30,000	1,35,306	55.18	77.27
2015-16	31	1,35,000	1,36,858	59.90	321.93
2016-17	31	1,40,000	1,51,431	64.91	273.81
2017-18	31	1,30,000	1,09,109	79.61	72.64
2018-19	25	1,05,000	99,544	74.64	147.42
2019-20 (Apr-Dec, 2019)	25	1,05,000 (78,750)	60,880	51.08 (Tentative)	-
Jan-Dec, 2019	25	1,05,000	94,815.50	-	147.42
Jan-Dec, 2018	31 (partially)	1,11,250	1,00,592	-	72.64

During 2019-20 (Apr-Dec, 2019), a total of 0.6088 lakh metres of drilling has been carried out in 15 blocks and also in the identified projects/ mines by deploying 25 drills in the SCCL command area of Godavari Valley Coal Field.

A total of 46,693 mtr. involving 173 boreholes were Geophysically logged.

During the period under reference, 8 boreholes core data sent for Physico Mechanical Properties tests and results of 11 Bhs received. In various mines, 76 underground & 37 opencast visits carried out for geo-technical mapping, subsequently 20 geotechnical reports, 15 RMR reports and 9 'Q' value reports submitted. 46 no. of Standard penetration tests (SPT) conducted for obtaining soil characteristics of proposed OB dump areas pertaining to various mines.

During the same period, in mining areas 145 piezometric wells and 339 Phreatic wells were monitored in all seasons. 94 bore well sites were identified to augment water supply. One mine water inflow assessment investigation carried out. 13 Hydrogeological

environment reports for EIA/EMP submitted and 2 environmental inventory reports submitted to incorporate in GR.

Exploration activities in Penagadapa Captive Coal Block, GVCF, Telangana state completed by drilling 11 Bhs with a metreage of 4682m and Geological Report submitted on 14-12-2019.

Inventory of Geological Resources of Coal:

As on 1.4.2019, the total measured coal resources in GVCF, Telangana amount to 10,622.32 MT (331) and the Indicated & Inferred geological resources amount to 8,564.74 MT (332) and 2,651.88 MT (333) respectively. The total geological resources of coal in GVCF, Telangana state are 21,838.94 MT (as per the National Inventory of coal for the year 2018-19).

Lignite Reserves in India

Lignite reserves in India have been currently estimated at around **45758.70** million tonnes as on 01.04.2019. The state wise distribution of lignite reserves as on 01.04.2019 is as follows:

Resource in million tonne

State	Measured	Indicated	Inferred	Total	%
Pondicherry	0.00	405.61	11.00	416.61	0.91
Tamil Nadu	4340.35	22496.63	9392.85	36229.83	79.18
Rajasthan	1168.53	3029.78	2150.77	6349.08	13.88
Gujarat	1278.65	283.70	1159.70	2722.05	5.95
Jammu & Kashmir	0.00	20.25	7.30	27.55	0.06
Kerala	0.00	0.00	9.65	9.65	0.02
West Bengal	0.00	1.13	2.80	3.93	0.01
Total	6787.53	26237.1	12734.07	45758.70	100.00

Promotional exploration

a) Promotional Regional Exploration:

During the year 2019-20, a target of 35000 metres of drilling work under Promotional exploration is allotted in the states of Tamil Nadu & Rajasthan. Out of which, 30000 meters is allotted to MECL and 5000meters is allotted to NLCIL which is going to be taken up through MoU with MECL. The details of work done against the target are given below.

Sl.No.	State	Target during 2019-20 (in meters)	Achievement (April 2019 to November 2019) (Provl)
1	Tamil Nadu	35000	-
2	Rajasthan		7877.90
	Total	35000	7877.90

b) Detailed exploration by NLCIL under MoC Central Sector Scheme:

During the year 2019-20, MoC has allotted 30000 meters in RS.Mangalam block, Ramnad, Tamil Nadu to NLCIL under Central Sector Scheme of MoC. NLCIL has entered into MoU with MECL during November-2019 for taking up this detailed exploration work.

c) Detailed Exploration under NMET Scheme (MoM):

During the year 2019-20, a target of 25000 mts of drilling work is earmarked for MECL to be carried out in the states of Tamil Nadu. The details of work done against the target are given below.

Sl.No.	State	Target during 2019-20 (in meters)	Achievement (April 2019 to November 2019) (Provl)
1	Veeranam, Tamil Nadu	25000	13754.00

d) Contractual scheme By NLCIL:

During 2019-20 (up to November 2019), NLCIL has not taken up detailed/check drilling work in any of its future lignite blocks.

