भारत कोकिंग कोल लिमिटेड
एक मिनिरत्न कम्पनी
(कोल इंडिया लिमिटेड का एक अंग)
महाप्रबंधक का कार्यालय, पूर्वी झरिया क्षेत्र
पी.ओ.- भौरा, जिला - धनबाद (झारखण्ड)
पिन - ८२८३०२, दूरभाष - ०३२६-२३२****,
ईमेल- cgmej@bccl.gov.in
पंजीकृत कार्यालय कोयला भवन, कोयला नगर, धनबाद-
८२६***, (झारखण्ड)
CIN U10101JH1972GOI000918
दूरभाष-०३२६-२३२****/फैक्स-०३२६-२३३****, ईमेल-
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Bharat Coking Coal Limited
A MINI RATNA Co.
(A Subsidiary of Coal India Ltd)
Office of the General Manager, Eastern Jharia Area
P.O. Bhowra, Dist: Dhanbad (Jharkhand),PIN- 828302
Tel: 0326-2320077, Email-cgmej@bccl.gov.in
Regd.Off: Koyla Bhawan, Koyla Nagar, Dhanbad-826005,
CIN: U10101JH1972GOI000918,
Tel: 0326-2230190/FAX: 0326-2230050, Email – cos@bccl.gov.in

Ref No.: BCCL/EJ/GM/Envt./2021/50 Date: 29/05/2021

To,
The Director
Ministry of Environment, Forests and Climate Change
Regional office (ECZ)
Bungalow No. A-2, Shyamali Colony
Ranchi – 834002
Jharkhand

Sub.: Six monthly compliance report of the conditions of Environmental Clearance granted to Cluster X group of mines of BCCL for the period from October 2020 to March 2021.
(Ref.: EC Order No.- J-11015/380/2010-IA.II(M) dated 06.02.2013 & EC amended Vide letter no.- J-11015/380/2010-IA.II(M) dated 12.06.2019)

Dear Sir,

Kindly find the enclosed here with the six monthly compliance report of the conditions of Environmental Clearance for the period from October 2020 to March 2021 in respect of Cluster X group of mines of BCCL.

Thanking You.

Encl.: Six monthly compliance report with annexure

Yours faithfully
31/5/21
General Manager
Eastern Jharia Area, BCCL
Cluster X

CC to:
1. Director, 1A Monitoring Cell, Paryavaran Bhawan, CGO Complex, New delhi-110003.
2. Member Secretary, JSPCB, Ranchi
3. Dy. GM / HOD (Env.), BCCL, Koyla Bhawan, Dhanbad
4. AGM, E.J. Area, Bhowra, BCCL
5. Area Manager (Env.), E.J. Area
6. Master File

ENVIRONMENTAL CLEARANCE COMPLIANCE OF CLUSTER-X

(GRANTED VIDE J-11015/380/2010-IA.II (M) Dated 06.02.2013 and EC AMENDED DATED 12.06.2019)
(From October 2020 to March 2021)

<table>
<tr><th>Sl. No.</th><th>A. Specific Conditions by MOEF:</th><th>Compliance</th></tr>
<tr><td>I.</td><td>The maximum production from the opencast and underground section in the cluster shall not exceed beyond that for which environmental clearance has been granted for the cluster X as below:</td><td>The production from the cluster is within the limit for which environmental clearance has been granted. The year wise and colliery wise production of coal in MTPA is as follows:
COAL PRODUCTION DATA (IN MT) OF CLUSTER X SINCE GRANT OF EC
<table>
<tr><th colspan="2">Mine Name</th><th>EC Capacity (Peak)</th><th>2013-14</th><th>2014-15</th><th>2015-16</th><th>2016-17</th><th>2017-18</th><th>2018-19</th><th>2019-20</th><th>2020-21</th></tr>
<tr><td rowspan="2">Bhowra North</td><td>UG</td><td>0.143</td><td>0.024</td><td>0.032</td><td>0.028</td><td>0.023</td><td>0.012</td><td>0.006</td><td>0.0065</td><td>0.000015</td></tr>
<tr><td>OC</td><td>0.546</td><td>0.143</td><td>0.01</td><td>0.028</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td rowspan="2">Bhowra South</td><td>UG</td><td>0.377</td><td>0.037</td><td>0.032</td><td>0.025</td><td>0.022</td><td>0.01</td><td>0.007</td><td>0.0003</td><td>0</td></tr>
<tr><td>OC</td><td>1.2</td><td>0.185</td><td>0.11</td><td>0.28</td><td>0.413</td><td>0.458</td><td>0.892</td><td>0.318</td><td>0.675</td></tr>
<tr><td>ASP Colliery</td><td>OCP</td><td>0.709</td><td>0.139</td><td>0.085</td><td>0.219</td><td>0.267</td><td>0.277</td><td>0.239</td><td>0.175</td><td>0.225</td></tr>
<tr><td>Sudamdih Shaft</td><td>UG</td><td>0.24</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Amlabad UG</td><td>UG</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">Total (Cluster X)</td><td>2.289*</td><td>0.528</td><td>0.269</td><td>0.580</td><td>0.725</td><td>0.757</td><td>1.145</td><td>0.600</td><td>0.900125</td></tr>
</table></td></tr>
<tr><td>II.</td><td>All the void /water bodies should be backfilled up to Ground level and no OB dump at the end of mining.</td><td>This activity is post closure mining activity and will be done as per approved mine closure plan. However, progressive backfilling is done, the year wise data of backfilling in Ha. is as follows:
UNIT WISE BACKFILLING DATA (IN HA) OF CLUSTER X
<table>
<tr><th>Mine Name</th><th>2013-14</th><th>2014-15</th><th>2015-16</th><th>2016-17</th><th>2017-18</th><th>2018-19</th><th>2019-20</th></tr>
<tr><td>Bhowra North-Mix</td><td>1.76</td><td>3.17</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td></tr>
<tr><td>Bhowra South- Mix</td><td>4.10</td><td>6.50</td><td>6.50</td><td>5.24</td><td>5.24</td><td></td><td></td></tr>
<tr><td>ASP Colliery - OC</td><td>1.93</td><td>0.96</td><td>0.6</td><td>0.58</td><td>0.51</td><td></td><td></td></tr>
<tr><td>Sudamdih Shaft</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Amlabad UG</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
</table>
After physical reclamation/backfilling, biological reclamation has been done which is as follows:
AREA OF ECOLOGICAL RESTORATION SITES / PLANTATION / BIOLOGICAL RECLAMATION (in Ha.)
<table>
<tr><th>Colliery / Mine Name</th><th>2013-14</th><th>2014-15</th><th>2015-16</th><th>2016-17</th><th>2017-18</th><th>2018-19</th><th>2019-20</th><th>2020-21</th></tr>
<tr><td>Bhowra North</td><td>-</td><td>-</td><td>-</td><td>5.20</td><td>3.10</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Bhowra South</td><td>-</td><td>4.78</td><td>-</td><td>-</td><td>-</td><td>4.50</td><td>-</td><td>-</td></tr>
<tr><td>ASP Colliery</td><td>-</td><td>3.95</td><td>5.71</td><td>-</td><td>-</td><td>-</td><td>-</td><td>22.10</td></tr>
<tr><td>Sudamdih Shaft</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Amlabad UG</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Total (in Ha.)</td><td>-</td><td>8.73</td><td>5.71</td><td>5.20</td><td>3.10</td><td>4.50</td><td>-</td><td>22.10</td></tr>
</table></td></tr>
<tr><td>III.</td><td>Extensive plantation should be provided on either side of Damodar River.</td><td>Extensive plantation is present along the Damodar river which is under cluster X. In addition to this, area of 22.10 Ha. (19.5 Ha + 2.6 Ha) were identified near Damodar river in consultation with District Forest Officer, Dhanbad for plantation under Riverside plantation scheme and work orders were issued for plantation near Damodar River.
List of plant species present along the bank of Damodar river are given below:</td></tr>
</table>

List of the plants species

S. No.	Botanical Name	Local Name	Hindi Name
1	*Acacia arabica*	Babul	Babul
2	*Adina cordifolia*	Karam	Karam
3	*Ailanthus excelsa*	Ghorkarani/ Ghorkaram	Ghorkarani/ Ghorkaram
4	*Alangium Lamarckii*	Dhela	Dhela
5	*Albizzia lebbek*	Siris	Siris
6	*Albizzia procera*	Safed Siris	Safed Siris
7	*Alstonia scholaris*	Chatni	Chatni
8	*Azadirachta indica*	Neem	Neem
9	*Bombax ceiba*	Semal	Semal
10	*Butea frondosa*	Palas	Palas
11	*Casearia tomentosa*	Beri	Beri
12	*Cassia fistula*	Dhanraj/Amaltas	Dhanraj/Amaltas
13	*Dalbergia sissoo*	Shisham	Shisham
14	*Eugenia jamb*	Jamun	Jamun
15	*Ficus religiosa*	Pipal	Pipal
16	*Lagerostroemia parviflora*	Sidha	Sidha
17	*Mitragyna parviflora*	Guri/Gurikaram	Guri/Gurikaram
18	*Terminalia arjuna*	Arjun	Arjun
19	*Phoenix acaulis*	Khejur	Khejur
20	*Ficus racemosa*	Gular	Gular
21	*Calotropis procera*	Calotropis	Calotropis
22	*Ricinus communis*	Castor	Castor

In addition to this, Action has been taken for the plantation or eco-restoration work as per the Road Map prepared by Forest Research Institute (FRI), Dehradun.

Details of Plantation in EJ Area (Cluster X)

Colliery	Site Name	Area (Ha)	Taken up in	Plantation (No.)							
				2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total
Bh (N)	Bh N/BLA OB Site	5.2	2016-17	-	-	13000	2850		1360	500	17710
	New BLA Site	3.1	2017-18	-	-	-	4725		616	500	5841
Bh (S)	3 Pit OB Site	4.76	2014-15	12189		1000	2200			1500	16889
	Bhowra Chandan OB Site	4.5	2018-19	-	-	-	-	11500	1728	2000	15228
ASP Colliery	COCP/ Vrindavan Site	5.71	2015-16	-	6125	8150	3000		2650	250	20175
	Kamini Kalyan Herbal Garden	3.32	1980 (old)	375 (planted before 2014)		40	50		150	150	615
	Mohalbani OB Site	3.95	2014-15	10874		1000	1200				13074
Plantation at other locations	Schools, along road, colony, etc.								1246	2380	3626
Total		**30.56**		**23063**	**6125**	**23190**	**14025**	**11500**	**7750**	**7280**	**92933**

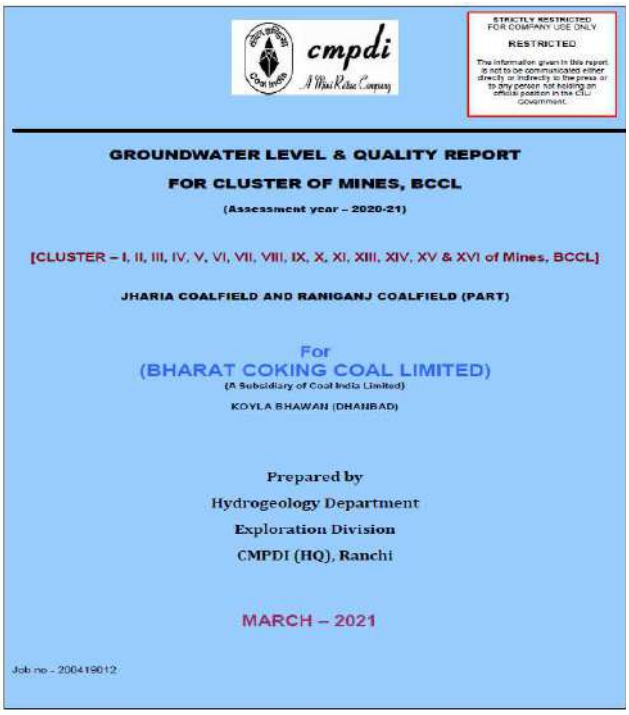
IV.	Details of impact of mining on Damodar River should be assessed and provided;	CMPDI is carrying out the Environment Monitoring which comprises of sampling and analysis of water from Damodar River (SW 21 & SW 22) under surface water analysis. However, Detail study of impact of mining on Damodar River will be taken up by CMPDI. Result of upstream and downstream samples showing no major changes in

		water quality of Damodar river (report enclosed as Annexure –I). **WATER QUALITY** ***(SURFACE WATER- 17 PARAMETERS)*** Name of the Company: **Bharat Coking Coal Limited** Year : **2020-21.** Name of the Cluster: **Cluster - X** Period: **Q.E.DEC 2020** **Stations:** 1. Upstream in Damodar river SW-21 2. Downstream in Damodar river SW-22 **Date of Sampling:** 07/12/2020 07/12/2020

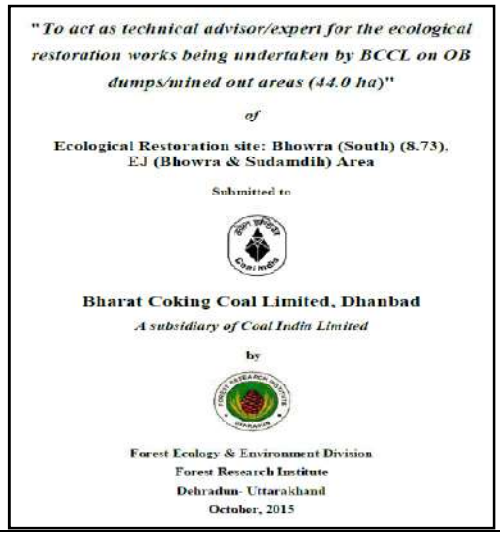
Sl.No	Parameter	Sampling Stations SW21 07.12.2020	SW22 07.12.2020			IS: 2296	Detection Limit	BIS Standard & Method
1	Arsenic (as As), mg/l, Max	<0.006	<0.006			0.2	0.006	IS-3025,part 37:1988, R-2019/ APHA 23rd Edition AAS-VGA
2	BOD (3 days 27°C), mg/l, Max	<2.0	<2.0			3.00	2.00	IS 3025 (Part 44) : 1993 Reaffirmed 2019 , 3 day incubation at 27°C
3	Colour	Colourless	Colourless			300	Qualitative	Physical/Qualitative
4	Chlorides (as Cl), mg/l, Max	26	29			600	2.00	IS-3025/32:1988, R-2019 Argentometric
5	Copper (as Cu), mg/l, Max	<0.2	<0.2			1.5	0.2	IS 3025/42 : 1992 R : 2019, AAS-Flame
6	Dissolved Oxygen, min.	6.5	8.6			4	0.10	IS 3025 (Part 38) : 1989, Reaffirmed 2019 Modified Winkler Azide Method
7	Fluoride (as F) mg/l, Max	0.87	0.77			1.5	0.02	APHA, 23RD Edition, Page 4-90 to , 4500 –F- D (SPADNS Method)
8	Hexavalent Chromium, mg/l, Max	<0.01	<0.01			0.05	0.01	IS 3025 (Part 52) : 2003,Reaffirmed 2019
9	Iron (as Fe), mg/l, Max	<0.2	<0.2			50	0.2	IS 3025 /53 : 2003,R : 2019 , AAS-Flame Method
10	Lead (as Pb), mg/l, Max	<0.005	<0.005			0.1	0.005	APHA, 23rd Edition, AAS-GTA
11	Nitrate (as NO_3), mg/l, Max	6.29	6.56			50	0.50	APHA, 23rd Edition, P-4-127, 4500 - NO_3^- B , UV-Spectrophotometric Screening Method
12	pH value	8.21	8.14			6.5-8.5	2.5	IS 3025, Part 11 : 1983 R 2017 Electrometric method
13	Phenolic compounds (as C_6H_5OH), mg/l, Max	<0.002	<0.002			0.005	0.002	APHA, 22nd Edition 4-Amino Antipyrine
14	Selenium, mg/l, Max	<0.007	<0.007			0.05	0.007	IS-3025,part 56:2003, R-2019/ APHA 23rd Edition, AAS-VGA
15	Sulphate (as SO_4) mg/l, Max	100	101			400	2.00	APHA –23rd Edition, P-4-199, 4500 SO_4^{2-} E
16	Total Dissolved Solids, mg/l, Max	290	261			1500	25.00	IS 3025, Part 16: 1984 R 2017 Gravimetric method
17	Zinc (as Zn), mg/l, Max	<0.1	<0.1			15	0.1	IS 3025/ 49 : 1994, R : 2019, AAS-Flame

All values are expressed in mg/lit unless specified.

Analysed By JSA/SA/SSA | Checked By Lab In Charge RI-5, CMPDI, Dhanbad | Approved By HOD(In-charge) Environment RI-2, CMPDI, Dhanbad

V.	Impact of mining on ground water of the area (Impact Zone) should be provided;	Ground water monitoring is being carried out by CMPDI and the ground water analysis report is enclosed as Annexure – II.  cmpdi A Mini Ratna Company STRICTLY RESTRICTED FOR COMPANY USE ONLY RESTRICTED The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL/ Government. **GROUNDWATER LEVEL & QUALITY REPORT** **FOR CLUSTER OF MINES, BCCL** **(Assessment year – 2020-21)** **[CLUSTER – I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV & XVI of Mines, BCCL]** **JHARIA COALFIELD AND RANIGANJ COALFIELD (PART)** For **(BHARAT COKING COAL LIMITED)** (A Subsidiary of Coal India Limited) KOYLA BHAWAN (DHANBAD) **Prepared by** **Hydrogeology Department** **Exploration Division** **CMPDI (HQ), Ranchi** **MARCH – 2021** Job no - 20041912
VI.	A Garland drain should be provided and the drain water should not be discharged	Garland drain, Toe wall & retaining wall along the stabilized OB dump is present. OB dump is being stabilized through biological reclamation/ecological restoration technique which can be seen in

<table>
<tr><td></td><td>into Damodar River;</td><td>Picture attached. No mine water is being discharged into Damodar river.
 
Garland drain along OB Dump
 
 
 
 
Toe Wall / Retaining Wall along OB Dump</td></tr>
<tr><td>VII.</td><td>Excess water from mine after treatment should be supplied to the villagers;</td><td>An action plan for the utilization and treatment of surplus mine water has been prepared. In this regard 26 mines have been identified for implementation of the Phase-I of the action Plan. However, at present, surplus mine water is being supplied to nearby villages / locality for domestic purpose (non-drinking purpose). List of villages for supplied water is as follows:
<table>
<tr><th>S. No.</th><th>Colliery/Mine Name</th><th>Village list for supply of water</th></tr>
<tr><td>1</td><td>ASP Colliery</td><td>Sudamdih colony, Patherdih colony, Patherdih Basti, Patherdih Basti, Supkar Basti, Hattala basti, etc</td></tr>
<tr><td>2</td><td>Bhowra Group of mines (Bhowra North & Bhowra South)</td><td>Gaurkhuti, 12 no. basti, 13 no.basti, 35 no. basti; 6 no. Bhowra, Manjhi Basti, Gandhi Nagar, 19 no. Basti upar, 19 no. Basti niche, Bhowra 16 no., Bhowra 9 no. etc.</td></tr>
<tr><td>3</td><td>Amlabad colliery</td><td>Amlabad colony and nearby basti</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>VIII.</td><td>Rejects of washery along with dry carbon slurry should be utilized in power plant and other recognized vendors;</td><td>Rejects of washery along with dry carbon slurry is being sale to power plants and other vendors through local sales. Year wise produced dry carbon slurry is given below:
<table>
<tr><th>Year</th><th>Dry Carbon Slurry Produced (in metric Ton)</th></tr>
<tr><td>2013-14</td><td>43488</td></tr>
<tr><td>2014-15</td><td>6775</td></tr>
<tr><td>2015-16</td><td>9880</td></tr>
<tr><td>2016-17</td><td>12609</td></tr>
<tr><td>2017-18</td><td>6513</td></tr>
<tr><td>2018-19</td><td>4405</td></tr>
<tr><td>2019-20</td><td>2255</td></tr>
</table></td></tr>
<tr><td>IX.</td><td>There should be no discharge from the Washery (Slurry) in to the Damodar River. The entire washery water should be recycled;</td><td>All the washeries of BCCL are designed on Closed Circuit System to ensure no discharge from the washery premises.
  
Zero Discharge System at Sudamdih Washery</td></tr>
<tr><td>X.</td><td>Damodar River should be protected by plantation on both sides;</td><td>Extensive plantation is present along the Damodar river which is under cluster X. In addition to this, area of 22.10 Ha. (19.5 Ha + 2.6 Ha) were identified near Damodar river in consultation with District Forest Officer, Dhanbad for plantation under Riverside plantation scheme and work orders were issued for plantation near Damodar River. List of plant species present along the bank of Damodar river are given in condition no. III.
In addition to this, Action has been taken for the plantation or eco-restoration work as per the Road Map prepared by Forest Research Institute (FRI), Dehradun.
 
</td></tr>
<tr><td>XI.</td><td>A herbal garden with medicinal plants be</td><td>Kamini Kalyan Herbal Garden with 3.32 Ha. area has been taken up and developed, it will be further enriched as thematic medicinal plants</td></tr>
</table>

developed;

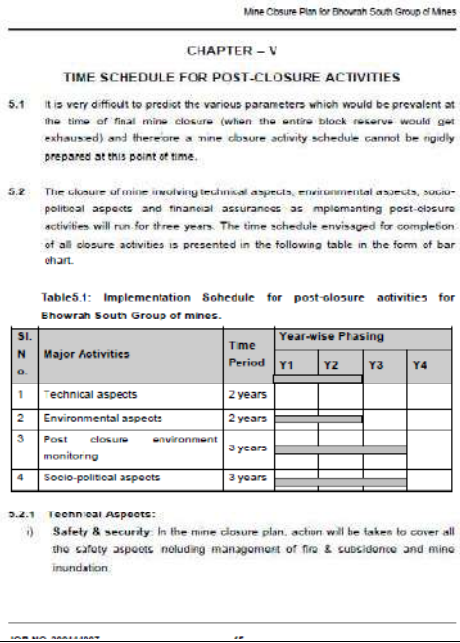
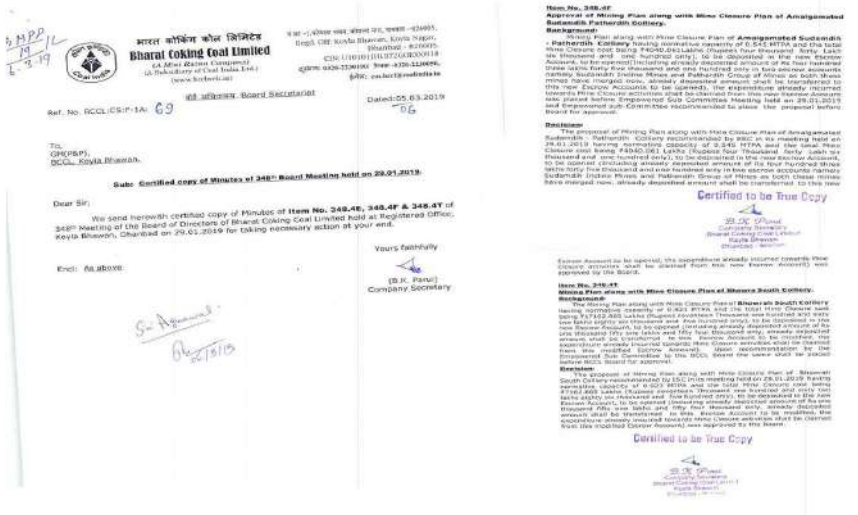
garden for conservation of germplasm and public awareness. Medicinal/ herbal plants have been planted as per BCCL Env. Dept. HQ guidelines.

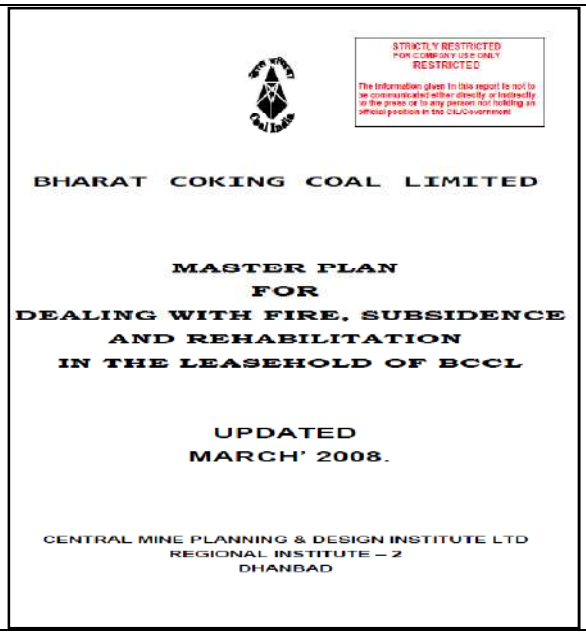
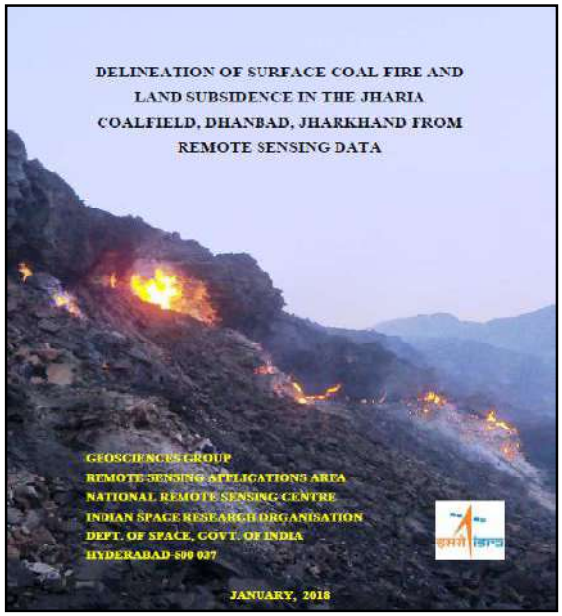
List of medicinal plants present in Kamini Kalyan herbal garden is:

S. No.	Biological Names	Local Names	Hindi Names
1	Aegle marmelos	Bel	Bel
2	Alangium Lamarckii	Dhela	Dhela
3	Albizzia lebbek	Siris	Siris
4	Alstonia scholaris	Chatni	Chatni
5	Azadirachta indica	Neem	Neem
6	Bombax ceiba	Semal	Semal
7	Butea frondosa	Palas	Palas
8	Casearia tomentosa	Beri	Beri
9	Dalbergia sissoo	Shisham	Shisham
10	Emblica officinalis	Amla	Amla
11	Eugenia jamb	Jamun	Jamun
12	Arotocarpus integrifolia	Kathal	Kathal
13	Ficus religiosa	Pipal	Pipal
14	Gmelina arborea	Gamhar	Gamhar
15	Mangifera indica	Mango	Mango
16	Pongamia glabra	Karanj	Karanj
17	Tectona grandis	Sagwan/Teak	Sagwan/Teak
18	Terminalia arjuna	Arjun	Arjun
19	Terminalia belerica	Bahera	Bahera
20	Dendro calamus strictus	Bans/Bamboo	Bans/Bamboo
21	Spondias mangifera	Amra	Amra
22	Saraca asoca	ashok	ashok
23	Cocos nucifera	Nariyal	Nariyal
24	Annona reticulata	Sarifaa	Sarifaa
25	Psidium guajava	amrud	amrud
26	Citrus limon	Nimboo	Nimboo
27	Ficus racemosa	Gular	Gular
28	Eucalyptus globulus	safeda	safeda
29	Neolamarckia cadamba	Kadamba	Kadamba
30	Alstonia scholaris	Chatri	Chatri
31	Araucaria heterophylla	Christmas tree	Christmas tree

List of medicinal herbs and shurbs present at Kamini Kalyan Garden

S. No.	Biological Names	Local Names	Hindi Names
1	*Ocimum tenuiflorum*	Tulsi	Tulsi
2	*Catharanthus roseus*	Sadabahar	Sadabahar
3	*Aloe vera*	Aloe vera	Aloe vera
4	*Jatropha curcas*	Ratanjot	Ratanjot
5	*Murraya koenigii*	Kari patta	Kari patta
6	*Sansevieria trifasciata*	Nagdaman	Nagdaman
7	*Euphorbia tithymaloides*	Nagdon	Nagdon
8	*Allium bisceptrum*	Janglee Pyaaj	Janglee Pyaaj

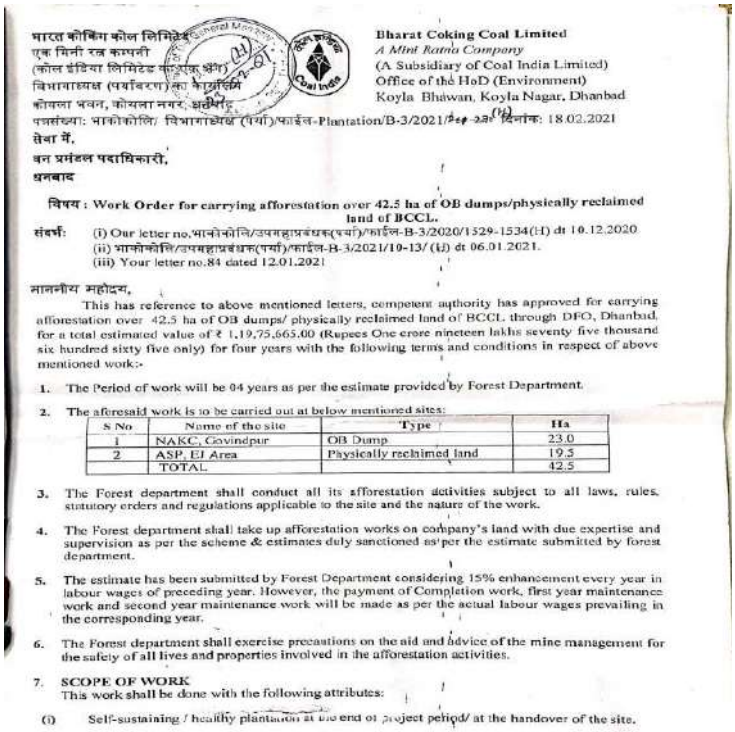
XII.	A time schedule for filling of existing and abandoned quarries be done.	Existing & abandoned quarries are being filled as per approved progressive mine closure plan of the colliery. Mining Plan and Mine Closure Plan of Amalgamated Sudamdih Patherdih and Bhowra (South) mines has been approved in 348th BCCL Board meeting dated 29.01.2019. Time schedule as per approved mine closure plan is attached as Annexure – III.  Mine Closure Plan for Bhowrah South Group of Mines CHAPTER – V TIME SCHEDULE FOR POST-CLOSURE ACTIVITIES 5.1 It is very difficult to predict the various parameters which would be prevalent at the time of final mine closure (when the entire block reserve would get exhausted) and therefore a mine closure activity schedule cannot be rigidly prepared at this point of time. 5.2 The closure of mine involving technical aspects, environmental aspects, socio-political aspects and financial assurances as implementing post-closure activities will run for three years. The time schedule envisaged for completion of all closure activities is presented in the following table in the form of bar chart. Table5.1: Implementation Schedule for post-closure activities for Bhowrah South Group of mines. Sl. No. / Major Activities / Time Period / Year-wise Phasing (Y1, Y2, Y3, Y4) 1 Technical aspects 2 years 2 Environmental aspects 2 years 3 Post closure environment monitoring 3 years 4 Socio-political aspects 3 years 5.2.1 Technical Aspects: i) Safety & security: In the mine closure plan, action will be takes to cover all the safety aspects neluding management of fire & subsidence and mine inundation.
XIII.	Of the total water bodies area of 286.54 ha in the post mining land use, consist of 243.97 ha of natural water bodies like Damodar river and no. of water ponds. Only 42.57 ha of mine voids were proposed to be converted to artificial water bodies for catering to domestic use of local villagers. Keeping in view the Damodar river in the vicinity, there should be no additional water bodies are created from mine.	This is post mining closure activities and will be done as per approved mining plan & mine closure plan. Mining Plan and Mine Closure Plan of Amalgamated Sudamdih Patherdih and Bhowra (South) mines has been approved in 348th BCCL Board meeting dated 29.01.2019.  भारत कोकिंग कोल लिमिटेड Bharat Coking Coal Limited (A Mini Ratna Company) (A Subsidiary of Coal India Ltd.) Ref. No. BCCL/CSIP-1A/ 69 Dated: 05.03.2019 To, GM(P&P), BCCL, Koyla Bhawan. Sub: Certified copy of Minutes of 348th Board Meeting held on 29.01.2019. Dear Sir, We send herewith certified copy of Minutes of Item No. 348.4E, 348.4F & 348.4T of 348th Meeting of the Board of Directors of Bharat Coking Coal Limited held at Registered Office, Koyla Bhawan, Dhanbad on 29.01.2019 for taking necessary action at your end. Yours faithfully (B.K. Parui) Company Secretary Encl: As above Certified to be True Copy Certified to be True Copy
XIV.	The measure identified in the environmental plan for cluster X groups of mine and the conditions given in this environmental clearance letter shall be dovetailed to the implementation of the	Master plan/Jharia Action Plan is dovetailed with environmental clearance conditions. Jharia Master Plan is attached as Annexure–IV.

	Jharia action plan.	
XV.	As there is no fire in cluster X but the measure should be adopted by proponent to control the spread of neighboring fire to the cluster X. The proponent shall prepare time series maps of the Jharia Coalfields through NRSA to monitor and prevent fire problems in the Jharia Coalfield by isothermal mapping/ imaging and monitoring temperatures of the coal seams (whether they are close to spontaneous ignition temperatures) and based on which, areas with potential fire problems shall be identified. Measures to prevent ingress of air (ventilation) in such areas, to prevent restart fresh/ spread fires in other areas including in mines of cluster XIV shall be undertaken.	The Work Order for "Delineation of Surface Fire and associated land subsidence in Jharia Coal Field using satellite based remote sensing techniques" has been awarded to NRSC under the MoU signed with NRSC. NRSC has submitted the final report, in which Coal Mine fire map has been prepared based on the Satellite data of Landsat-8 and attached as Annexure V.  Measure to prevent ingress of air (ventilation) is being taken as specified in EMP and as per Jharia Master Plan. Further fire patches are under operation to dig out the fiery coal and combustible materials to save the coal from burning and to stop further spread of the fire. Once the fiery coal is dug-out/excavated there will be no more chance of re-starting of fresh/ spreading of fire into other areas.
XVI.	Underground mining should be taken up after completion of reclamation of Opencast	All OC Mines are in developing stage and Mining is being done as per the Coal Mines Regulation (CMR) Act 1957.

<table>
<tr><td></td><td>mine area after 2 years.</td><td></td></tr>
<tr><td>XVII.</td><td>No mining shall be undertaken where underground fires continue. Measure shall be taken to prevent/check such fire including in old OB dump.</td><td>It is being complied.
Action is being taken to control, mine fires including old OB dump areas as specified in Jharia Master Plan and the mining is being done as per the Coal Mines Regulation (CMR) Act.</td></tr>
<tr><td>XVIII.</td><td>A part of cluster X is under River Damodar. It was clarified that although the mine is underground, there is no coal underneath River Damodar, which would be mined. The Committee desired that the data of bore wells near River Damodar require to be monitored for permeability and seepage of water of River Damodar.</td><td>CMPDI has prepared a report for design location and construction of 23 nos. of Piezometer covering all the 17 clusters of BCCL. The estimate is being revised in association with CMPDI for re-tendering. Re-tendering and procurement for establishing and construction of a network of piezometric well system is under process.</td></tr>
<tr><td>XIX.</td><td>The rejects of washeries in Cluster –X should be send to FBC based plant.</td><td>At present the Rejects generation is very low in operation of Sudamdih Washery as maximum portion is generated as middling. Rejects once significant in quantity will be checked for grade and auctioned to the users.</td></tr>
<tr><td>XX.</td><td>There shall be no external OB dumps. OB produce from the whole cluster will be 29.01 Mm3. OB from One Patch OCP mine shall be backfilled. At the end of the mining there shall be no void and the entire mined out area shall be re-vegetated. Areas where opencast mining was carried out and completed shall be reclaimed immediately thereafter.</td><td>Action is being taken as specified in EMP. O.B. removed from mine/ collieries are back filled in old/ abandoned quarry/voids. At the end of the mining, there shall not be voids and area will be re-vegetated and reclaimed with the proper eco-restoration techniques suggested by the experts available in BCCL and in external agencies i.e. FRI Dehradun, CEMDE Delhi.
Year wise data of OB removal & excavated area is given below:
UNIT WISE OB REMOVED (IN M3) OF CLUSTER X
<table>
<tr><th>Mine Name</th><th>2013-14</th><th>2014-15</th><th>2015-16</th><th>2016-17</th><th>2017-18</th><th>2018-19</th><th>2019-20</th><th>2020-21</th></tr>
<tr><td>Bhowra North</td><td>502538</td><td>1172570</td><td>321554</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Bhowra South</td><td>581650</td><td>318400</td><td>6222675</td><td>4491830</td><td>3488184</td><td>2205725</td><td>3854237</td><td>3993684</td></tr>
<tr><td>ASP Colliery</td><td>260443</td><td>77444</td><td>1364138</td><td>1535176</td><td>1126630</td><td>923629</td><td>585637</td><td>2170162</td></tr>
<tr><td>Sudamdih Shaft</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Amlabad UG</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Total (Cluster X)</td><td>1344631</td><td>1568414</td><td>7908367</td><td>6027006</td><td>4614814</td><td>3129354</td><td>4439875</td><td>6163847</td></tr>
</table>
UNIT WISE EXCAVATED AREA (IN Ha) OF CLUSTER X
<table>
<tr><th>Mine Name</th><th>2013-14</th><th>2014-15</th><th>2015-16</th><th>2016-17</th><th>2017-18</th><th>2018-19</th><th>2019-20</th><th>2020-21</th></tr>
<tr><td>Bhowra North – Mix</td><td>12.50</td><td>10.42</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0</td><td>0</td></tr>
<tr><td>Bhowra South – Mix</td><td colspan="4">29.97*</td><td colspan="2">16.44*</td><td></td></tr>
<tr><td>ASP Colliery</td><td>0.96</td><td>0.60</td><td>0.58</td><td>0.51</td><td>0.52</td><td>4.63</td><td>9.04</td><td>20.42</td></tr>
<tr><td>Sudamdih Shaft</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Amlabad UG</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
</table>
* Data showing cumulative excavated area of Bhowra south (mix) from 2013-14 to 2017-18 & 2018-19 to 2020-21</td></tr>
</table>

<table>
<tr><td>XXI.</td><td>A detailed calendar plan of production with plan for
OB dumping and backfilling (for OC mines) and reclamation and final mine closure plan for each mine of cluster- X shall be drawn up and implemented.</td><td>Calendar year plan of coal production as per EMP / revised EC is given below:
<table>
<tr><th>Name of mine</th><th></th><th>Peak (MTY)</th><th>18-19</th><th>19-20</th><th>20-21</th><th>21-22</th><th>22-23</th></tr>
<tr><td rowspan="2">Bhowrah North</td><td>OC</td><td>0.546</td><td>0.3</td><td>0.3</td><td>0.3</td><td>0.3</td><td>0.35</td></tr>
<tr><td>UG</td><td>0.143</td><td>0.03</td><td>0.03</td><td>0.03</td><td>0.03</td><td>0.03</td></tr>
<tr><td rowspan="2">Bhowrah South</td><td>UG</td><td>0.377</td><td>0.03</td><td>0.03</td><td>0.03</td><td>0.03</td><td>0.03</td></tr>
<tr><td>OC</td><td>1.2</td><td>0.8</td><td>0.93</td><td>0.93</td><td>0.93</td><td>1.17</td></tr>
<tr><td>Amalgamated Sudamdih Patherdih Mine</td><td>OC</td><td>0.709</td><td>0.6</td><td>0.6</td><td>0.6</td><td>0.7</td><td>0.709</td></tr>
<tr><td>Sudamdih Shaft (UG)</td><td>UG</td><td>0.24</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Amlabad (UG) (Closed)</td><td>UG</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Total</td><td></td><td>2.289</td><td>1.73</td><td>1.86</td><td>1.86</td><td>1.96</td><td>2.289</td></tr>
<tr><td colspan="3">Sanctioned Peak Capacity as per Existing EC</td><td>2.289</td><td>2.289</td><td>2.289</td><td>2.289</td><td>2.289</td></tr>
</table>
Mine closure plan as per the guidelines of Ministry of Coal have been prepared by Central Mine Planning and Design Institute (CMPDI) and it is being implemented.</td></tr>
<tr><td>XXII.</td><td>The void in 5 ha area shall be converted into a water reservoir of a maximum depth of 15-20 m in post mining stage and shall be gently sloped and the upper benches of the reservoir shall be recognized with plantation and the periphery of the reservoir fenced. The abandoned pits and voids should be backfilled with OB and biologically reclaimed with plantation and or may be used for pisciculture</td><td>This is post mine closure activity.
A part of the void will be converted into the water body as specified in EMP at post mining stage and plantation, sitting arrangement etc. will be provided around the periphery of the reservoir & will be developed as water recreational park.</td></tr>
<tr><td>XXIII.</td><td>Mining shall be carried out as per statuette from the streams/nalas flowing within the lease and maintaining a safe distance from the Nalas flowing along the lease boundary. A safety barrier of a minimum 60 m width shall be maintained along the nalas/water bodies. The small water bodies in OC shall be protected to the extent feasible and the embankment proposed along water body shall be strengthened with stone pitching.</td><td>Mining operation is being done as per Coal Mines Regulation Act.
Action for construction of embankment has been taken as specified in EMP. Every year monsoon preparation programme is carried out by colliery / mines before the onset of monsoon for protection of mines from rain water flow and to maintain a safe distance from nalas flowing or small water bodies protection in the lease boundary.</td></tr>
<tr><td>XXIV.</td><td>Active OB dumps near water</td><td>No OB is being dumped near water bodies. The OB dumps created</td></tr>
</table>

	bodies and rivers should be rehandled for backfilling abandoned mine voids. However, those which have been biologically reclaimed need not be disturbed.	earlier already stabilized & further action has been taken for their eco-restoration work as per Road Map prepared by FRI, Dehradun.
XXV.	Thick green belt shall be developed along undisturbed areas, mine boundary and in mine reclamation. During post mining stage, a total of 47.63 ha area would be reclaimed by planting native species in consultation with the local DFO/Agriculture Department/institution with the relevant discipline. The density of the trees shall be around 2500 plants per ha.	Eco-restoration sites covering an area of 30.56 Ha have also been developed in consultations with institutes like FRI which was duly visited and appreciated during their visit.   In 2020-21 year, approx. 7280 plants were planted under different programs like Env. Day Celebration, Jal Shakti Abhiyan, Independence day Celebration, Eco-restoration sites, Swachh Bharat Abhiyan etc.     Green belt is developed at available places and after the remaining area is decoaled, plantation will speed up in a time bound manner as per the EC conditions. Details of plantation in EJ Area is shown in point no. III.
XXVI.	The road should be provided with avenue plantation on both side as trees act as sink of carbon and other pollutant.	Avenue plantation will be made along the permanent road nd near permanent structures to minimize the pollution. Approx 2500 plants have been planted as Avenue Plantation from Panchait dam to Ambona Jamkudur and in BIT Campus by DFO, Dhanbad. In 2020-21, approx 2380 plants were planted in different

		colonies,schools, office premises and free saplings were distributed to local residents for awareness towards environment and plantation.     DFO was requested through a letter regarding need based survey for plantation (Block plantation / gabion/ avenue plantation) under the leasehold area of Cluster X. A Team from DFO, Dhanbad has visited the Cluster X and identified the area of 22.10 Ha. (19.5 Ha + 2.6 Ha) near Damodar river in joint field visit and work orders were issued for plantation under Riverside plantation scheme near Damodar River. Copy of the work order is enclosed Annexure – VII. 
XXVII.	Specific mitigative measures identified for the Jharia Coalfields in the Environmental Action Plan	A meeting was called by Chairman, Jharkhand Pollution control Board on 11.06.2019 and JSPCB directed to prepare an Environmental Action Plan which will be implemented by BCCL. Action Plan has been prepared in consultation with Jharkhand Pollution Control Board for entire BCCL and approved by Competent Authority of BCCL. It is

भारत कोकिंग कोल लिमिटेड
एक मिनी रत्न कम्पनी
(कोल इंडिया लिमिटेड का अनुषंग)
विभागाध्यक्ष (पर्यावरण) का कार्यालय
कोयला भवन, कोयला नगर, धनबाद

Bharat Coking Coal Limited
A Mini Ratna Company
(A Subsidiary of Coal India Limited)
Office of the HoD (Environment)
Koyla Bhawan, Koyla Nagar, Dhanbad

पत्रसंख्या: भाकोकोलि/ विभागाध्यक्ष (पर्या)/फाईल-Plantation/B-3/2021/ दिनांक: 18.02.2021

सेवा में,
वन प्रमंडल पदाधिकारी,
धनबाद

विषय : Work Order for carrying afforestation over 42.5 ha of OB dumps/physically reclaimed land of BCCL.

संदर्भ: (i) Our letter no.भाकोकोलि/उपमहाप्रबंधक(पर्या)/फाईल-B-3/2020/1529-1534(H) dt 10.12.2020
(ii) भाकोकोलि/उपमहाप्रबंधक(पर्या)/फाईल-B-3/2021/10-13/(H) dt 06.01.2021.
(iii) Your letter no.84 dated 12.01.2021

माननीय महोदय,

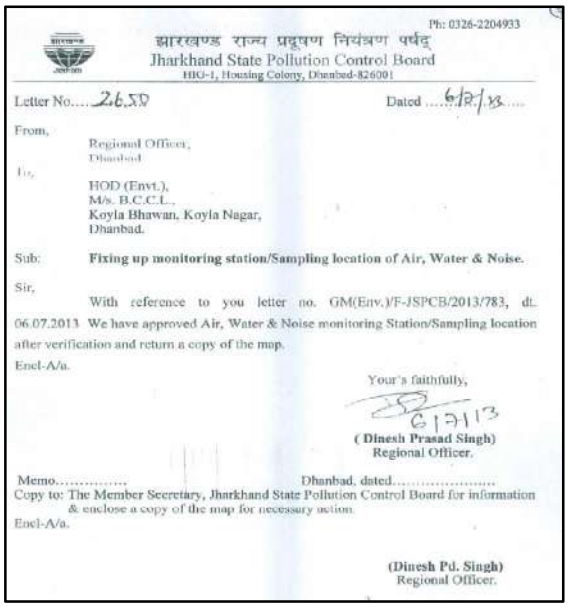
This has reference to above mentioned letters, competent authority has approved for carrying afforestation over 42.5 ha of OB dumps/ physically reclaimed land of BCCL through DFO, Dhanbad, for a total estimated value of ₹ 1,19,75,665.00 (Rupees One crore nineteen lakhs seventy five thousand six hundred sixty five only) for four years with the following terms and conditions in respect of above mentioned work:-

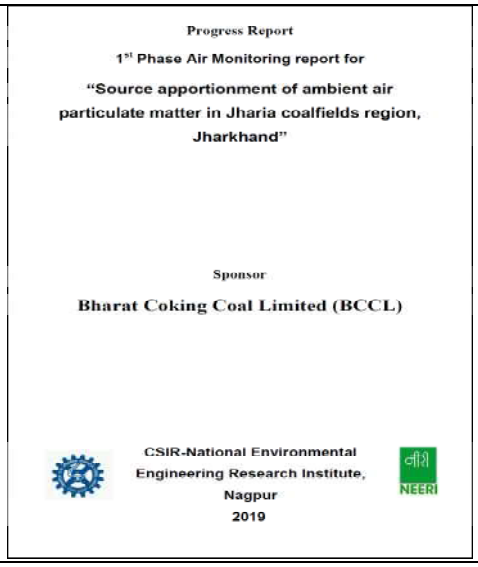
1. The Period of work will be 04 years as per the estimate provided by Forest Department.
2. The aforesaid work is to be carried out at below mentioned sites:

S No	Name of the site	Type	Ha
1	NAKC, Govindpur	OB Dump	23.0
2	ASP, EJ Area	Paysically reclaimed land	19.5
	TOTAL		42.5

3. The Forest department shall conduct all its afforestation activities subject to all laws, rules, statutory orders and regulations applicable to the site and the nature of the work.
4. The Forest department shall take up afforestation works on company's land with due expertise and supervision as per the scheme & estimates duly sanctioned as per the estimate submitted by forest department.
5. The estimate has been submitted by Forest Department considering 15% enhancement every year in labour wages of preceding year. However, the payment of Completion work, first year maintenance work and second year maintenance work will be made as per the actual labour wages prevailing in the corresponding year.
6. The Forest department shall exercise precautions on the aid and advice of the mine management for the safety of all lives and properties involved in the afforestation activities.
7. SCOPE OF WORK
This work shall be done with the following attributes:

(i) Self-sustaining / healthy plantation at the end of project period/ at the handover of the site.

	prepared for Dhanbad as a critically polluted area and relevant for Cluster –XIV shall be implemented.	being implemented comprehensively for all the mines of BCCL. Some of the salient steps of this action plan are as under: 1. Covered Transportation 2. Permanent Pucca Transportation Road 3. Fixed & Overhead Sprinklers and Mobile Sprinklers 4. AAQ & CQAAQMS Monitoring 5. Online PM10 Analyzer 6. Source Apportionment Study.
XXVIII.	The locations of monitoring stations in the Jharia Coalfields should be finalized in consultation with the Jharkhand State Pollution Control Board. The Committee stated that smoke/dust emission vary from source to source (fuel wood, coal, fly ash from TPPs, silica from natural dust, etc) and a Source Apportionment Study should be got carried out for the entire Jharia Coalfields. Mineralogical composition study should be undertaken on the composition of the suspended particulate matter (PM10 and PM2.5) in Jharia Coalfields and also quantified. These studies would help ascertain source and extent of the air pollution, based on which appropriate mitigative measures could be taken.	The locations of monitoring stations had been finalized in consultation with JSPCB.  Ph: 0326-2204933 झारखण्ड राज्य प्रदूषण नियंत्रण पर्षद Jharkhand State Pollution Control Board HIG-1, Housing Colony, Dhanbad-826001 Letter No.....26.39 Dated .....6/7/13..... From, Regional Officer, Dhanbad To, HOD (Envt.), M/s. B.C.C.L., Koyla Bhawan, Koyla Nagar, Dhanbad. Sub: **Fixing up monitoring station/Sampling location of Air, Water & Noise.** Sir, With reference to you letter no. GM(Env.)/F-JSPCB/2013/783, dt. 06.07.2013 We have approved Air, Water & Noise monitoring Station/Sampling location after verification and return a copy of the map. Encl-A/a. Your's faithfully, 6/7/13 **(Dinesh Prasad Singh)** **Regional Officer.** Memo..... Dhanbad, dated..... Copy to: The Member Secretary, Jharkhand State Pollution Control Board for information & enclose a copy of the map for necessary action. Encl-A/a. **(Dinesh Pd. Singh)** Regional Officer. The monitoring work of ambient environment quality is being carried out by Central Mine Planning & Design Institute Limited (CMPDIL) which is having CSIR laboratory recognized under the EP Rules. Work Order for the Project "Source Apportionment of ambient air particulate matter in Jharia coalfields region, Jharkhand" has been awarded to CSIR-National Environmental Engineering Research Institute (NEERI), Nagpur on 12.05.2018 and work has been started in September, 2018. Field data collection has been completed and draft report has been prepared by NEERI and final report will be submitted soon to BCCL. Copy of the progress report is enclosed as Annexure VIIII.



Progress Report

1st Phase Air Monitoring report for

"Source apportionment of ambient air particulate matter in Jharia coalfields region, Jharkhand"

Sponsor

Bharat Coking Coal Limited (BCCL)

CSIR-National Environmental Engineering Research Institute, Nagpur

2019

XXIX.	No groundwater shall be used for the mining activities. Additional water required, if any, shall be met from mine water or by recycling/reuse of the water from the existing activities and from rainwater harvesting measures. The project authorities shall meet water requirement of nearby village(s) in case the village wells go dry to dewatering of mine.	No groundwater is drawn for mining activities however cutting of aquifer is integral part of mining. Mine water is being used for the industrial purpose like water sprinkling to suppress dust generation, etc. Further Mine water is also utilized for the community purposes. Following action has been taken by the company: • Installation of Pressure filters for utilization of mine water. In cluster X, there is three nos. of Rapid Gravity Pressure Filter plant of total 1.72 MGD capacity, which is used for supply of water in nearby colonies, houses, quarters.

Detail of Water Treatment Plant/ Filter Plant in E.J. Area

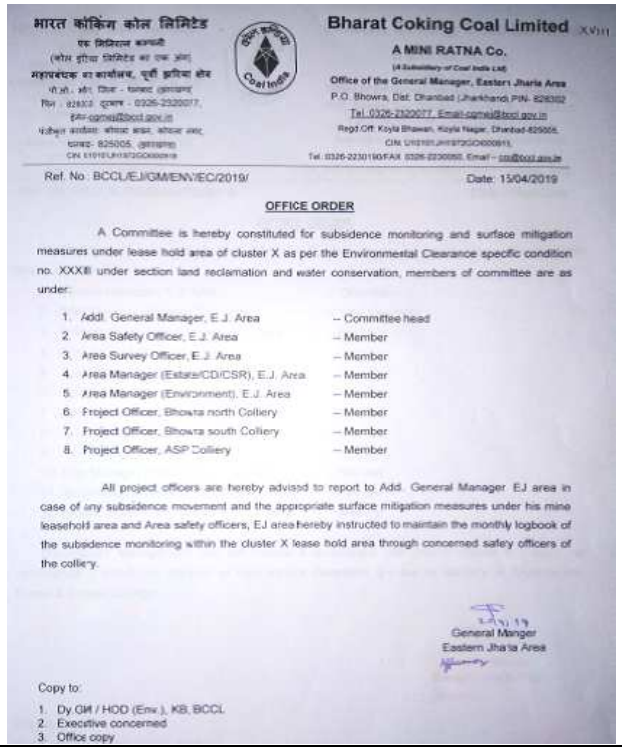
S. No.	Location of source of water	Treatment method	Capacity (MGD)	In use (MGD)	Supply of water
1	Sudamdih	Rapid gravity filter	0.8	0.47	Sudamdih colony, Patherdih colony, Patherdih Basti, Patherdih Basti, Supkar Basti, Hattala basti, etc
2	Bhowra	Rapid gravity filter	0.66	0.39	Gaurkhuti, 12 no. basti, 13 no.basti, 35 no. basti; 6 no. dhowra, Manjhi Basti, Gandhi Nagar, 19 no. Basti upar, 19 no. Basti niche, etc.
3	Amlabad	Rapid gravity filter	0.26	0.02	Amlabad colony and nearby basti

Report on Rain water harvesting and artificial recharge system in cluster X prepared by CMPDIL and attached as Annexure – X. Ponds & old quarries are being used for rain water harvesting & artificial recharge system in the area.

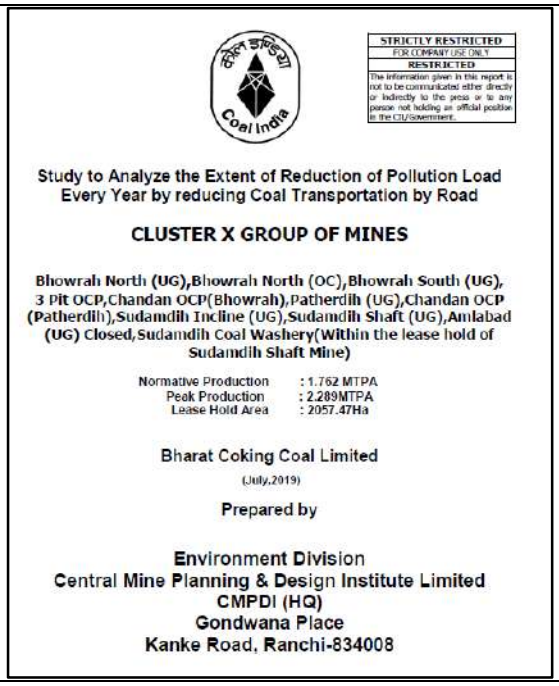
A proposal has been moved for construction of two (2) nos. Rooftop Rain Water Harvesting Structures in EJ Area under "Jal Shakti

		Abhiyan" program.
XXX.	Regular monitoring of groundwater level and quality of the study area shall be carried out by establishing a network of existing wells and construction of new peizometers. The monitoring for quantity shall be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality including Arsenic and Fluoride during the month of May. Data thus collected shall be submitted to the Ministry of Environment & Forest and to the Central Pollution Control Board/SPCB quarterly within one month of monitoring. Rainwater harvesting measures shall be undertaken in case monitoring of water table indicates a declining trend.	Regular monitoring of Ground water quality is being carried out by CMPDIL. The Ground water Level and Quality report for Clusters of mines of BCCL (including Cluster X), have been submitted by CMPDIL & attached as Annexure II. Establishment of new piezometers is under process. CMPDI has prepared a report for design location and construction of 23 Nos of Piezometer covering all the 17 clusters of BCCL. Tender and procurement process for establishing and construction of a network of piezometer well system is under process.
XXXI.	Mine discharge water shall be treated to meet standards prescribed standards before discharge into natural water courses/agriculture. The quality of the water discharged shall be monitored at the outlet points and proper records maintained thereof and uploaded regularly on the company website.	Mine discharge water is being allowed to settle down in the mine sumps before disposal into storage reservoirs. The monitoring of mine water quality parameters is being done by CMPDIL and parameters are well within the prescribed limit provided by CPCB.

		WATER QUALITY MONITORING 3.1 **Location of sampling sites** (Refer Plate No. – II) i) **Mine Discharge of Bhowrah North (MW10)** A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Kashi jore. 3.2 **Methodology of sampling and analysis** Water samples were collected as per standard practice. The effluent samples were collected and analyzed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad. 3.3 **Results & Interpretations** The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits. **WATER QUALITY DATA** *(EFFLUENT WATER- FOUR PARAMETERS)* Name of the Cluster: **Cluster -X** | Month: **MAR. 2021** | Name of the Station: **Mine Discharge of Bhowrah North** | Sl. No. | Parameters | MW10 First Fortnight 15.03.2021 | MW10 Second Fortnight 22.03.2021 | As per MOEF General Standards for schedule VI | | 1 | Total Suspended Solids | 44 | 45 | *100 (Max)* | | 2 | pH | 7.92 | 7.97 | *5.5 - 9.0* | | 3 | Oil & Grease | <2.0 | <2.0 | *10 (Max)* | | 4 | COD | 20 | 28 | *250 (Max)* | All values are expressed in mg/lt. except pH.
XXXII.	ETP shall also be provided for workshop, and CHP, if any. Effluents shall be treated to confirm to prescribe standards in case discharge into the natural water course.	There is no CHP in Cluster X. A proposal has been moved for the installation of Oil & Grease trap system at workshop under EJ Area.
XXXIII.	Regular monitoring of subsidence movement on the surface over and around the working area and impact on natural drainage pattern, water bodies, vegetation, structure, roads, and surroundings shall be continued till movement ceases completely. In case of observation of any high rate of subsidence movement, appropriate effective corrective measures shall be taken to avoid loss of life and material. Cracks shall be effectively plugged with ballast and clayey soil/suitable material.	As per CMR, regular monitoring of subsidence movement on the surface over and around the working area and impact on natural drainage pattern, water bodies, vegetation, structure, roads, and surroundings is done. Currently there is no depillaring operation going on in underground mines of cluster X. A team at area level is constituted for regular monitoring of subsidence.
XXXIV.	Sufficient coal pillars shall be left unextracted around the air shaft (within the	Sufficient coal pillars have been left around air shafts as per the statutes and DGMS guidelines.

	subsidence influence area) to protect from any damage from subsidence, if any.	
XXXV.	High root density tree species shall be selected and planted over areas likely to be affected by subsidence.	A list of high root density Plant species certified by FRI and its plantation in subsidence prone area will be taken-up at the time of depillaring operations. Nursery of high root density is also developed under EJ Area. List of high root density plant species is given below.  **Certificate of high root density plant for controlling subsidence** This is to certify that BCCL has been doing plantation/ecological restoration under the guidelines of Forest Research Institute. The various species selected for the restoration are having a tap root system with branches which serve the purpose. These species have high root density and are already being planted at all the ecorestoration/plantation sites of BCCL. The various species having tap root system are given below. S.No. / Species / Common name 1. *Acacia nilotica* Kikkar 2. *Albizia odoratissima* Kala siris 3. *Bauhinia variegata* Kachnar 4. *Cassia fistula* Amaltas 5. *Ficus benghalensis* Baniyan /bargad 6. *Ficus racemosa* Gular 7. *Ficus religiosa* Pipal 8. *Gmelina arborea* Ghamar 9. *Lagerstroemea parviflora* Jarul 10. *Lannea coromandelica* Zhingan 11. *Madhuca latifolia* Mahua 12. *Mangifera indica* Aam 13. *Morus alba* Shahtoot 14. *Phyllanthus emblica* Aonla 15. *Pithecellobium dulce* Jangal jalebi 16. *Pongamia pinnata* Karanj 17. *Tamarindus indica* Imli 18. *Trema orientalis* Tree 19. *Terminalia arjuna* Arjun 20. *Terminalia bellerica* Bahera 21. *Dalbergia sissoo* Shisham 22. *Syzizium cuminii* Jaman 23. *Azadirachta indica* Neem 24. *Holoptelea integrifolia* Indian elm 25. *Butea monosperma* Palash /dhak Scientist / Scientist Forest Ecology & Climate Change Division Forest Research Institute, Dehradun-24800
XXXVI.	Depression due to subsidence resulting in water accumulating within the low lying areas shall be filled up or drained out by cutting drains.	It shall be complied, where ever applicable. However, a committee has been constituted for subsidence monitoring and surface mitigation measures under lease hold area of cluster X.  भारत कोकिंग कोल लिमिटेड Bharat Coking Coal Limited A MINI RATNA Co. Office of the General Manager, Eastern Jharia Area P.O. Bhowra, Dist. Dhanbad (Jharkhand) PIN- 828302 Ref. No.: BCCL/EJ/GM/ENV/EC/2019/ Date: 15/04/2019 **OFFICE ORDER** A Committee is hereby constituted for subsidence monitoring and surface mitigation measures under lease hold area of cluster X as per the Environmental Clearance specific condition no. XXXII under section land reclamation and water conservation, members of committee are as under: 1. Addl. General Manager, E.J. Area – Committee head 2. Area Safety Officer, E.J. Area – Member 3. Area Survey Officer, E.J. Area – Member 4. Area Manager (Estate/CD/CSR), E.J. Area – Member 5. Area Manager (Environment), E.J. Area – Member 6. Project Officer, Bhowra north Colliery – Member 7. Project Officer, Bhowra south Colliery – Member 8. Project Officer, ASP Colliery – Member All project officers are hereby advised to report to Add. General Manager EJ area in case of any subsidence movement and the appropriate surface mitigation measures under his mine leasehold area and Area safety officers, EJ area hereby instructed to maintain the monthly logbook of the subsidence monitoring within the cluster X lease hold area through concerned safety officers of the colliery. General Manger Eastern Jharia Area Copy to: 1. Dy.GM / HOD (Env.), KB, BCCL 2. Executive concerned 3. Office copy

XXXVII.	Solid barriers shall be left below the roads falling within the blocks to avoid any damage to the roads.	It is being followed. Sufficient barriers are left for saving the surface installation and infra structures as per the CMR guidelines.
XXXVIII.	No depillaring operation shall be carried out below the township/colony.	It is being followed.
XXXIX.	The Transportation Plan for conveyor-cum–rail for Cluster- X should be dovetailed with Jharia Action Plan. Road transportation of coal during Phase–I should be by mechanically covered trucks, which should be introduced at the earliest. The Plan for conveyor-cum–rail for Cluster-XIV should be dovetailed with Jharia Action Plan. The road transpiration of coal during phase–I should be by mechanically covered trucks.	Vehicles engaged in transportation are duly checked at Security Check-Post (CISF Check-Post) where security personnel also ensure proper covering of Trucks. No OEM is providing mechanically covered trucks. A communication in this regard has been made to Coal India Ltd for taking up with OEM. In absence of availability of approved OEM of mechanically covered trucks, BCCL is ensuring trucks are covered with tarpaulin through mandatory clause of covering in transportation contracts. The transport Plan for conveyor-cum-rail for Cluster X is to be implemented in the Phase II of the Jharia Master Plan. At present, Phase -1 is under implementation and after completion of Pre-implementation (1st & 2nd Yr.) and Phase 1 (3rd to 7th year) and Phase 2 (8th to 12th year). The plan shall be prepared after the completion of the above said phases to have conveyor-cum-rail transportation as informed by CMPDIL to whom the said work of preparation of Rail-cum-conveyor plan has been awarded (Annexure XI). During Phase- 1 & 2, covering of trucks by tarpaulin covers is being ensured as can be seen in Picture attached.  
XL.	A study should be initiated to analyze extent of reduction in pollution load every year by reducing road transport.	CMPDI is carrying out the study to analyze extent of reduction in pollution load every year by reducing road transport. Pollution load study report for Cluster X is attached in annexure XII.

<table>
<tr><td></td><td></td><td> 
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The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL/Government.

Study to Analyze the Extent of Reduction of Pollution Load Every Year by reducing Coal Transportation by Road

CLUSTER X GROUP OF MINES

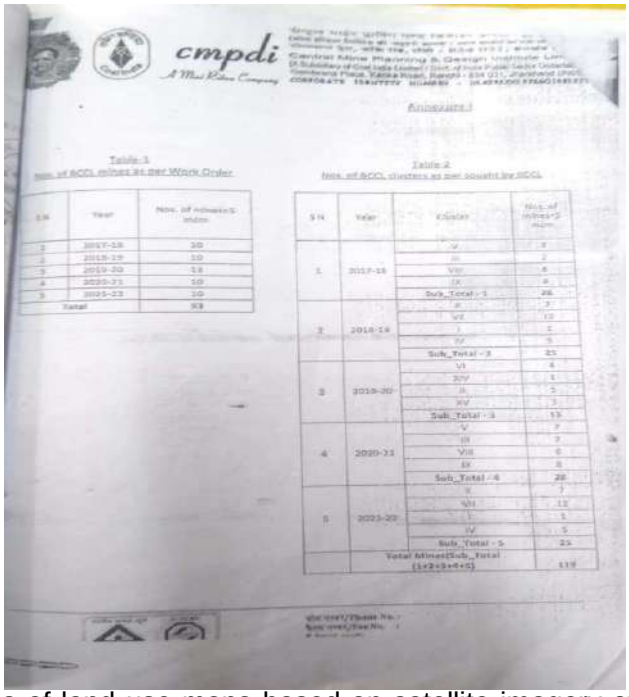
Bhowrah North (UG),Bhowrah North (OC),Bhowrah South (UG), 3 Pit OCP,Chandan OCP(Bhowrah),Patherdih (UG),Chandan OCP (Patherdih),Sudamdih Incline (UG),Sudamdih Shaft (UG),Amlabad (UG) Closed,Sudamdih Coal Washery(Within the lease hold of Sudamdih Shaft Mine)

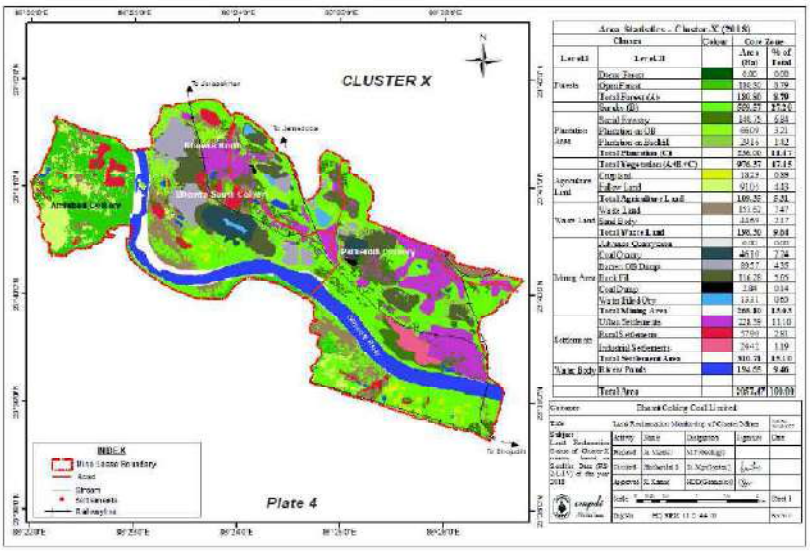
Normative Production : 1.762 MTPA
Peak Production : 2.289MTPA
Lease Hold Area : 2057.47Ha

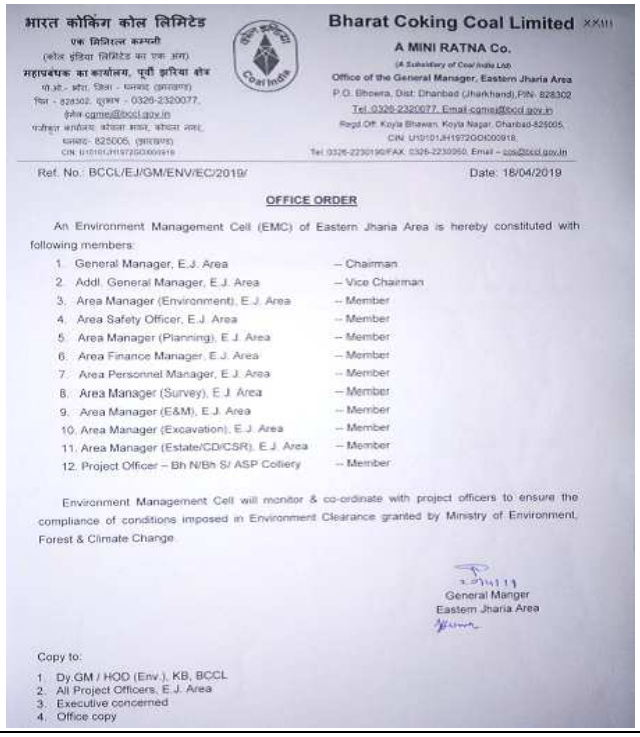
Bharat Coking Coal Limited
(July,2019)

Prepared by

Environment Division
Central Mine Planning & Design Institute Limited
CMPDI (HQ)
Gondwana Place
Kanke Road, Ranchi-834008</td></tr>
<tr><td>XLI.</td><td>R&R of 1670 nos of PAF's involved. They should be rehabilitated at cost of Rs 7087.75 Lakhs as per the approved Jharia Action Plan.</td><td>Implementation of master plan has already been started through Jharkhand Rehabilitation and Development Authority (JRDA), Dhanbad to a well-established Jharia Vihar Township located at Belgoria. The rehabilitation data for EJ area is as follows:
<table>
<tr><td colspan="2">No. of Households</td><td>Shifted</td></tr>
<tr><td>Non LTH</td><td>LTH</td><td>Non LTH + LTH</td></tr>
<tr><td>3125</td><td>528</td><td>81</td></tr>
</table></td></tr>
<tr><td>XLII.</td><td>Details of transportation, CSR, R&R and implementation of environmental action plan for each of the 17 clusters should be brought out in a booklet for and submitted to Ministry.</td><td>A separate booklet comprising of CSR activities has been prepared and attached as annexure XIII (A) – Detail of CSR activity of Cluster X.</td></tr>
<tr><td>XLIII.</td><td>A detailed CSR Action Plan shall be prepared for Cluster X group of mines. Specific activities shall be identified for CSR of Rs 20.25/annum @ of Rs 5/ton of coal production. As recurring expenditure. The 47.63 ha of area within Cluster XIV ML existing as waste land and not being acquired shall be put to productive use under CSR and developed with fruit bearing and other useful species for the local</td><td>It being complied. CSR action plan of BCCL is centralized and BCCL is implementing CSR Activities. CSR action plan of BCCL including CSR budget and expenditure is enclosed as Annexure XIII (B).
A separate CSR committee has been formed at Area level for cluster-X, who will look after the works being executed under CSR. A booklet comprising of CSR activities conducted by E.J. area has been prepared and attached as annexure XIII (A) – Detail of CSR activity of Cluster X.</td></tr>
</table>

	communities. Third party evaluation shall be got carried out regularly for the proper implementation of activities undertaken in the project area under CSR. Issue raised in the Public Hearing shall also be integrated with activities being taken up under CSR. The details of CSR undertaken along with budgetary provisions for the village-wise various activities and expenditure thereon shall be uploaded on the company website every year. The company must give priority to capacity building both within the company and to the local youth, who are motivated to carry out the work in future.	**CSR ACTIVITY PLAN** **OF** **CLUSTER – X** **AS PER** EC CONDITION (SPECIFIC CONDITION-XLII): Details of transportation, CSR, R&R and implementation of environmental action plan for each of the 17 clusters should be brought out in a booklet for and submitted to Ministry. **MAY, 2017**
XLIV.	For monitoring land use pattern and for post mining land use, a time series of land use maps, based on satellite imagery (on a scale of 1: 5000) of the core zone and buffer zone, from the start of the project until end of mine life shall be prepared once in 3 years (for any one particular season which is consistent in the time series), and the report submitted to MOEF and its Regional office at Bhubaneswar.	Presently a time series map of vegetation cover in the Jharia Coal Field has been carried out through CMPDI, Ranchi using satellite imagery for every 3 years.  Time series of land use maps based on satellite imagery of the core zone and buffer zone is attached as Annexure – XIV. Details of vegetation cover under Cluster X is given below, As per the time series map of vegetation cover report:

		Land use / Reclamation status | Area (in Ha) | % a.) Plantation on OB dump | 66.09 | 3.21 b.) Plantation on Backfill area (Biological Reclamation) | 29.16 | 1.42 c.) Social Forestry / Avenue Plantation | 140.75 | 6.84 d.) Shrubs | 559.57 | 27.2 e.) Other Plantation area | 180.8 | 8.79 **Total area under Vegetation** | **976.37** | **47.45** CMPDI 
XLV.	A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests five year before mine closure for approval. Habitat Restoration Plan of the mine area shall be carried out using a mix of native species found in the original ecosystem, which were conserved in-situ and ex-situ in an identified area within the lease for reintroduction in the mine during mine reclamation and at the post mining stage for habitat restoration.	Mining Plan and Mine Closure Plan of Amalgamated Sudamdih Patherdih and Bhowra (South) mines has been approved in 348th BCCL Board meeting dated 29.01.2019. Approval copy is attached in Specific condition no. XIII. Mine Closure Cost of different mine have been deposited every year in the Escrow account and Cluster X of BCCL had deposited the amount of Rs. 3656.16 lakh (including interest) to the escrow account till 31st March 2021. Details of the fund deposited till 31.03.2021 in the escrow account is given below: **Statement showing Mine Closure Cost (Escrow Account) Details** S. No. | Name of Mine | Escrow account | Amount deposited in Escrow account till 31st March 2021 (in Rs. Lakh) | | Total amount in Escrow Fund | | | Deposited in Escrow account from2013-14 to 2020-21 | Interest incurred from 2013-14 to 2020-21 | Principal & Interest upto 31.03.2021 1 | Bhowra (N) Grp of Mines (UG+OC) | 150100008868 | 532.28 | 218.37 | 750.66 2 | Bhowra (S) Grp of Mines (UG+OC) | 150100008830 | 1406.74 | 577.74 | 1984.48 3 | Sudamdih Incline Mine | 150100008868 | 93.74 | 52.66 | 146.4 4 | Patherdih Grp of Mines | 150100008872 | 389.22 | 136 | 525.22 5 | Amalgamated Sudamdih-Paherdih Colliery | 150100011524 | 63.68 | 0.86 | 64.55 6 | Sudamidh Shaft Mine | 150100011673 | 174.22 | 10.63 | 184.85 **Total Eastern Jharia Area (Cluster X)** | | | **2659.88** | **996.26** | **3656.16**
XLVI.	A separate environmental management cell with	A full-fledged Environment Department, headed by a HoD (Environment) along with a suitable qualified multidisciplinary team of

	suitable qualified personnel shall be set up under the control of a Senior Executive, who will report directly to the Head of the company for implementing environment policy and socioeconomic issues and the capacity building required in this regard.	executives which includes Environment, Mining, Excavation, Civil executives and technicians has been established in Headquarters. They are also trained in ecological restoration, sustainable development, rainwater harvesting methods etc. The team is multidisciplinary and very much motivated under the guidance of company's Director (Technical) and CMD. Further capacity building at both corporate and operating level is being done. At the project level, two Executives in each area have been appointed as Environment Officer and are also entrusted with the responsibility of compliance and observance of the environmental acts/ laws including environment protection measures. The activities are monitored on regular basis at Area and at Head quarter levels. GM (Environment) at head quarter level, co-ordinates with all the Areas and reports to the Director (Technical) and in turn he reports to the CMD of the company. Environment Management Cell at area level has been constituted for the management of Environment and monitoring of compliance of EC conditions. 
XLVII.	Implementation of final mine closure plan for Cluster X, subject to obtaining prior approval of the DGMS in regard to mine safety issues	Final Mine Closure Plan has been prepared for each Mine in this cluster. Before implementation of final mine closure plan, prior permission from DGMS has been taken in regard to mine safety issues. Safety Management Plan (SMP) for each colliery has been prepared as per Coal Mines Regulation Act for the Safety of the mine and mining operations.

भारत कोकिंग कोल लिमिटेड
एक मिनिरत्न कम्पनी
(कोल इंडिया लिमिटेड का एक अंग)
महाप्रबंधक का कार्यालय, पूर्वी झरिया क्षेत्र

Bharat Coking Coal Limited
A MINI RATNA Co.
(A Subsidiary of Coal India Ltd)
Office of the General Manager, Eastern Jharia Area
P.O. Bhowra, Dist: Dhanbad (Jharkhand), PIN- 828302
Tel: 0326-2320077, Email-cgmej@bccl.gov.in
Regd Off: Koyla Bhawan, Koyla Nagar, Dhanbad-826005,
CIN: U10101JH1972GOI000918,
Tel: 0326-2230190/FAX: 0326-2230060, Email – ceo@bccl.gov.in

Ref. No.: BCCL/EJ/GM/ENV/EC/2019/ Date: 18/04/2019

OFFICE ORDER

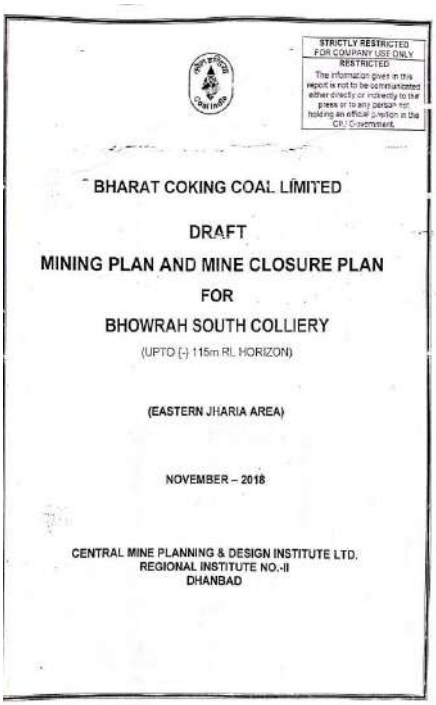
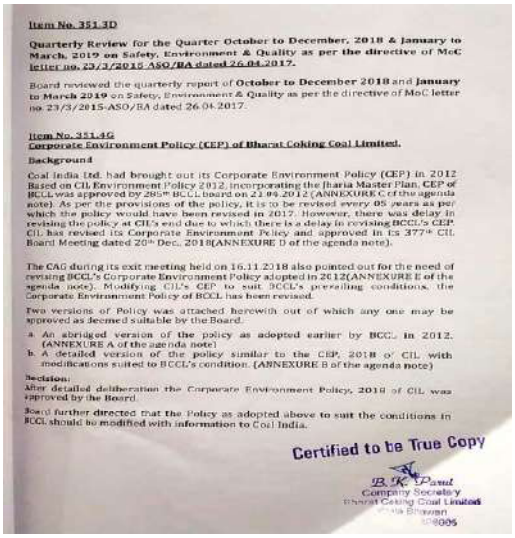
An Environment Management Cell (EMC) of Eastern Jharia Area is hereby constituted with following members:

1.	General Manager, E.J. Area	– Chairman
2.	Addl. General Manager, E.J. Area	– Vice Chairman
3.	Area Manager (Environment), E.J. Area	– Member
4.	Area Safety Officer, E.J. Area	– Member
5.	Area Manager (Planning), E.J. Area	– Member
6.	Area Finance Manager, E.J. Area	– Member
7.	Area Personnel Manager, E.J. Area	– Member
8.	Area Manager (Survey), E.J. Area	– Member
9.	Area Manager (E&M), E.J. Area	– Member
10.	Area Manager (Excavation), E.J. Area	– Member
11.	Area Manager (Estate/CD/CSR), E.J. Area	– Member
12.	Project Officer – Bh N/Bh S/ ASP Colliery	– Member

Environment Management Cell will monitor & co-ordinate with project officers to ensure the compliance of conditions imposed in Environment Clearance granted by Ministry of Environment, Forest & Climate Change.

General Manger
Eastern Jharia Area

Copy to:
1. Dy.GM / HOD (Env.), KB, BCCL
2. All Project Officers, E.J. Area
3. Executive concerned
4. Office copy

		 
XLVIII.	Corporate Environment Responsibility: A. The Company shall have a well laid down Environment Policy approved by the Board of Directors. B. The Environment Policy shall prescribe for standard operating process/ procedures to bring into focus any infringements/ deviation/ violation of the environmental or forest norms/conditions. C. The hierarchical system or Administrative Order of the company to deal with environmental issues and for ensuring compliance with the environmental clearance conditions shall be furnished. D. To have proper checks and balances, the company shall have a well laid down	A revised Corporate Environment Policy 351.4(G) has already been laid down and approved in 377th Board meeting by the Board of Directors. This is also posted on BCCL website link- http://www.bcclweb.in/environment/CEP_04.11.2019.pdf Complied. And attached as Annexure - XVI  Item No. 351.3D Quarterly Review for the Quarter October to December, 2018 & January to March, 2019 on Safety, Environment & Quality as per the directive of MoC letter no. 23/3/2015 ASO/BA dated 26.04.2017. Board reviewed the quarterly report of October to December 2018 and January to March 2019 on Safety, Environment & Quality as per the directive of MoC letter no 23/3/2015-ASO/BA dated 26-04-2017. Item No. 351.4G Corporate Environment Policy (CEP) of Bharat Coking Coal Limited. Background Coal India Ltd. had brought out its Corporate Environment Policy (CEP) in 2012 Based on CIL Environment Policy 2012, incorporating the Jharia Master Plan. CEP of BCCL was approved by 285th BCCL board on 21.09.2012 (ANNEXURE C of the agenda note). As per the provisions of the policy, it is to be revised every 05 years as per which the policy would have been revised in 2017. However, there was delay in revising the policy at CIL's end due to which there is a delay in revising BCCL's CEP. CIL has revised its Corporate Environment Policy and approved in its 377th CIL Board Meeting dated 20th Dec, 2018(ANNEXURE D of the agenda note). The CAG during its exit meeting held on 16.11.2018 also pointed out for the need of revising BCCL's Corporate Environment Policy adopted in 2012(ANNEXURE E of the agenda note). Modifying CIL's CEP to suit BCCL's prevailing conditions, the Corporate Environment Policy of BCCL has been revised. Two versions of Policy was attached herewith out of which any one may be approved as deemed suitable by the Board. a. An abridged version of the policy as adopted earlier by BCCL in 2012. (ANNEXURE A of the agenda note) b. A detailed version of the policy similar to the CEP, 2018 of CIL with modifications suited to BCCL's condition. (ANNEXURE B of the agenda note) Decision: After detailed deliberation the Corporate Environment Policy, 2018 of CIL was approved by the Board. Board further directed that the Policy as adopted above to suit the conditions in BCCL should be modified with information to Coal India. Certified to be True Copy B. K. Parul Company Secretary Bharat Coking Coal Limited A hierarchical system of the company to deal with environmental issues from corporate level to mine level already exists. Being complied. There is apex Committee constituted at Ministry of Coal & CIL level and an Environment Advisory Committee has been also formulated at

	system of reporting of non-compliances/violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large.	BCCL level comprising of the HODs of different disciplinary, chaired by DT(P&P), for implementation and monitoring of compliances of EC Conditions of all the areas of BCCL.
B.	**General Conditions by MOEF:**	
I.	No change in mining technology and scope of working shall be made without prior approval of the Ministry of Environment and Forests.	For change in scope of working of cluster X, amended EC has been obtained vide letter no.J-11015/380/2010-IA-II(M) dated 12th June 2019. Copy of amended EC is attached as Annexure XVII.
II.	No change in the calendar plan of production for quantum of mineral coal shall be made	Being followed. Production is being done well within production capacity of this cluster as per EC.
III.	Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for PM10, PM2.5, SO2 and NOx monitoring. Location of the stations shall be decided based on the meteorological data, topographical features	The optimum location of monitoring stations in Jharia Coal Field finalized in consultation with the Jharkhand State Pollution Control Board. Ambient air quality is being regularly monitored by CMPDIL. Report is enclosed as Annexure XXVIII – Environmental Monitoring Report for cluster X. Water Sprinkling in Mine Premises has been regularly done to reduce PM10 and PM2.5 level. Picture showing water sprinkling is attached.

No.J-11015/380/2010-IA-II(M)
Government of India
Ministry of Environment, Forest and Climate Change
IA Division

Indira ParyavaranBhawan,
Jorbagh Road, N Delhi-3
Dated: 12th June, 2019

To,

The General Manager (E&F)
M/s Bharat Coking Coal Ltd,
Koyala Bhawan,
District **Dhanbad** (Jharkhand) Email: envbccl@gmail.com

Sub: Cluster X Coal Mining Project of capacity 2.289 MTPA and Coal Washery of 2.08 MTPA of M/s Bharat Coking Coal Limited in an area of 2057.47 ha located in District Dhanbad (Jharkhand) - Amendment in Environmental Clearance - reg.

Sir,

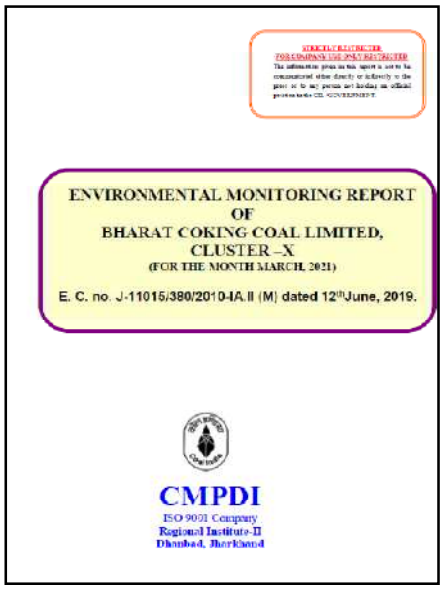
This refers to your online proposal No. IA/JH/CMIN/8812/2010 dated 15th September, 2017 and additional information dated 9th February, 2019 on the above mentioned subject.

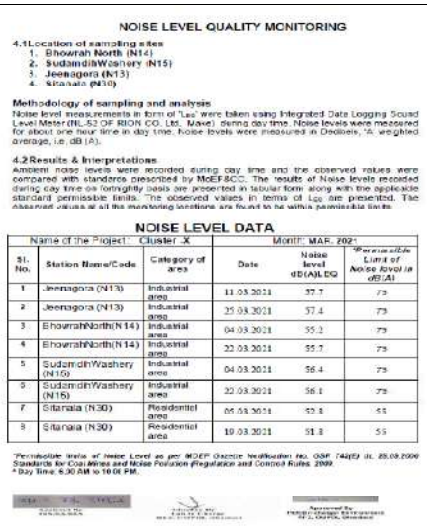
2. The Ministry of Environment, Forest and Climate Change has considered the proposal for amendment in environmental clearance dated 6th February, 2013 granted by the Ministry in favour of M/s Bharat Coking Coal Ltd for Cluster X Coal Mining Project (comprising six mine lease holds) of total capacity 2.289 MTPA (peak) and coal washery of 2.08 MTPA in a total area of 2057.47 ha in Jharia Coalfields, District Dhanbad (Jharkhand).

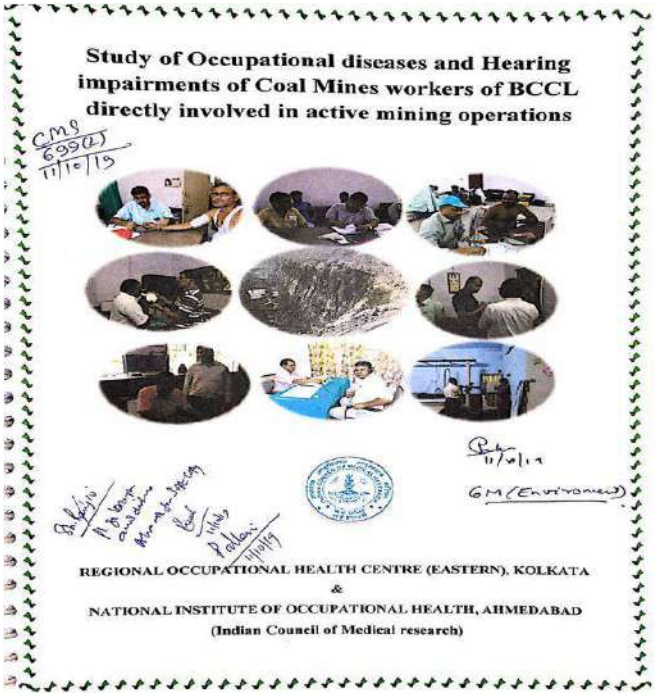
3. The amendment in said environmental clearance has been sought due to the proposed restructuring/re-appropriation of individual mines in the Cluster for implementation of the Master Plan dealing with fire and subsidence with the revised details as under -

S. No	Mine	Type of Mine UC/OC	Production Capacity (MTPA)	Lease Area (ha)	Mine Life (Years)	
1	Bhowrah North	UG	0.143	208.83	>20	
	Bhowrah North	OC	0.546		6	
		UG	0.377		30	
2	Bhowrah South	OC	1.2	571.58	43	Fire dealing
3	Amalagamated Sudamdih Patherdih Mine	OC	0.709	498.61	33	Amalgamation of mines for fire dealing
4	Sudamdih Shaft	UG	0.24	391.5	30	
5	Amlabad Closed	UG	0	386.95	NA	
6	Sudamdih Coal Washery (Within lease hold of Sudamdih Shaft Mine)		2.08	18	18	
	TOTAL		2.289	2057.47		

With the proposed restructuring, combined production capacity of the Cluster would remain at 2.289 MTPA (peak) in the same total area of 2057.47 ha.

	and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board. Monitoring of heavy metals such as Hg, As, Ni, Cd, Cr, etc carried out at least once in six months.	   
IV.	Data on ambient air quality (PM10, PM 2.5, SO2 and NOx) and heavy metals such as Hg, As, Ni, Cd, Cr and other monitoring data shall be regularly submitted to the Ministry including its Regional Office at Bhubaneswar and to the State Pollution Control Board and the Central Pollution Control Board once in six months. Random verification of samples through analysis from independent laboratories recognized under the EPA rules, 1986 shall be furnished as part of compliance report.	Ambient air quality data (PM10, PM2.5, SO2 and NOx) and other monitoring data have been regularly monitored and analyzed by CMPDIL and submitted the report, which is attached as Annexure VIII.  ENVIRONMENTAL MONITORING REPORT OF BHARAT COKING COAL LIMITED, CLUSTER –X (FOR THE MONTH MARCH, 2021) E. C. no. J-11015/380/2010-IA.II (M) dated 12thJune, 2019. CMPDI ISO 9001 Company Regional Institute-II Dhanbad, Jharkhand
V.	Adequate measures shall be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with ear plugs/muffs.	It is being complied in mines and also the Noise levels are below the Ambient Noise Standard (Day time 75 dB & Night Time (70 dB for Industrial Area). However, ear muffs / ear plugs are provided to the workers engaged in blasting and drilling operations, HEMM operations etc.

		 NOISE LEVEL QUALITY MONITORING 4.1Location of sampling sites 1. Bhowrah North (N14) 2. SudamdihWashery (N15) 3. Jeenagora (N13) 4. Sitanala (N30) Methodology of sampling and analysis Noise level measurements in form of 'Leq' were taken using Integrated Data Logging Sound Level Meter (NL-52 OF RION CO. Ltd., Make) during day time. Noise levels were measured for about one hour time in day time. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A). 4.2Results & Interpretations Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{eq} are presented. The observed values at all the monitoring locations are found to be within permissible limits. NOISE LEVEL DATA Name of the Project: Cluster -X — Month: MAR, 2021 Sl. No. / Station Name/Code / Category of area / Date / Noise level dB(A)LEQ / *Permissible Limit of Noise level in dB(A) 1 / Jeenagora (N13) / Industrial area / 11.03.2021 / 57.7 / 75 2 / Jeenagora (N13) / Industrial area / 25.03.2021 / 57.4 / 75 3 / EhowrahNorth(N14) / Industrial area / 04.03.2021 / 55.2 / 75 4 / EhowrahNorth(N14) / Industrial area / 22.03.2021 / 55.7 / 75 5 / SudamdihWashery (N15) / Industrial area / 04.03.2021 / 56.4 / 75 6 / SudamdihWashery (N15) / Industrial area / 22.03.2021 / 56.1 / 75 7 / Sitanala (N30) / Residential area / 05.03.2021 / 53.8 / 55 8 / Sitanala (N30) / Residential area / 19.03.2021 / 51.8 / 55 *Permissible limits of Noise Level as per MOEF Gazette Notification No. GSR 742(E) dt. 25.09.2000 Standards for Coal Mines and Noise Pollution (Regulation and Control) Rules, 2000 * Day Time: 6.30 AM to 10.00 PM.
VI.	Industrial wastewater (workshop and wastewater from the mine) shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May 1993 and 31st December 1993 or as amended from time to time before discharge. Oil and grease trap shall be installed before discharge of workshop effluents.	The optimum location of monitoring stations in Jharia Coal Field finalized in consultation with the Jharkhand State Pollution Control Board. Mine water & ground water quality is being regularly monitored by CMPDIL. Physico-Chemical characteristics of effluents are well within the prescribed limit. A proposal has been moved for the installation of Oil & Grease trap system at workshop under EJ Area and it is under process for approval.
VII.	Vehicular emissions shall be kept under control and regularly monitored. Vehicles used for transporting the mineral shall be covered with tarpaulins and optimally loaded.	Vehicular emissions are being under control and the Pollution under control certificate has been attached as Annexure – XVIII. All the vehicles used for coal transportation are covered with tarpaulins.
VIII.	Monitoring of environmental quality parameters shall be carried out through establishment of adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board and data got analyzed through a laboratory recognized under EPA Rules, 1986.	Monitoring of Environmental quality parameters have been regularly done by CMPDIL with proper analysis equipment.

<table>
<tr>
<td>IX.</td>
<td>Personnel working in dusty areas shall wear protective respiratory devices and they shall also be provided with adequate training and information on safety and health aspects.</td>
<td>It is being complied. All Personnel working in mines are provided with respiratory masks and safety eyeglass to protect the dust ingestion. Year wise details of protective respiratory devices / dust m ask issued is given below:
<u>Details of Protective Respiratory Devices / Dust Mask Issued</u>
<table>
<tr><td>Mine Name</td><td>2016</td><td>2017</td><td>2018</td><td>2019</td><td>2020</td><td>2021</td></tr>
<tr><td>Bhowra North</td><td>200</td><td>180</td><td>70</td><td>220</td><td>300</td><td>100</td></tr>
<tr><td>Bhowra South</td><td>38</td><td>119</td><td>80</td><td>110</td><td>660</td><td>100</td></tr>
<tr><td>ASP Colliery</td><td>65</td><td>68</td><td>72</td><td>50</td><td>300</td><td>50</td></tr>
</table>
National Institute of Occupational Health (NIOH) has conducted a study on Occupational disease and Hearing impairments of Coal Mines workers of BCCL directly involved in active mining operations and submitted their final report which has already been scrutinized by Medical Department, BCCL. NIOH report is enclosed as Annexure - XIX.
 

A separate full-fledged Human Resource Development (HRD) Department is conducting regular training programs on safety and health issues. Apart from this, Vocational Training Center exist in E.J. area (cluster X), which provides periodical training on the safety and occupational health issue to workers working in the mines.</td>
</tr>
<tr>
<td>X.</td>
<td>Occupational health surveillance programs of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed and records maintained thereof. The quality of environment due</td>
<td>Initial Medical Examination (IME) and Periodical Medical Examination (PME) of all the personnel are carried out as per the Statutes and Director General of Mines Safety (DGMS) guideline. IME, PME and VTC details are given below:
<table>
<tr><td></td><td>Year</td><td>Target</td><td>Actual</td></tr>
<tr><td>PME</td><td>2016</td><td>951</td><td>993</td></tr>
<tr><td></td><td>2017</td><td>891</td><td>927</td></tr>
<tr><td></td><td>2018</td><td>385</td><td>464</td></tr>
<tr><td></td><td>2019</td><td>1073</td><td>896</td></tr>
<tr><td></td><td>2020</td><td>1221</td><td>1036</td></tr>
</table>
</td>
</tr>
</table>

	to outsourcing and the health and safety issues of the outsourced manpower should be addressed by the company while outsourcing.	

VTC	2016-17	472	488
	2017-18	338	392
	2018-19	343	386
	2019-20	414	455
	2020-21	461	557

Contractual Workers:	Training	IME	
2014-15	15	2014-15	15
2015-16	78	2015-16	74
2016-17	78	2016-17	62
2017-18	163	2017-18	124
2018-19	111	2018-19	111

Certificate of the area medical officer showing no occupational disease has been detected in the Cluster X group of mines is attached.

भारत कोकिंग कोल लिमिटेड
एक मिनीरत्न कम्पनी
महाप्रबंधक का कार्यालय, पूर्वी झरिया क्षेत्र

Bharat Coking Coal Limited
A MINI RATNA Co.
Office of the General Manager, Eastern Jharia Area
P.O. Bhowra, Dist. Dhanbad (Jharkhand)

Ref. No.

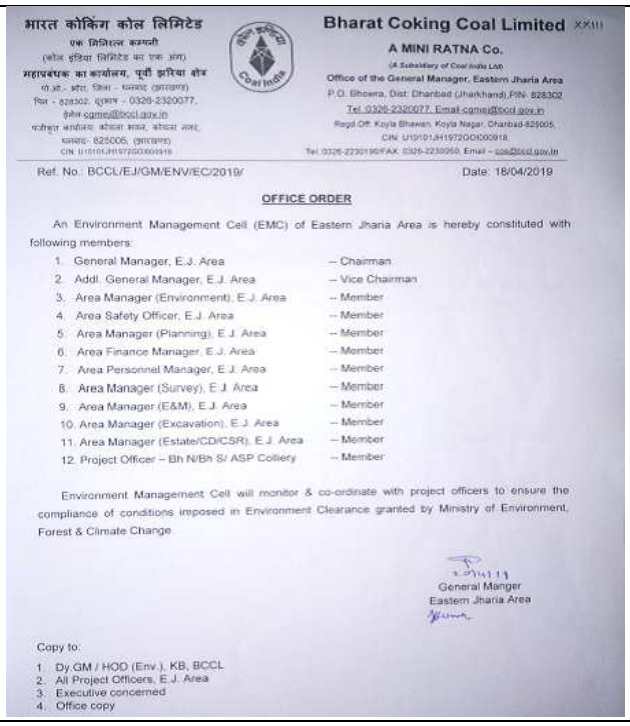
Date: 17-4-19

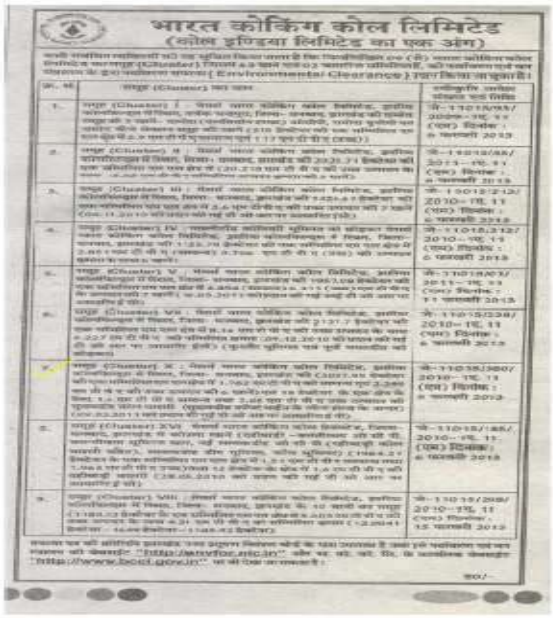
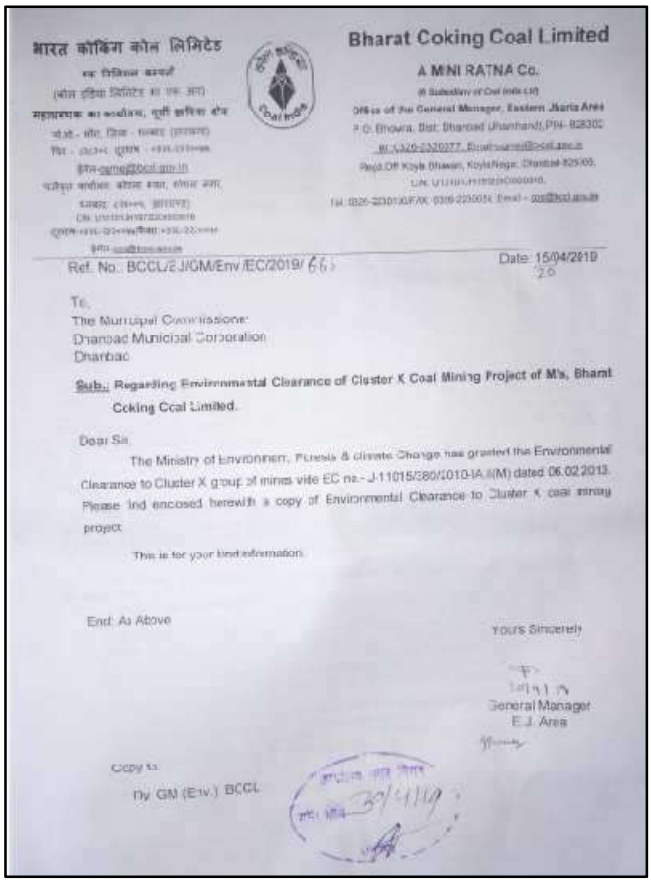
TO WHOMSOEVER IT MAY CONCERN

No Occupational Disease has been detected in mines of Eastern Jharia Area (Cluster X), BCCL at Bhowra Regional Hospital and Sudamdih Hospital till date

Area Medical Officer
Bhowra Regional Hospital
E.J.
B.C.C.L.

XI.	A separate environmental management cell with suitable qualified personnel shall be set up under the control of a Senior Executive, who will report directly to the Head of the company.	Environment Management Cell at area level has been constituted for the management of Environment and monitoring of compliance of EC conditions.

		 भारत कोकिंग कोल लिमिटेड एक मिनिरत्न कम्पनी (कोल इंडिया लिमिटेड का एक अंग) महाप्रबंधक का कार्यालय, पूर्वी झरिया क्षेत्र पो.ओ.- भौरा, जिला - धनबाद (झारखण्ड) पिन - 828302, दूरभाष - 0326-2320077, ईमेल cgmej@bccl.gov.in पंजीकृत कार्यालय: कोयला भवन, कोयला नगर, धनबाद- 826005, (झारखण्ड) CIN: U10101JH1972GOI000918 Bharat Coking Coal Limited A MINI RATNA Co. (A Subsidiary of Coal India Ltd) Office of the General Manager, Eastern Jharia Area P.O. Bhowra, Dist: Dhanbad (Jharkhand),PIN- 828302 Tel: 0326-2320077, Email-cgmej@bccl.gov.in Regd.Off. Koyla Bhawan, Koyla Nagar, Dhanbad-826005, CIN: U10101JH1972GOI000918 Tel: 0326-2230190/FAX: 0326-2230060, Email – ceo@bccl.gov.in Ref. No.: BCCL/EJ/GM/ENV/EC/2019/ Date: 18/04/2019 OFFICE ORDER An Environment Management Cell (EMC) of Eastern Jharia Area is hereby constituted with following members: 1. General Manager, E.J. Area – Chairman 2. Addl. General Manager, E.J. Area – Vice Chairman 3. Area Manager (Environment), E.J. Area – Member 4. Area Safety Officer, E.J. Area – Member 5. Area Manager (Planning), E.J. Area – Member 6. Area Finance Manager, E.J. Area – Member 7. Area Personnel Manager, E.J. Area – Member 8. Area Manager (Survey), E.J. Area – Member 9. Area Manager (E&M), E.J. Area – Member 10. Area Manager (Excavation), E.J. Area – Member 11. Area Manager (Estate/CD/CSR), E.J. Area – Member 12. Project Officer – Bh N/Bh S/ ASP Colliery – Member Environment Management Cell will monitor & co-ordinate with project officers to ensure the compliance of conditions imposed in Environment Clearance granted by Ministry of Environment, Forest & Climate Change General Manger Eastern Jharia Area Copy to: 1. Dy.GM / HOD (Env.), KB, BCCL 2. All Project Officers, E.J. Area 3. Executive concerned 4. Office copy
XII.	The funds earmarked for environmental protection measures shall be kept in separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this Ministry and its Regional Office at Bhubaneswar.	Year wise and item wise expenditure made on environment protection measures is enclosed as Annexure – XX. **Major Environmentall Measure cost for the year 2017-18** | Sl. No. | Major Environment Activity (2017-18) | Cost Incurred (In Lakhs) | | 1 | Environmental Monitoring (through HQ) | 20.55 | | 2 | Source Apportionment Study (through HQ) | 141.60 | | 3 | Ecological Restoration / Block Plantation | 221.53 | | 4 | FRI Dehradun Monitoring Cost | 0.89 | | 5 | Water Sprinkling | 34.66 | | Total Cost Incurred (Manpower cost and Diesel cost is included) | 419.23 | **Major Environmental measures cost for the year 2018-19** | Sl. No. | Major Environment Activity (2017-18) | Cost Incurred (In Lakhs) | | 1 | Routine Environmental Monitoring | 32.57 | | 2 | Water Quarterly Monitoring Report | 3.60 | | 3 | FRI Dehradun Monitoring Cost | 0.89 | | 4 | Ecological Restoration/Block Plantation | 38.31 | | 5 | Water Sprinkling | 31.51 | | 6 | Construction of water curtain sprinkler | 1.50 | | 7 | Statutory Fee including CTO/CTE | 3.80 | | 8 | Ground water Monitoring | CMPDIL (through HQ) | | Total Cost Incurred (Manpower cost and Diesel cost is included) | 112.18 | **Major Environmental measures cost for the year 2019-20** | Sl. No. | Major Environment Activity (2019-20) | Cost Incurred (In Lakhs) | | 1 | Routine Environmental Monitoring | 17.99 | | 2 | Water Quarterly Monitoring Report | 1.69 | | 3 | FRI Dehradun Monitoring Cost | 0.85 | | 4 | Ecological Restoration/Block Plantation | 45.50 | | 5 | Water Sprinkling | 31.51 | | 6 | Statutory Fee including CTO/CTE | 3.80 | | 7 | Mist water sprinkler (Indent) through HQ | 45.66 | | 8 | Ground water Monitoring | CMPDIL (through HQ) | | 9 | Online PM10 Analyser Installation (through HQ) | 42.30 | | Total Cost Incurred (Manpower cost and Diesel cost is included) | 189.30 |
XIII.	The Project authorities shall advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within seven days of the clearance letter	It has been complied. Advertisement in local newspaper has also been done.

	informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution control Board and may also be seen at the website of the ministry of Environment & Forests at http://envfor.nic.in.	**Advertisement of EC of cluster X in Newspaper** Newspaper Detail: Hindustan date-01.03.2013  भारत कोकिंग कोल लिमिटेड (कोल इण्डिया लिमिटेड का एक अंग)
XIV.	A copy of the environmental clearance letter shall be marked to concern Panchayat/Zila Parishad, Municipal corporation or Urban local body and local NGO, if any, from whom any suggestion /representation has been received while processing the proposal. A copy of the clearance letter shall also be displayed on company's website.	A copy of EC letter sent to Municipal corporation / panchyat is attached.  भारत कोकिंग कोल लिमिटेड Bharat Coking Coal Limited A MINI RATNA Co. Ref. No.: BCCL/EJ/GM/Env/EC/2019/66 Date: 15/04/2019 To, The Municipal Commissioner Dhanbad Municipal Corporation Dhanbad Sub.: Regarding Environmental Clearance of Cluster X Coal Mining Project of M/s. Bharat Coking Coal Limited. Dear Sir, The Ministry of Environment, Forests & climate Change has granted the Environmental Clearance to Cluster X group of mines vide EC no.- J-11015/380/2010-IA.II(M) dated 06.02.2013. Please find encosed herewith a copy of Environmental Clearance to Cluster X coal mining project. This is for your kind information. Encl: As Above Yours Sincerely General Manager E.J. Area Copy to Dy GM (Env.) BCCL Copy of EC letter of cluster X has been displayed on BCCL website. Link- http://www.bcclweb.in/Environment%20Clearance/ECX.pdf Amended Environment clearance (New) letter link- http://www.bcclweb.in/Environment%20Clearance/ClusterX%20amendment.pdf

XV.	A copy of the environmental clearance letter shall be shall also be displayed on the website of the concerned State Pollution Control Board. The EC letter shall also be displayed at the Regional Office, District Industry Sector and Collector's Office/Tehsildar's Office for 30 days.	Complied.
XVI.	The clearance letter shall be uploaded on the company's website. The compliance status of the stipulated environmental clearance conditions shall also be uploaded by the project authorities on their website and updated at least once every six months so as to bring the same in public domain. The monitoring data of environmental quality parameter (air, water, noise and soil) and critical pollutant such as PM10, PM2.5, SO2 and NOx (ambient) and critical sectoral parameters shall also be displayed at the entrance of the project premises and mine office and in corporate office and on company's website.	Complied. The clearance letter has been uploaded on the BCCL website. Link-http://www.bcclweb.in/Environment%20Clearance/ECX.pdf Amended Environment clearance (New) letter link-http://www.bcclweb.in/Environment%20Clearance/ClusterX%20amendment.pdf The compliance status of the stipulated environmental clearance conditions has been uploaded on BCCL website, link-http://bcclweb.in/Environment%20Clearance/Oct18_Mar19/Cluster_X.pdf
XVII.	The project proponent shall submit six monthly compliance reports on status of compliance of the stipulated environmental clearance conditions (both in hard copy and in e-mail) to the respective Regional Office of the Ministry, respective Zonal Offices of CPCB and the SPCB.	Being complied.
XVIII.	The Regional Office of this	Project authority is ready to extend its full cooperation for any kind of

	Ministry located at Bhubaneswar shall monitor compliance of the stipulated conditions. The Project authorities shall extend full cooperation to the office(s) of the Regional Office by furnishing the requisite data/ information/monitoring reports.	visit and inspection conducted by Regional Office in connection with EC Conditions Compliance.
XIX.	The Environmental statement for each financial year ending 31 March in Form –V is mandated to be submitted by the project proponent for the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be uploaded on the company's website along with the status of compliance of EC conditions and shall be sent to the respective Regional Offices of the MoEF by E-mail.	Environmental Statement (Form-V) has been regularly submitted for each financial year to Jharkhand State Pollution Control Board. Annexure XXI – Environmental statement (Form-V) of projects/collieries of E.J. Area attached.
C.	**Other Conditions by MOEF:**	
i.	The Ministry or any other Competent Authority may stipulate any further condition(s) for environmental protection.	Agreed.
ii.	Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract the provisions of the Environment (Protection) Act, 1986.	Agreed.
iii.	The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the	It is being complied.

	Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and Rules. The Proponent shall ensure to undertake and provide for the costs incurred for taking up remedial measures in case of soil contamination, contamination of groundwater and surface water, and occupational and other diseases due to the mining operations.	
iv.	The Environmental Clearance is subject to the outcome of the Writ Petition filed by M/S Bharat Coking Coal Limited (BCCL) in response to the closure orders issued by the Jharkhand State Pollution Control Board which is pending in the Jharkhand High Court.	Agreed.

29/5/2021
Area Manager (Env.)
EJ Area

29/5/21
Project Officer
ASP,
EJ Area

29/5/21
Project Officer
Bhowra (South),
EJ Area

29/5/21
Project Officer
Bhowra (North),
EJ Area

29/5/21
Addl. General Manager
EJ Area, BCCL
Cluster X

31/5/21
General Manager
EJ Area, BCCL
Cluster X

Annexure - I

STRICTLY RESTRICTED
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The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL / GOVERNMENT.

WATER QUALITY REPORT
OF
BHARAT COKING COAL LIMITED,
CLUSTER – X

(FOR THE Q.E. DECEMBER 2020)

E. C. no. J-11015/380/2010-IA.II (M) dated 12th June, 2019.

CMPDI

ISO 9001 Company

Regional Institute-II

Dhanbad, Jharkhand

CLUSTER - X

(FOR THE Q.E. DECEMBER 2020)

CONTENTS

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WATER QUALITY REPORT
OF
BHARAT COKING COAL LIMITED
CLUSTER – X

(FOR THE Q.E. DECEMBER 2020)

E. C. no. J-11015/380/2010-IA.II (M) dated 12th June, 2019.

CMPDI

ISO 9001 Company

Regional Institute-II

Dhanbad, Jharkhand

EXECUTIVE SUMMARY

1.0 Introduction

The purpose of environmental monitoring is to assess the quality of various attributes that affects the environment around us. In accordance with the quality of these attributes appropriate strategy is to be developed to control the pollution level within the permissible limits. One of these major attributes is water.

Bharat Coking Coal Limited (BCCL), a Subsidiary company of Coal India Limited is operating Underground and Opencast Mines in Jharia Coalfield (JCF) is a part of Gondwana Coalfields located in Dhanbad district of Jharkhand, the JCF is bounded by $23^0$37' N to $23^0$52' N latitudes and $86^0$09' E to $86^0$30' E longitude occupying an area of 450 Sq.km. BCCL has awarded Environmental monitoring work of Jharia Coalfield (JCF) to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per the conditions laid down by the MoEF&CC while granting environmental clearance of project, consent letter issued by the respective SPCB, and other statutory requirements.

2.0 Sampling location and rationale

2.1 Water sampling stations

The Water sampling stations were selected for mine effluent water, drinking water supply, well/ Hand pump water & also surface water samples.

2.2 Ambient air sampling locations

The ambient air quality monitoring stations were selected to represent core, buffer zone area. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Water quality

Water samples were collected as per standard practice. Effluent samples were analyzed for 25 parameters on quarterly basis & for 27 parameters on half yearly basis. The drinking and Surface water samples were collected and analyzed for 25 and 17 parameters respectively, on quarterly basis. Thereafter the samples were preserved and analyzed at the Environmental Laboratory at CMPDI RI-II, Dhanbad

3.2 Heavy Metal in Ambient Air

Parameters chosen for assessment of Heavy metal in Ambient Air Quality were cadmium (Cd), Mercury (Hg), Arsenic (As), Chromium (Cr), Nickel (Ni), and Lead (Pb). Respirable Dust Samplers (RDS) & fine particulates for PM 2.5 sampler were used for sampling PM 10 & PM 2.5 respectively. These heavy metals are analyzed regularly on half yearly basis. The samples were analyzed in Environmental Laboratory of CMPDI, RI-II, Dhanbad

4.0 Results and interpretations

4.1 Water quality

The test results indicate that the major parameters compared with MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines, IS.10500/2012 (Drinking water) and IS: 2296 (Surface water), are with in permissible limits.

4.2 Heavy Metal in Ambient Air

The results of Heavy metal in Ambient Air Quality are presented in tabular form for each monitoring station. The concentration of heavy metals in ambient air is well within the permissible limit

CHAPTER - I

INTRODUCTION

1.0 Any industry and development activities including coal mining is bound to affect environmental attributes. There are positive as well as negative impacts of such operations. For controlling the adverse impacts a regular monitoring is essential. The environmental monitoring is being done as per the guide-lines stipulated by Ministry of Environment, Forests and Climate Change (MoEF&CC), Govt. of India.

Bharat Coking Coal Limited (BCCL), a subsidiary company of Coal India Limited (CIL) is operating UG Mines and Opencast Mines in Jharia Coalfield (JCF). The Jharia Coalfield (JCF) having an area of 450 Sq.KM.

Bharat Coking Coal has awarded Environmental Monitoring work of all Projects, Cluster wise, to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per conditions laid down by MoEF&CC while granting environmental clearance to different projects. CMPDI has trained manpower and well equipped laboratory to carry out monitoring, analysis and R&D work in the field of environment.

1.1 The Cluster-X is in the Eastern part of the Jharia coalfield. It includes a group of 6 Mines (viz. Amlabad UG, Bhowra north UG/OC, Bhowra South UG/OC , Amalgamated Sudamdih Patherdih Mine, Sudamdih Shaft, Sudamdih Coal Washery The Cluster–X is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster–X are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Damodar River.

1.2 The Cluster-X is designed to produce 1.762 MTPA (normative) and 2.289 MTPA (peak) capacity of coal and coal washery of 2.08 MTPA.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 1.762 MTPA (normative) and 2.289 MTPA (peak) capacity of coal production vide letter no. J-11015/380/2010-IA.II (M) dated 12thJune, 2019.

.

In compliance of these conditions the Environmental Monitoring has been carried out & report prepared for submission to MoEF&CC & SPCB and other statutory authorities.

CHAPTER – II

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.2 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Bhowrah North (A14): Industrial Area

The location of the sampling station is 23°41'37.00"N - 86°23'54.00"E.

ii) Sudamdih Washery (A15): Industrial Area

The location of the sampling station is 23°39'31.00"N - 86°25'48.00"E.

II. BUFFER ZONE Monitoring Location

i) Jeenagora (A13): Industrial Area

The location of the sampling station is 23°42'31.00"N - 86°26'38.00"E.

ii) Sitanala (A30): Industrial Area

This location of the sampling station is 23°41'15.00"N - 86°22'39.00"E, at the Amlabad Project office which is currently in-operational.

2.3 Results and interpretations

The results of Heavy metal in Ambient Air Quality are presented in tabular form for each monitoring station. The concentration of heavy metals in ambient air is well within the permissible limit.

AMBIENT AIR QUALITY DATA

Name of the Company: **Bharat Coking Coal Limited** Year : **2020-21.**
Name of the Cluster : **Cluster - X** PERIOD: **Q. E. DEC- 2020.**

Heavy Metal Analysis report of Ambient Air Quality

SAMPLE	Cadmium(Cd) (µg/m3)	Mercury(Hg) (µg/m3)	Arsenic(As) (ng/m3)	Chromium(Cr) (µg/m3)	Nickel (Ni) (ng/m3)	Lead (Pb) (µg/m3)
Jeenagora (A13)	<0.001	<0.001	<0.005	<0.01	<0.1	0.005
Bhowrah North (A14)	<0.001	<0.001	<0.005	<0.01	<0.1	0.008
Sudamdih Washery (A15)	<0.001	<0.001	<0.005	<0.01	<0.1	<0.005
Sitanala (A30):	<0.001	<0.001	<0.005	<0.01	<0.1	<0.005

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HOD(In-charge) Environment
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CHAPTER – III

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. - I**)

i) Drinking Water quality at **Bhowrah North (DW10)**

ii) Surface Water quality at **U/S of Damodar River (SW21)**

iii) Surface Water quality at **D/S of Damodar River (SW22)**

iv) Mine Effluent quality **at Bhowrah North (MW10)**

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. Effluent samples were analyzed for 25 parameters on quarterly basis & for 27 parameters on half yearly basis. The drinking and Surface water samples were collected and analyzed for 25 and 17 parameters respectively, on quarterly basis. Thereafter the samples were preserved and analyzed at the Environmental Laboratory at CMPDI RI-II, Dhanbad

3.3 Results & Interpretations

The results are given in tabular form along with the applicable standards. Results show that most of the parameters are within the permissible limits.

WATER QUALITY

(SURFACE WATER- 17 PARAMETERS)

Name of the Company: **Bharat Coking Coal Limited** Year : **2020-21.**

Name of the Cluster: **Cluster - X** Period: **Q.E.DEC 2020**

Stations:

1. Upstream in Damodar river SW-21
2. Downstream in Damodar river SW-22

Date of Sampling:

07/12/2020

07/12/2020

Sl.No	Parameter	Sampling Stations				IS: 2296	Detection Limit	BIS Standard & Method
		SW21 07.12.2020	SW22 07.12.2020					
1	Arsenic (as As), mg/l, Max	<0.006	<0.006			0.2	0.006	IS-3025,part 37:1988, R-2019/ APHA 23rd Edition AAS-VGA
2	BOD (3 days 27ºC), mg/l, Max	<2.0	<2.0			3.00	2.00	IS 3025 (Part 44) : 1993 Reaffirmed 2019 , 3 day incubation at 27°C
3	Colour	Colourless	Colourless			300	Qualitative	Physical/Qualitative
4	Chlorides (as Cl), mg/l, Max	26	29			600	2.00	IS-3025/32:1988, R-2019 Argentometric
5	Copper (as Cu), mg/l, Max	<0.2	<0.2			1.5	0.2	IS 3025/42 : 1992 R : 2019, AAS-Flame
6	Dissolved Oxygen, min.	6.5	8.6			4	0.10	IS 3025 (Part 38) : 1989, Reaffirmed 2019 Modified Winkler Azide Method
7	Fluoride (as F) mg/l, Max	0.87	0.77			1.5	0.02	APHA, 23RD Edition, Page 4-90 to , 4500 –F- D (SPADNS Method)
8	Hexavalent Chromium, mg/l, Max	<0.01	<0.01			0.05	0.01	IS 3025 (Part 52) : 2003,Reaffirmed 2019
9	Iron (as Fe), mg/l, Max	<0.2	<0.2			50	0.2	IS 3025 /53 : 2003,R : 2019 , AAS-Flame Method
10	Lead (as Pb), mg/l, Max	<0.005	<0.005			0.1	0.005	APHA, 23rd Edition, AAS-GTA
11	Nitrate (as NO_3), mg/l, Max	6.29	6.36			50	0.50	APHA, 23rd Edition, P-4-127, 4500 - NO_3^- B , UV-Spectrophotometric Screening Method
12	pH value	8.21	8.14			6.5-8.5	2.5	IS 3025, Part 11 : 1983 R 2017 Electrometric method
13	Phenolic compounds (as C_6H_5OH), mg/l, Max	<0.002	<0.002			0.005	0.002	APHA, 22nd Edition 4-Amino Antipyrine
14	Selenium, mg/l, Max	<0.007	<0.007			0.05	0.007	IS-3025,part 56:2003, R-2019/ APHA 23rd Edition, AAS-VGA
15	Sulphate (as SO_4) mg/l, Max	100	101			400	2.00	APHA –23rd Edition. P-4-199, 4500 SO_4^{2-} E
16	Total Dissolved Solids, mg/l, Max	290	261			1500	25.00	IS 3025, Part 16: 1984 R 2017 Gravimetric method
17	Zinc (as Zn), mg/l, Max	<0.1	<0.1			15	0.1	IS 3025/ 49 : 1994, R : 2019, AAS-Flame

All values are expressed in mg/lit unless specified.

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RI-2, CMPDI, Dhanbad

WATER QUALITY

(DRINKING WATER- 25 PARAMETERS)

Name of the Company: **Bharat Coking Coal Limited** Year : **2020-21.**

Name of the Cluster: **Cluster - X** Period: **Q.E. DEC 2020**

Stations: **Date of Sampling:**

1. Drinking Water from Bhowrah South DW-10 30.11.2020

Sl. No	Parameter	Sampling Stations			Detection Limit	IS:10500 Drinking Water Standards	Standard / Test Method
		DW 10 30.11.2020					
1	Boron (as B), mg/l, Max	<0.2			0.2	0.5	APHA, 23rd Edition ,Carmine
2	Colour,in Hazen Units	2			1	5	APHA, 23rd Edition ,Pt.-Co. Method
3	Calcium (as Ca), mg/l, Max	106			1.6	75	IS 3025, Part 40: 1991 R 2019 EDTA Method
4	Chloride (as Cl), mg/l, Max	99			2	250	IS-3025/32:1988, R-2019 Argentometric
5	Copper (as Cu), mg/l, Max	<0.03			0.03	0.05	IS 3025 Part 42 : 1992 R : 2019, AAS-Flame APHA,23rd Edition, AAS-GTA
6	Fluoride (as F) mg/l, Max	0.90			0.2	1.0	APHA, 23RD Edition, Page 4-90 to , 4500 –F- D (SPADNS Method)
7	Free Residual Chlorine, mg/l, Min	<0.04			0.04	0.2	APHA, 23rd Edition, , 4500-Cl^- B. (Iodometric Method-I)
8	Iron (as Fe), mg/l, Max	<0.2			0.2	1.0	IS 3025 Part 53 : 2003, R : 2019 , AAS-Flame Method
9	Lead (as Pb), mg/l, Max	<0.005			0.005	0.01	IS:3025(Part 47):1994 (Reaffirmed 2019) APHA, 23rd Edition, AAS-GTA
10	Manganese (as Mn), mg/l, Max	0.17			0.02	0.1	APHA, 23rd Edition, 3111B, Direct Air Acetylene Flame AAS-Flame
11	Nitrate (as NO_3), mg/l, Max	40.33			0.5	45	APHA, 23rd Edition, P-4-127, 4500 - NO_3^- B , UV-Spectrophotometric Screening Method
12	Odour	Agreeable			Qualitative	Agreeable	APHA, 23rd Edition, , 2150-C
13	pH value	7.01			0.2	6.5-8.5	IS 3025, Part 11 : 1983 R 2017 Electrometric method
14	Phenolic compounds (as C_6H_5OH), mg/l, Max	<0.001			0.001	0.002	APHA, 22nd Edition,4-Amino Autipyrine
15	Selenium, mg/l, Max	<0.007			0.007	0.01	IS -3025,part 56:2003,R-2019/APHA 23rd Edition, AAS-VGA
16	Sulphate (as SO_4) mg/l, Max	137			10	200	APHA –23rd Edition. P-4-199, 4500 SO_4^{2-} E
17	Taste	Acceptable			Qualitative	Acceptable	APHA,23rd Edition, 2160-C Flavour Rating Assesment
18	Total Alkalinity (c_ac_{03}),, mg/l, Max	166			4	200	IS 3025, Part 23: 1986 R 2019 Titration Method
19	Total Arsenic (as As), mg/l,Max	<0.006			0.006	0.01	IS-3025, part 37:1988,R-2019/APHA23rd Edition AAS-VGA
20	Total Chromium (as Cr), mg/l, Max	<0.04			0.04	0.05	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA, 23rd Edition, AAS-GTA
21	Total Dissolved Solids, mg/l, Max	617			25	500	IS 3025, Part 16: 1984 R 2017 Gravimetric method
22	Total Hardness (c_ac_{03}), mg/l, Max	437			4	200	IS 3025, Part 21, 2009 R 2019 EDTA Method
23	Turbidity, NTU, Max	3			1	5	IS 3025, Part 10 : 1984 R 2017 Nephelometric Method
24	Zinc (as Zn), mg/l, Max	0.14			0.1	5	IS 3025 Part 49 : 1994,R : 2019, AAS-Flame
25	Nickel as Ni, mg/l Max	<0.01			0.01	0.02	IS 3025 Pat 54 : 2003,R : 2019, AAS-Flame APHA 23rd Edition, AAS-GTA

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WATER QUALITY

(MINE EFFLUENT - 27 PARAMETERS)

Name of the Company: **Bharat Coking Coal Limited** Year : **2020-21.**

Name of the Cluster: **Cluster - X** Period: **Q.E. DEC2020**

Effluent water of BCCL Mines					**Date of Sampling:**
Sample Code :MW 10					07.12.2020
Sl.No.	**Parameter**	**Results**	**Detection Limit**	**MOEF -SCH-VI STANDARDS Class 'A'**	**BIS Standard & Method**
1	Ammonical Nitrogen, mg/l, Max	0.06	0.02	50.0	IS 3025/34:1988, R : 2009, Nessler's
2	Arsenic (as As), mg/l, *Max*	<0.006	0.006	0.2	IS 3025, part 37:1988, R-2019/ APHA 23rd Edition AAS-VGA
3	B.O.D (3 days 27°C), mg/l, Max	<2.0	2.00	30.0	IS 3025 /44:1993,R:2003 3 day incubation at 27°C
4	Colour	Colourless	Qualitative	Qualitative	Physical/Qualitative
5	COD, mg/l, Max	32	4.00	250.0	APHA 23rd Edition 5220 C Titrimetric Method
6	Copper (as Cu), mg/l, *Max*	<0.2	0.2	3.0	IS 3025(Part42): 1992 R : 2019, AAS-Flame
7	Dissolved Phosphate (as P), mg/l, Max	<0.3	0.30	5.0	IS 3025/ 31, 1988 R 2019
8	Fluoride (as F) mg/l, *Max*	0.91	0.2	2.0	APHA, 23RD Edition, Page 4-90 to , 4500 –F- D (SPADNS Method)
9	Free Ammonia, mg/l, Max	<0.01	0.01	5.0	IS:3025/34:1988, Nesseler's
10	Hexavalent Chromium, mg/l, Max	<0.01	0.01	0.1	IS 3025 (Part 52) : 2003,Reaffirmed 2019
11	Iron (as Fe), mg/l, *Max*	<0.2	0.2	3.0	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame
12	Lead (as Pb), mg/l, *Max*	<0.005	0.005	0.1	APHA, 23rd Edition, AAS-GTA
13	Manganese(as Mn), mg/l, Max	<0.2	0.2	2.0	IS-3025(Part 59):2006, R 2017 AAS-Flame /APHA, 23rd Edition, 3111B, AAS-Flame
14	Nickel (as Ni), mg/l, *Max*	<0.1	0.1	3.0	IS-3025(Part 54):2003, R:2019 AAS-Flame
15	Nitrate Nitrogen, mg/l, *Max*	0.87	0.50	10.0	APHA, 23 rd Edition,UV-Spectrphotometric
16	Oil & Grease, mg/l, Max	<2.0	2.00	10.0	IS 3025/39:1991, R : 2019, Partition Gravimetric
17	pH value	8.05	2.5	5.5 to 9.0	IS-3025/11:1983, R-2017, Electrometric
18	Phenolic compounds (as C_6H_5OH),mg/l, *Max*	<0.002	0.002	1.0	APHA, 23rd Edition 4-Amino Antipyrine
19	Selenium, mg/l, Max	<0.007	0.007	0.05	IS 3025, part 56:2003, R-2019/APHA 23rd Edition, AAS-VGA
20	Sulphide (as S^{2-}) mg/l Max.	<0.005	0.005	2.0	APHA 23rd Edition Methylene Blue Method
21	Temperature (°C)	26.3	Shall not exceed 5^0 C above the receiving temp.		IS-3025/09:1984, Thermometeric
22	Total Chromium (as Cr), mg/l, *Max*	<0.1	0.1	2.0	IS-3025(Part 52):2003, R:2019 AAS-Flame
23	Total Kjeldahl Nitrogen, mg/l, Max	1.4	1.00	100.0	IS:3025/34:1988, Nesseler's
24	Total Residual Chlorine, mg/l, Max	<0.04	0.04	1.0	APHA, 23rd Edition, , 4500-Cl B. (Iodometric Method-I)
25	Total Suspended Solids, mg/l, Max	28	10.00	100.0	IS 3025/17:1984, R :2017, Gravimetric
26	Zinc (as Zn), mg/l, *Max*	<0.1	0.1	5.0	IS 3025 /49 : 1994, R : 2019, AAS-Flame
27	Odour	Agreeable		Qualitative	APHA, 23rd Edition, , 2150-C

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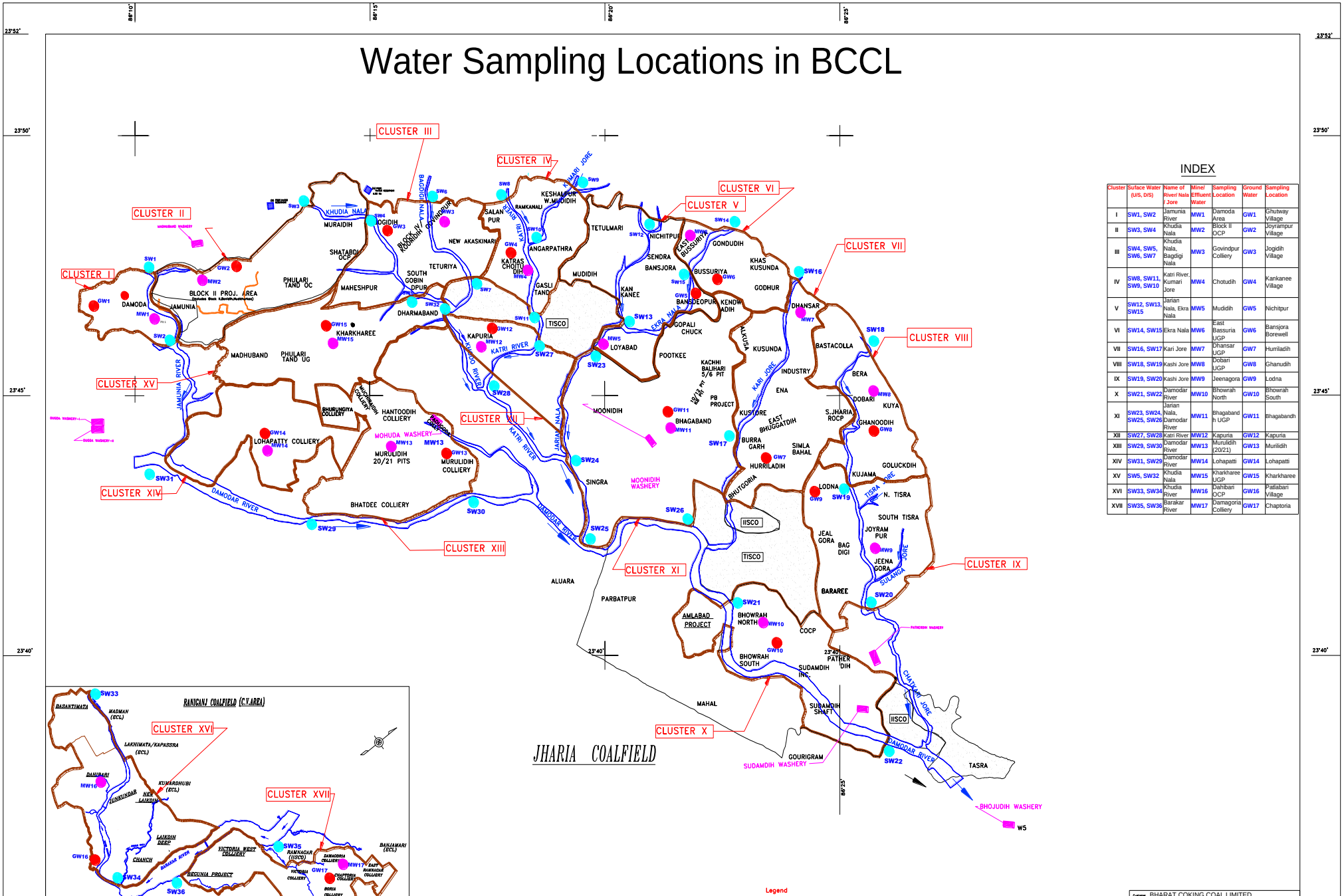
Water Sampling Locations in BCCL



INDEX

Cluster	Suface Water (U/S, D/S)	Name of River/ Nala / Jore	Mine/ Effluent Water	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamunia River	MW1	Damoda Area	GW1	Ghutway Village
II	SW3, SW4	Khudia Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudia Nala, Bagdigi Nala	MW3	Govindpur Colliery	GW3	Jogidih Village
IV	SW8, SW11, SW9, SW10	Katri River, Kumari Jore	MW4	Chotudih	GW4	Kankanee Village
V	SW12, SW13, SW15	Janian Nala, Ekra Nala	MW5	Mudidih	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bassuria UGP	GW6	Bansjora Borewell
VII	SW16, SW17	Kari Jore	MW7	Dhansar UGP	GW7	Hurriladih
VIII	SW18, SW19	Kashi Jore	MW8	Dobari UGP	GW8	Ghanudih
IX	SW19, SW20	Kashi Jore	MW9	Jeenagora	GW9	Lodna
X	SW21, SW22	Damodar River	MW10	Bhowrah North	GW10	Bhowrah South
XI	SW23, SW24, SW25, SW26	Janian Nala, Damodar River	MW11	Bhagaband UGP	GW11	Bhagabandh
XII	SW27, SW28	Katri River	MW12	Kapuria	GW12	Kapuria
XIII	SW29, SW30	Damodar River	MW13	Murulidih (20/21)	GW13	Murulidih
XIV	SW31, SW29	Damodar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW5, SW32	Khudia Nala	MW15	Kharkharee UGP	GW15	Kharkharee
XVI	SW33, SW34	Khudia River	MW16	Dahibari OCP	GW16	Patlabari Village
XVII	SW35, SW36	Barakar River	MW17	Damagoria Colliery	GW17	Chaptoria

HoD (Envt.)
Bharat Coking Coal Limited
(Signature)

Regional Officer, Dhanbad
Jharkhand State Pollution Control Board
(Signature)

Legend
- Sampling Locations of Surface Water (Upstream/ Downstream)
- Sampling Locations of Mine Water
- Sampling Locations of Effluent Water
- Sampling Locations of Ground Water

Customer: BHARAT COKING COAL LIMITED
Title: WATER SAMPLING LOCATIONS
Subject: MONITORING STATIONS

Annexure – II

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GROUNDWATER LEVEL & QUALITY REPORT

FOR CLUSTER OF MINES, BCCL

(Assessment year – 2020-21)

[CLUSTER – I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XIII, XIV, XV & XVI of Mines, BCCL]

JHARIA COALFIELD AND RANIGANJ COALFIELD (PART)

For
(BHARAT COKING COAL LIMITED)

(A Subsidiary of Coal India Limited)

KOYLA BHAWAN (DHANBAD)

Prepared by

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MARCH – 2021

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(Accredited Groundwater Professional Institutions by CGWB/CGWA)

(Accredited by NABL, valid upto: 2022)

(Accredited as a FAE in (HG) by QCI-NABET, valid upto: Aug'2021)

J. GROUND WATER LEVEL OF CLUSTER-X

Cluster-X consists of Bhowrah North OC & UG, Bhowrah South OC & UG, Amalgamated Sudamdih Patherdih, Sudamdih Shaft, Amlabad UG (Closed) and Sudamdih Coal Washery comes under the administrative control of Eastern Jharia Area of Bharat Coking Coal Limited (B.C.C.L - A Subsidiary of Coal India Limited). This cluster of mines is located in eastern part of Jharia Coalfield in Dhanbad district of Jharkhand. The life of the project works out is more than 30 years considering annual target production of 2.289 MTY.

Cluster-X mine involves leasehold area of about 2057.47 Ha of land. It covered in Survey of India toposheet no. 73 I/6. The area of Bhowrah North OC & UG, Bhowrah South OC & UG, Amalgamated Sudamdih Patherdih, Sudamdih Shaft, Amlabad UG (Closed) are 280.83 Ha, 571.58 Ha, 498.61 Ha, 391.50 Ha and 386.95 Ha respectively.

The present leasehold area of Cluster-X is 2057.47 Ha. The area has an undulating topography with gentle slope towards south and south east. The RL varies from 185 m to 150.0 m AMSL. Gaurkuthi Nala and few seasonal streams are controlling the drainage pattern of the area. The area comes under the watershed of Damodar River.

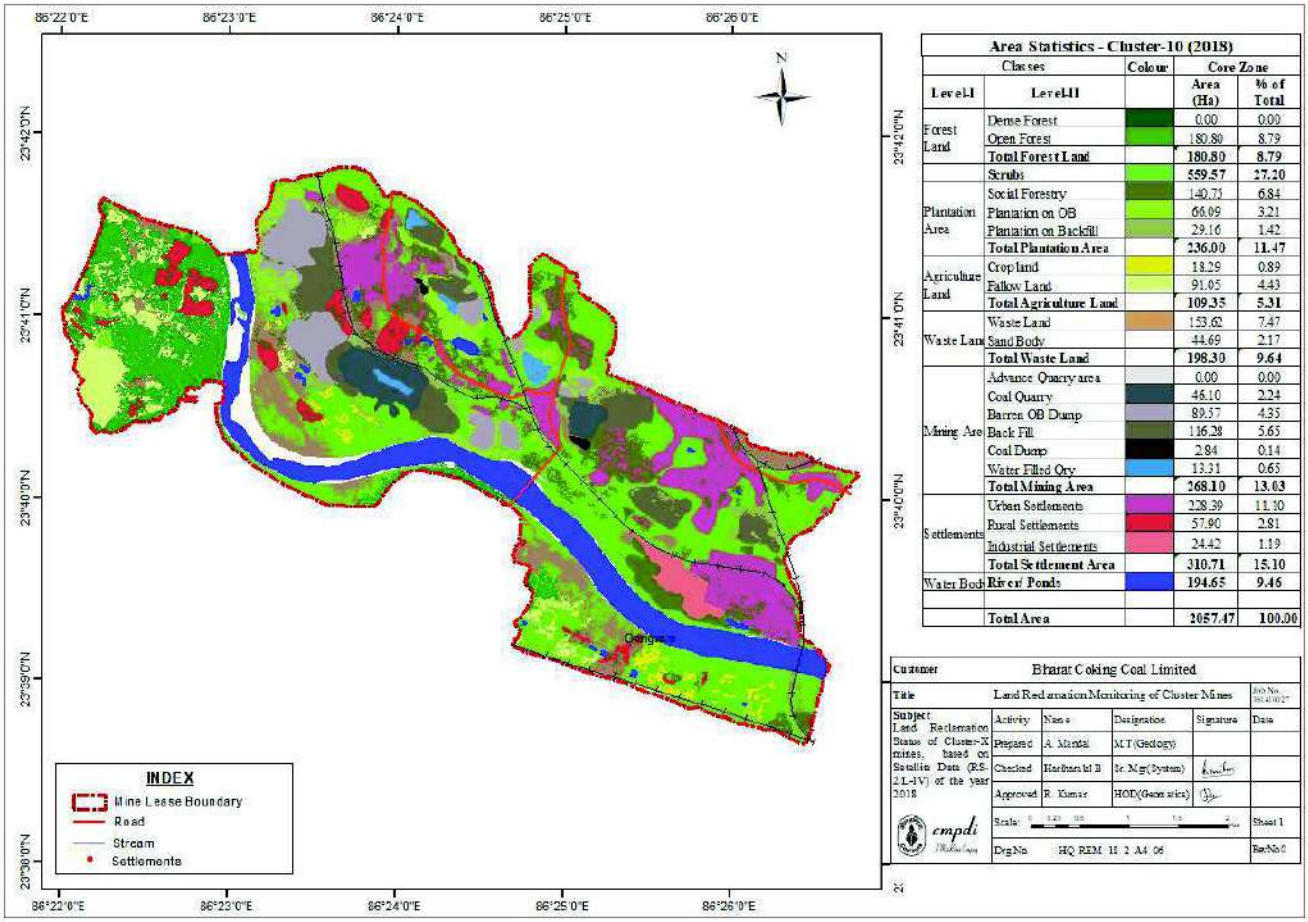
Monitoring stations (**A-19, D-35, D-36 and D-77**) are located in the core zone of the mine area. Water level monitoring in these monitoring stations has done in the months of May'20, August'20, and Nov'20 and January'21, the Ground water level data enclosed in the table below:

Sl No.	Well No.	Location	Water level (bgl in meters)											
			2020-21				2019-20				2018-19			
			May	Aug	Nov	Jan	May	Aug	Nov	Jan	Feb	May	Aug	Nov
1	A-19	Bhowrah	6.05	2.30	3.25	3.70	4.85	0.95	3.43	4.95	2.95	5.55	1.85	2.45
2	D-35	Patherdih	8.20	2.98	5.40	5.62	8.00	3.15	3.80	5.90	6.58	8.40	3.58	4.45
3	D-36	Sudamdih	2.10	0.06	1.00	1.15	1.20	0.10	0.55	0.65	1.00	1.20	0.45	0.60
4	D-77	Amlabad	6.40	5.90	3.50	4.25	6.40	2.80	3.20	4.50	3.63	6.30	4.00	5.20
Average WL (bgl)			5.69	2.81	3.29	3.68	5.11	1.75	2.75	4.00	3.54	5.36	2.47	3.18

LAST THREE-YEAR ASSESSMENT:

Pre-monsoon GW Level (m): Min – 1.20 m Max – 8.40 m
Post-monsoon GW Level (m): Min – 0.55 m Max – 5.40 m

LAND USE / LAND COVER MAP OF THE CLUSTER-X MINES, BCCL



Sl no	Land Use Details	Existing (sq. meter)	Proposed (sq. meter)	Grand Total (sq. meter)
1	Green Belt Area	1085.72 x 10^4	1085.72 x 10^4	1085.72 x 10^4
2	Open Land	661.04 x 10^4	661.04 x 10^4	661.04 x 10^4
3	Road/ Paved Area	228.39 x 10^4	228.39 x 10^4	228.39 x 10^4
4	Rooftop area of building/ sheds	82.32 x 10^4	82.32 x 10^4	82.32 x 10^4
5	Total	2057.47 x 10^4	2057.47 x 10^4	2057.47 x 10^4

4.0 GROUND WATER LEVEL SCENARIO

The summarized water level data of all clusters given in **Table – 7**.

Table –7: Groundwater level data Cluster-wise

Sl. No.	Cluster of BCCL	No. of Monitoring Wells	Water level fluctuation Below ground level (May, Aug, Nov'20 & Jan'21)	Avg. Fluctuation (in meters) during 2020-21	Geological Formation
1	I	4 nos.	0.15 to 10.00 m	2.76 m	Barakar
2	II	5 nos.	0.67 to 10.33 m	3.66 m	Barakar
3	III	5 nos.	0.32 to 10.33 m	2.95 m	Barakar
4	IV	4 nos.	0.03 to 9.25 m	3.27 m	Barakar
5	V	4 nos.	0.02 to 5.60 m	2.51 m	Barakar
6	VI	2 nos.	1.65 to 10.50 m	4.02 m	Barakar
7	VII	7 nos.	0.48 to 9.45 m	2.26 m	Barakar
8	VIII	4 nos.	1.41 to 8.45 m	2.87 m	Barakar
9	IX	6 nos.	0.30 to 9.40 m	1.53 m	Barakar
10	X	4 nos.	0.06 to 6.40 m	2.40 m	Barakar
11	XI	4 nos.	0.36 to 8.47 m	1.50 m	Barakar & Barren Measure
12	XIII	6 nos.	0.20 to 8.92 m	3.60 m	Raniganj
13	XIV	3 nos.	0.77 to 7.55 m	2.35 m	Raniganj
14	XV	3 nos.	0.85 to 4.88 m	1.20 m	Barakar & Barren Measure
15	XVI	3 nos.	0.70 to 5.90 m	0.75 m	Barakar

Depth to water level (in bgl) values described that water level goes down to maximum 10.50 m during pre-monsoon'2020 and maximum upto 8.60 m during post-monsoon'2020. Un-confined aquifer affected around 20 m to 30 m maximum close to active opencast mining areas, showing steep gradient towards mine void. Other than that, there is no mining effect in the water level within JCF area and RCF area (part). Historical water level data and hydrograph of permanent observation stations from CGWB shown in **Annexure–VII**. Water Table contour map and Depth to water level map shown in **Plate-IV & V**.

Monitoring groundwater (quantity & quality) to assess the present condition and resource has done regularly in the coalfield areas. Well hydrographs (**Annexure–VI and VII**) are prepared and studied to identify potentially adverse trends so that appropriate action can protect groundwater resource. Hydrograph trend analysis of CGWB monitoring wells and CMPDI observation wells, reveals decline

trends in both Pre and Post-monsoon GW level trends (max. upto 0.55 cm/year in Cluster-I, Cluster-V and Cluster-VII) but no significant decline trend (>1.0 m/year) of water level is noticed in any particular area for the last 10 years within the coalfield area. Regarding quality monitoring, the water sample location map (**Plate–II**) with collection points details (dug wells) given in **Annexure–V** and Quality is given in **Annexure–VII**.

5.0 GROUND WATER QUALITY

The ground water sample of the study area (15 nos. of Cluster of mines, BCCL) collected from dug wells and analyzed. Fifteen ground water samples (GW-1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15 & 16) analyzed during the month of June'2020 at CMPDI, RI-II, Dhanbad. The water sampling details given in **Annexure–V** and Water sample locations shown in **Plate-II**. The water quality data enclosed in **Annexure–VII.**

The study of the variations in water quality parameters described below:

The pH of the groundwater samples varies between 7.81 (GW-6) to 8.21 (GW-3), the pH is within the IS 10500 limit of drinking water standard.

The mineral constituents dissolved in water constitute the dissolved solids. The total dissolve solids vary from 178 (GW-11) to 764 mg/l (GW-5), the TDS values are above the IS 10500 standards of drinking water.

The alkalinity of the water samples varies from 76 (GW-6) to 152 mg/l (GW-11) and are within the stipulated standard of (200 mg/l) drinking water. The concentrations of calcium in the water samples vary from 32 (GW-11) to 180 mg/l (GW-15) and are ***slightly above*** the permissible limit (75 mg/l) of drinking water standards. The total hardness ranges between 148 (GW-8) to 680 mg/l (GW-5) and the value of total hardness in water samples are ***above*** the permissible limit (200 mg/l). The sulphate ranges between 38 (GW-8) to 178 mg/l (GW-13) and the value of sulphate in water sample are within the permissible limit (200 mg/l). The Iron, Copper, Manganese, Lead, Zinc and Chromium concentration in the water samples found to be below the upper ISI limits for drinking water.

7.0 IMPACT OF MINING ON GROUND WATER REGIME

7.1 GENERAL CONSEQUENCES OF COAL MINES ON AMBIENT HYDROGEOLOGICAL REGIME

Mining of coal either by opencast or underground method is bound to incise one or more water bearing strata (aquifers) which in turn may result in depletion or draw down in water levels and a corresponding inflow of water into the mine workings. The potential effects of coal mining operations on the hydrogeological regime are as under:

- Creates disruption in formation/aquifer
- Dewatering of aquifers
- Change in hydraulic gradient
- Modification of recharge to aquifers
- Change in groundwater flow pattern

The general need in mine planning from the hydrogeological point of view is the estimation of make of water (ground water seepage) into the mine, its rate, the mine pumping capacity to meet the storm rainwater accumulation, extent of depression of water surface and management of mine effluent (mine water). It is also desirable that the consequences of mining operation on the groundwater regime be determined in advance. However, the mine pumping in most of the cases are passive dewatering for the safety of the mine pit, active mine dewatering is done in few cases for very high potential aquifers.

7.2 POTENTIAL CONSEQUENCES OF OPENCAST AND UNDERGROUND COAL MINES OF JHARIA COALFIELD ON HYDROGEOLOGICAL REGIME

Generally, in the opencast and underground mines of Jharia Coalfield, alluvium and overlying weathered mantle are the first to excavate followed by upper Barakar Formation / Aquifer. Since these formations vary in thickness, compaction and their constituents over the area, their aquifer properties also vary.

The porosity and the compactness in the sandstone controls the discharge from these aquifers. The alluvium and weathered Formation wherever loose and fragile possess more porosity and this has high groundwater potential. Due to the mine cut, the depression in the water table created. The initial discharges due to this depression is large in amount due to concentration of flow to that region. In the top zones, water table condition prevails and away from the opening in the stratified section, semi-confined conditions exist. With progress of mine operations, there is an increase in the depth of incision as a result; the semi-confined aquifers are also punctured.

During mining the hydraulic gradients generally, steeps down near mine i.e. within the mine influence area. In the up-dip region, only un-confined aquifer punctured through the mining process and thus only it

affected whereas in the down-dip region both un-confined and semi-confined aquifers may be affected. The confined aquifers of lower Barakar Formation in the mining area not punctured as it lies below the working coal seams and hence normally there is no noticeable effect in the aquifer related to this formation.

7.3 ESTIMATION OF RADIUS OF MINE INFLUENCE ZONE

Radius of Influence can defined as the radial distance from the center of the borehole to the point where there is no lowering of groundwater table/potentiometric surface.

The radius of influence (R) for Opencast and UG Mines within Jharia CF calculated by using Sichardt's formula based on present mining scenario.

$$R_0 = C*(H-h) * \sqrt{(K)}$$

Where, R_0- Radius of influence (m), C - Constant =3000,

(H-h)- Drawdown (m), K – Hydraulic conductivity (m/s).

Here, K has used for Barakar Formations i.e. 0.05 m/d or 5.7 x 10^{-7} m/sec.

It may be appropriate to mention here that the presence of prominent boundaries/water bodies, faults or interfringing of sandstone and shale beds may restrict propagation of the drawdown cone. With the presence of low permeable beds such as clay/shale and younger coal seams in the formation, laying above the working seams the water level in the phreatic aquifer not directly affected. During the working of board and pillar method, subsidence takes place during the extraction of total coal (depillaring), both the phreatic and semi-confined aquifers get affected. Surface vigilance and filling up subsided zone, if any, has to constantly in view. The effect on groundwater level for most of the coal mine in Jharia coalfield has been observed in the down-dip side, generally within a distance upto 500 m and becomes milder/ negligible thereafter.

8.0 CONSERVATION MEASURES & FUTURE STRATEGY

- BCCL has installed 25 Pressure Filter Plant of total capacity of 4.16 MGD to meet drinking water requirement nearby the area. At present 63 Water Treatment Plants are operational having capacity of 16.16 MGD within Jharia Coalfield area. Further installation of 28 more Pressure Filter Plants with the capacity of 5.84 MGD are in progress.

- BCCL participated in development of low cost technology for drinking water in a CSIR project along with CIMFR, Dhanbad and a pilot plant of 4000 Liters/hour is functional at PB Project site of BCCL. Similar plant has proposed at other sites of BCCL.
- A scheme entitled 'Scheme for multi-purpose utilization of surplus mine water of Barora Area, Block II and Govindpur Area of BCCL' was prepared with a view to harness the excess water discharge to take care of the persistence problem of water scarcity in the nearby villages. In the scheme, two water reservoirs of capacity 27 MG and 17 MG have been proposed in the non-coal bearing area for storage of 3250 GPM and 2000 GPM surplus mine water which will be fed through pipe line by mine discharge at mines of Barora, Block-II and Govindpur Area.
- Rooftop rainwater harvesting (RWH) will took up in the project area using the administrative buildings. 138 no. of quarters having roof-top area of about 14950 sq. m. is already prepared to harvest rainwater and around 13150 cum/annum of water is going to be recharged the nearby groundwater system through RWH structures. Proposal already made to facilitate this kind of RWH structure at suitable locations i.e. Lodna Area, Kusunda Area (Jawahar Nagar, Matkuria, Coal Board Colony), Sijua Area (Nichitpur and Tetulmari Colony) within Jharia Coalfield to augment groundwater recharge.
- After cessation of mining, with plenty rainfall and abundant ground water recharge, the water levels will recoup and attain normalcy. Thus, the impact of mining on groundwater system may considered as a temporary phenomenon. The abandoned mine workings (UG) behave as water pool and improves the resources availability in the coalfield area.
- Utilization of treated mine water discharge by both industry and local people in the mine influence area. The excess mine water can be used to recharge groundwater system through connecting pipeline to abandoned dug wells. Utilization of mine water for irrigation use will also enhance the ground water recharge potential through artificial recharge in the area.
- Increase vegetative cover by plantation in the mine area under land amelioration measures. This will contain the surface run-off and increase the groundwater recharge.
- Creation of awareness among workers and local peoples about Rainwater harvesting and artificial recharge will have priority. This aspect usually covered during the Environmental Week celebrated every year (5 to 12 June).
- 23 nos. of Piezometer proposed to install within JCF and RCF to monitor GW level (**Plate-III**).

Monitoring of water quality of mine water discharge, local River/nala and domestic water source (dug well/hand pump wells) will continued under routine monitoring (May, August, November & Jan).

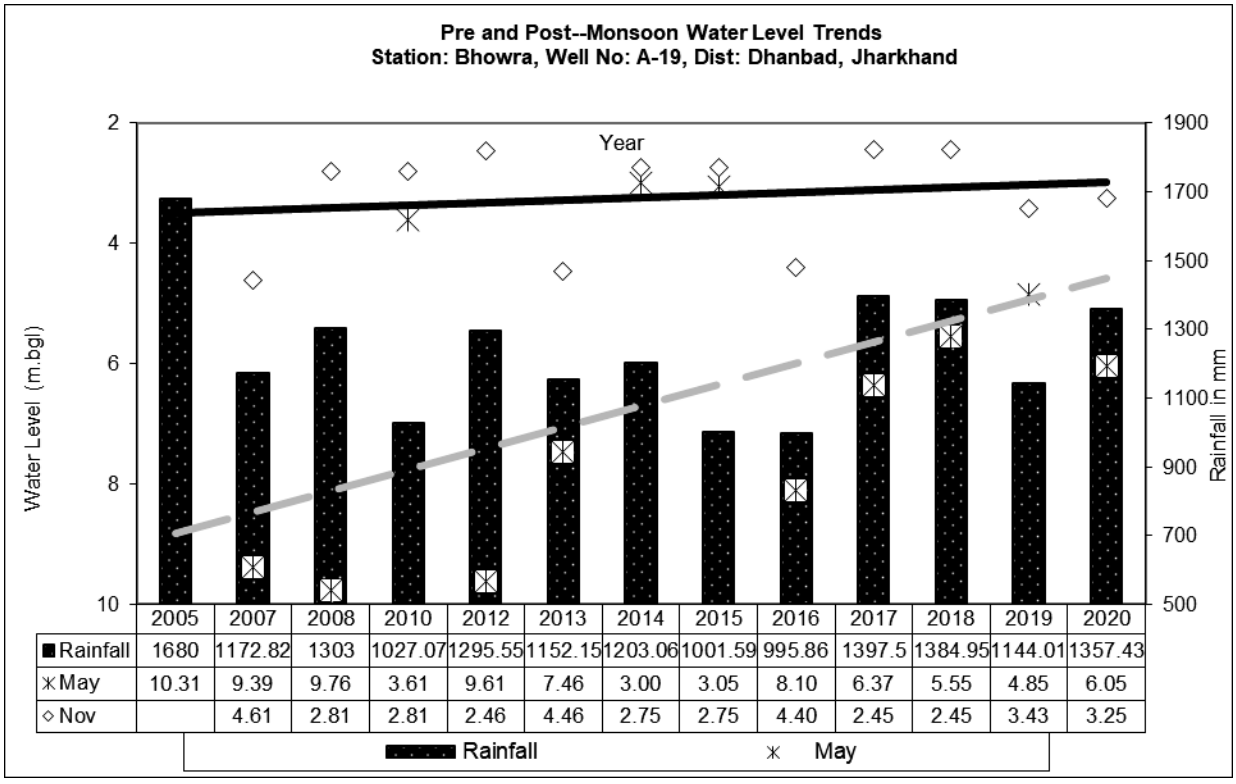
9.0 EXISTING/PROPOSED RAINWATER HARVESTING STRUCTURES IN BCCL COAL MINES

Fig-3 to 4.

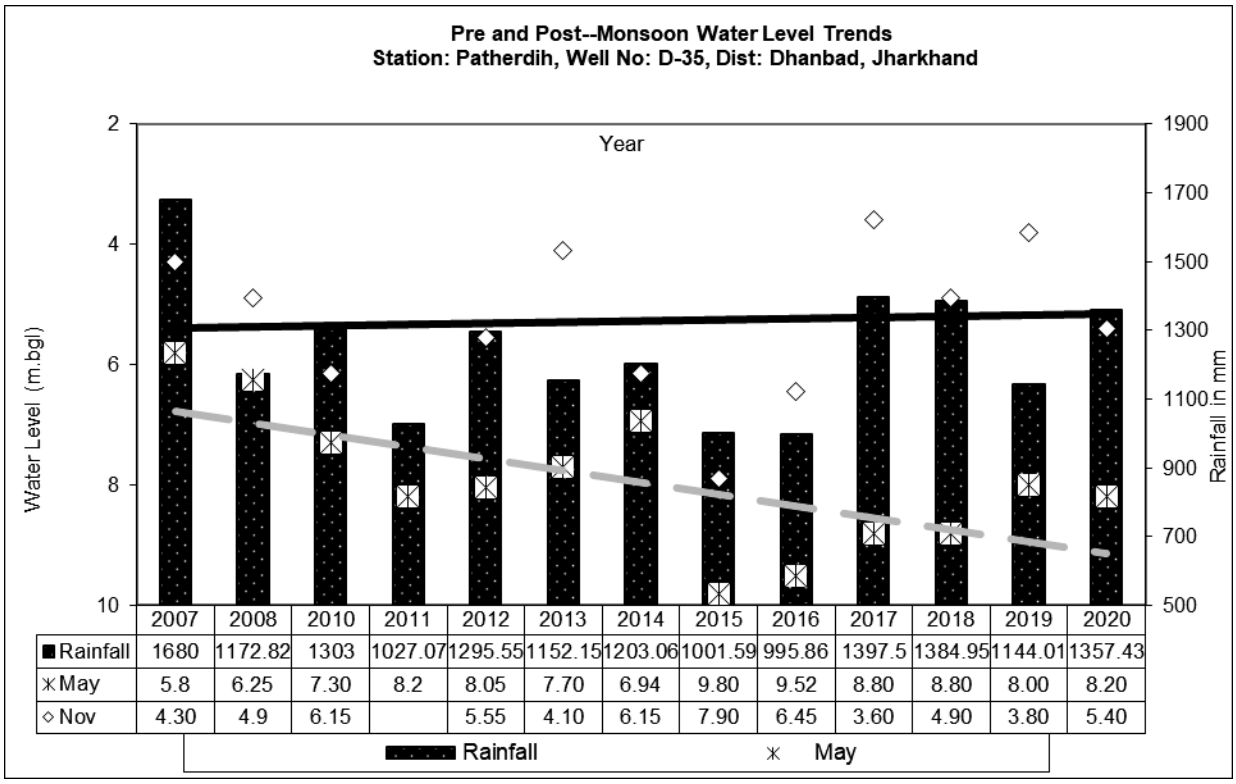
Proposed Rain Water Harvesting Site GVTC, Cluster-I, Barora Area

Proposed Rain Water Harvesting Site Nehru Balika Vidhalaya, Cluster-I, Barora Area

HYDROGRAPHS OF CLUSTER-X

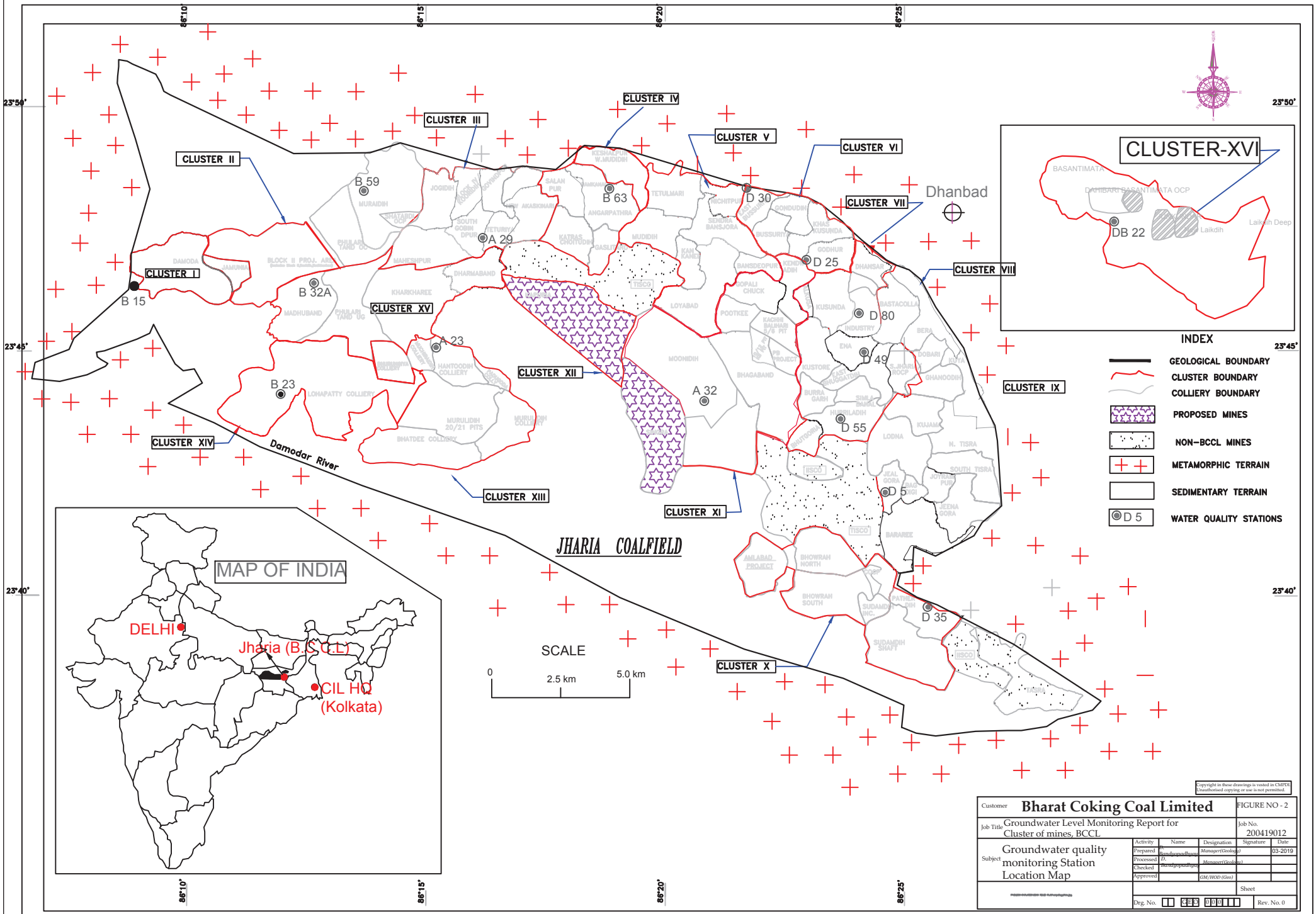


	2005	2007	2008	2010	2012	2013	2014	2015	2016	2017	2018	2019	2020
Rainfall	1680	1172.82	1303	1027.07	1295.55	1152.15	1203.06	1001.59	995.86	1397.5	1384.95	1144.01	1357.43
May	10.31	9.39	9.76	3.61	9.61	7.46	3.00	3.05	8.10	6.37	5.55	4.85	6.05
Nov		4.61	2.81	2.81	2.46	4.46	2.75	2.75	4.40	2.45	2.45	3.43	3.25



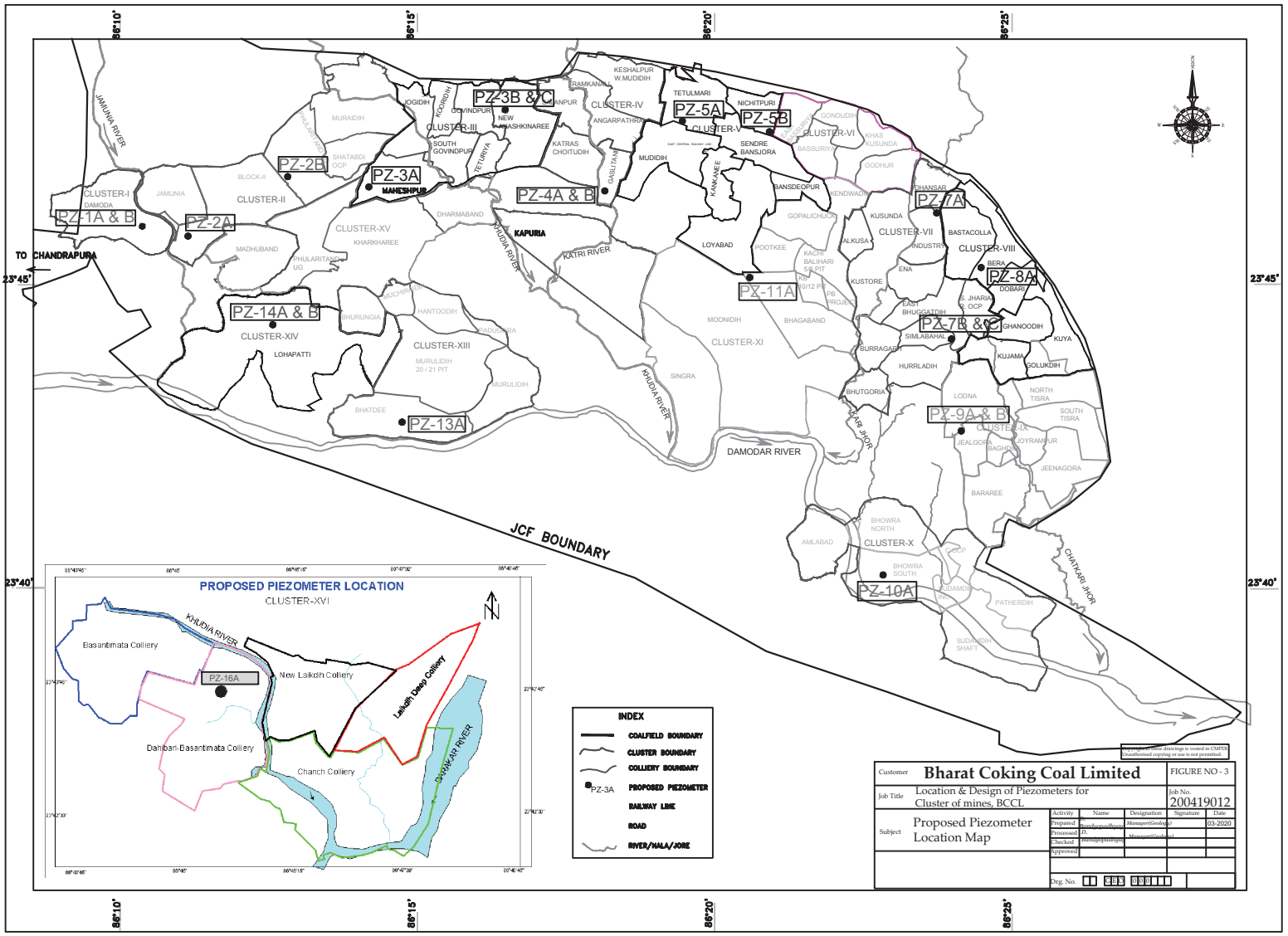
	2007	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Rainfall	1680	1172.82	1303	1027.07	1295.55	1152.15	1203.06	1001.59	995.86	1397.5	1384.95	1144.01	1357.43
May	5.8	6.25	7.30	8.2	8.05	7.70	6.94	9.80	9.52	8.80	8.80	8.00	8.20
Nov	4.30	4.9	6.15		5.55	4.10	6.15	7.90	6.45	3.60	4.90	3.80	5.40

GROUNDWATER QUALITY MONITORING STATION LOCATION MAP

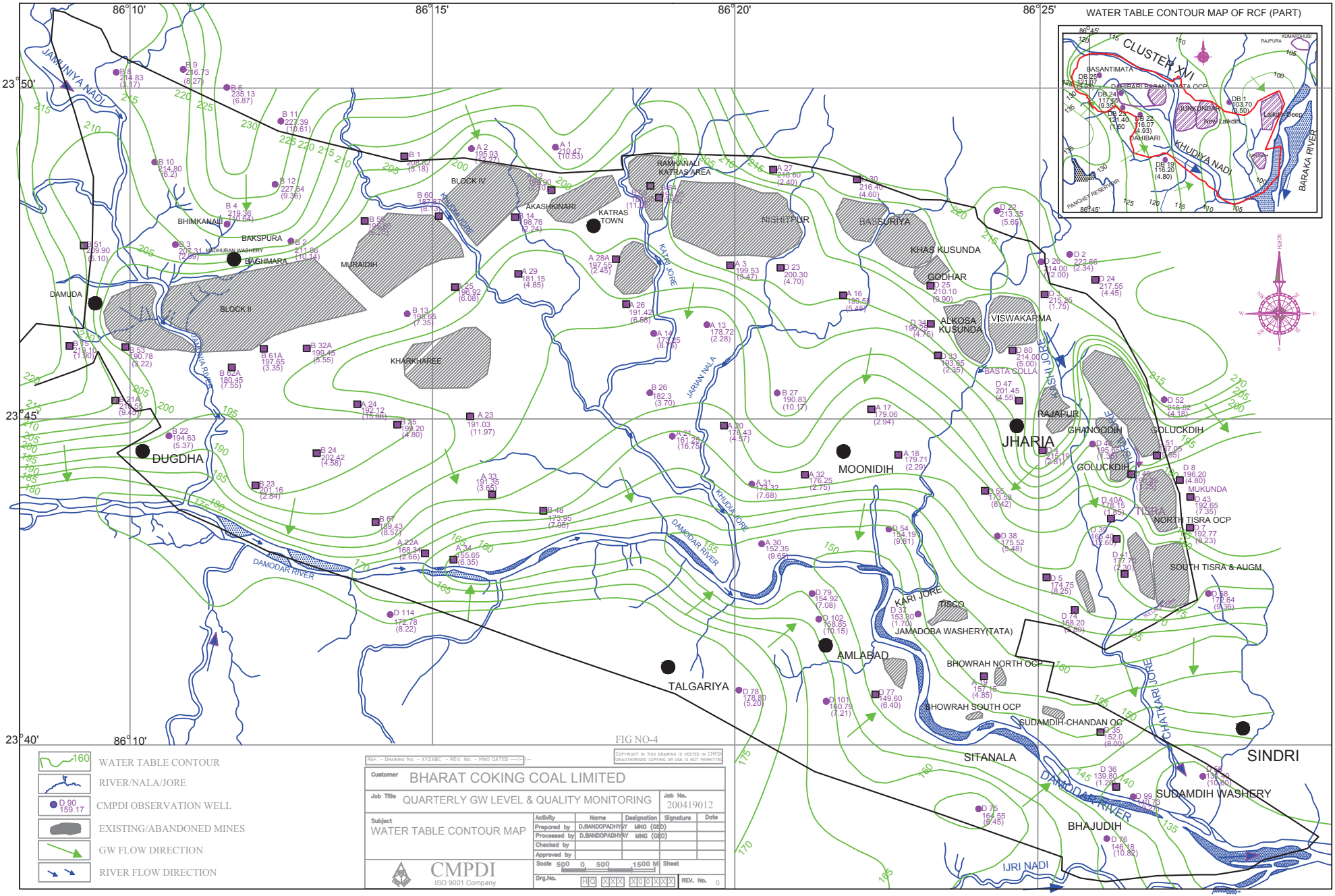


Customer	**Bharat Coking Coal Limited**				FIGURE NO - 2
Job Title	Groundwater Level Monitoring Report for Cluster of mines, BCCL				Job No. 200419012
Subject	Groundwater quality monitoring Station Location Map	Activity	Name	Designation	Signature / Date
		Prepared	S. Bandyopadhyay	Manager(Geology)	03-2019
		Processed	D. Bandyopadhyay	Manager(Geology)	
		Checked			
		Approved		GM/HOD (Geo)	
					Sheet
		Drg. No.	CES 000		Rev. No. 0

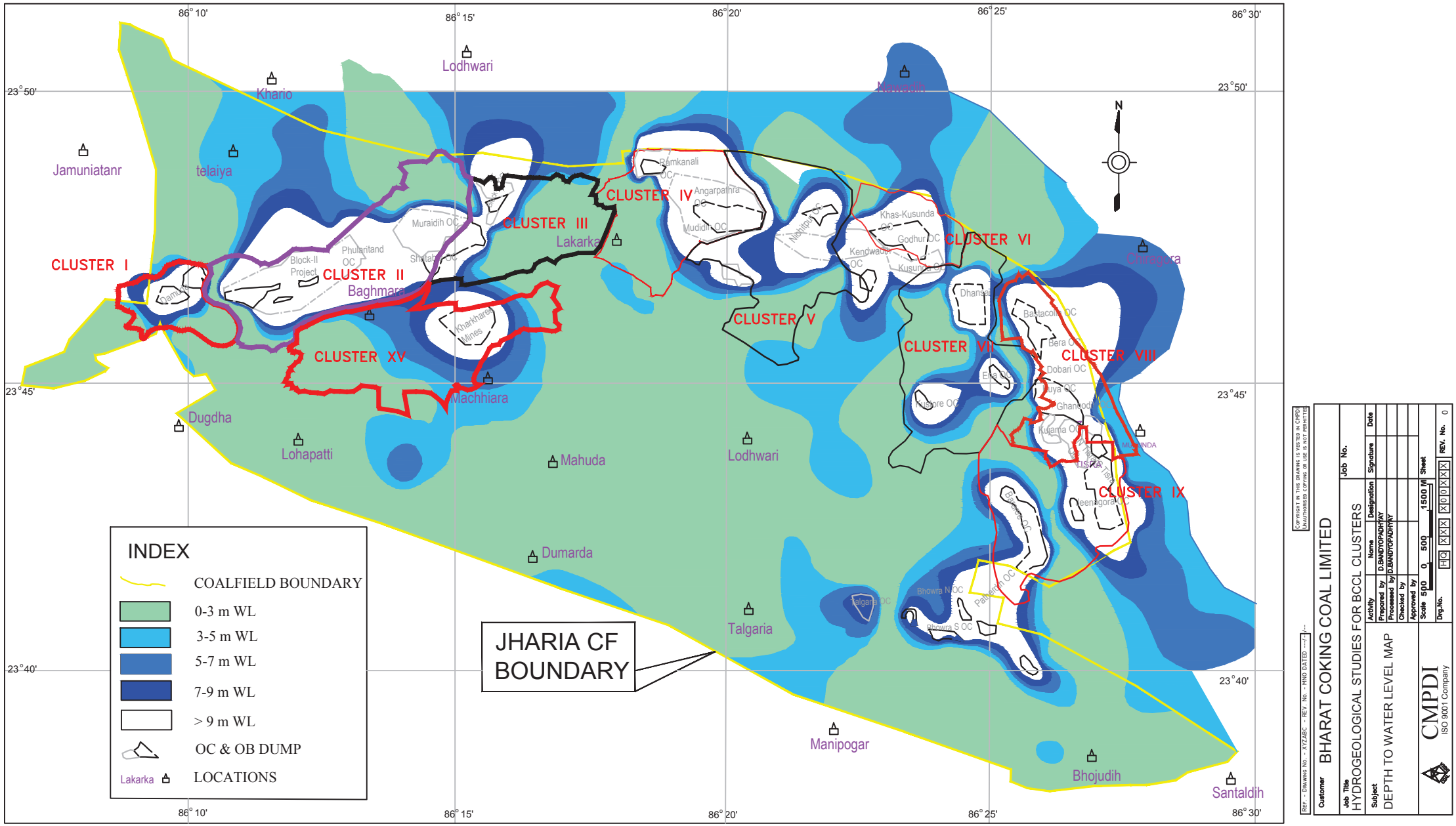
PROPOSED PIEZOMETER LOCATION MAP, JCF & RCF (part)



WATER TABLE CONTOUR MAP OF PRE-MONSOON 2020



DEPTH TO WATER LEVEL MAP OF JHARIA COALFIELD



Ref. - Drawing No. - XYZ/ABC - REV. No. - HNO DATED ----/--

Customer: BHARAT COKING COAL LIMITED

Job No.

Job Title: HYDROGEOLOGICAL STUDIES FOR BCCL CLUSTERS

Subject: DEPTH TO WATER LEVEL MAP

	Name	Designation	Signature	Date
Activity				
Prepared by	D.BANDYOPADHYAY			
Processed by	D.BANDYOPADHYAY			
Checked by				
Approved by				

Scale: 500 0 500 1500 Mt. Sheet

Drg.No. REV. No. 0

CMPDI
ISO 9001 Company

BHARAT COKING COAL LIMITED

DRAFT

MINING PLAN AND MINE CLOSURE PLAN

FOR

BHOWRAH SOUTH COLLIERY

(UPTO {-} 115m RL HORIZON)

(EASTERN JHARIA AREA)

NOVEMBER – 2018

CENTRAL MINE PLANNING & DESIGN INSTITUTE LTD.
REGIONAL INSTITUTE NO.-II
DHANBAD

CHAPTER - XII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

12.0 MINE CLOSURE PLANNING

12.1 OBJECTIVES OF CLOSURE PLANNING

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows.

- To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- To protect public health and safety;
- To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- To minimize adverse socio-economic impacts.

12.2 DIFFERENT ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects:

(a) Technical aspects;

The following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared.

Safety hazards including management of fire and subsidence: In the mine closure plan, action will be taken to cover all the safety aspects including management of fire & subsidence and mine inundation.

12.6 CLOSURE ACTION PLAN

Closure planning is a whole-of-life exercise that begins at the start of a mine and continues till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, and new technology and remain flexible enough to cope with unexpected events.

The following steps have to be undertaken in relation to Mine Closure Planning:

Prior to the surface demolition/restoration a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, etc. A list of surface assets should be prepared and made available to potential purchasers, prospective purchasers could be invited and asked to submit sealed bids, this could ensure that the sale of assets give better financial gain.

In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge have to be done.

Work force on roll of BCCL may be re-deployed for gainful utilization in the same or other mines of BCCL.

As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

12.7 PROTECTIVE MEASURES TO BE TAKEN

Protective measures must include the following :

- The protection of mine Entries , building and other structure on the project site against access by unauthorized persons;

IMPLEMENTATION SCHEDULE FOR MINE CLOSURE IN BHOWRAH SOUTH COLLIERY

(LIFE OF THE MINE: 43 YEARS)

S.N	Activity	Time Frame	YEAR					
			Operational Phase			Post Closure Phase		
			1st - 10th	11th - 20th	21th - 43th	PC1	PC2	PC3
A	**Dismantling of Structures**							
	Service Buildings	2 years						
	Residential Buildings	2 & ½ years						
	Industrial structures like CHP, Workshop, field sub-station, etc.	2 & ½ years						
B	**Permanent Fencing of mine void and other dangerous area**							
	Random rubble masonry of height 1.2 metre including leveling up in cement concrete 1:6:12 in mud mortar	2 years						
C	**Grading of highwall slopes**							
	Levelling and grading of highwall slopes	2 years						
D	**OB Dump Reclamation**							
	*Handling/Dozing of OB Dump and backfilling	Throughout the life of the mine including 3 years after cessation of mining operation						
	*Technical and Bio-reclamation including plantation and post care	Throughout the life of the mine including 3 years after cessation of mining operation						
E	**Landscaping**							
	Landscaping of the open space in the leasehold area for improving its esthetics and eco value	Throughout the life of the mine including 3 years after cessation of mining operation						
F	**Plantation**							
	Plantation over cleared area obtained after dismantling	2 years						

S.N	Activity	Time Frame	YEAR					
			Operational Phase			Post Closure Phase		
			1st - 10th	11th - 20th	21th - 43th	PC1	PC2	PC3
	*Plantation around the quarry area and in safety zone	Throughout the life of the mine including 3 years after cessation of mining operation						
	*Plantation over the OB Dump	Throughout the life of the mine						
G	**Post Closure Env Monitoring / testing of parameters for three years**							
	Air Quality	3 years						
	Water Quality	3 years						
H	***Entrepreneurship Development (Vocational/skill development training for sustainable income of affected people**	Throughout the life of the mine						
I	***Miscellaneous and other mitigative measures**	Throughout the life of the mine including 3 years after cessation of mining operation						
J	**Post Closure Manpower cost for supervision**	3 years						

NOTE: *: To be covered under Progressive Mine Closure activities also.

NOTE: The progressive mine closure will be done as per the provisions made out in the Mining Plan and as per the situation/requirement that may arise in course of execution of the Mining Plan

BHARAT COKING COAL LIMITED

MASTER PLAN
FOR
DEALING WITH FIRE, SUBSIDENCE AND REHABILITATION IN THE LEASEHOLD OF BCCL

UPDATED
MARCH' 2008.

CENTRAL MINE PLANNING & DESIGN INSTITUTE LTD
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I) As the manpower in BCCL is continuously reducing due to super -annuation, only 25000 BCCL houses shall be constructed against 42650 houses as proposed in the Master Plan. Therefore fund for construction of only 25000 houses shall be considered in the Master Plan.

II) The cost estimate of the fire projects should be reduced to the extent possible. Whenever fire is handled by direct removal of coal and OB, the cost shall be set off considering that 50% of coal will be available for selling.

III) A sample survey should be carried out for private (Pucca & Kutcha) for ascertaining suitable fund provision as compensation in the Master Plan.

IV) For the purpose of income generation scheme, it has been decided that head of every displaced house shall be paid wage of 250 days in a year for two years as per minimum wage rate of respective state Govts.

The Master plan, July'2006 has been prepared considering the above decision and was submitted to State Govt. of Jharkhand for their acceptance vide letter no.GM (ENV)/F-rhab/2007/138 dated 6.3.2007. Jharkhand state Govt. has not given acceptance as yet.

Cost up-dation of the Master Plan July'o6 has been done up to Feb'08 considering the increase in WPI and Civil Cost Index.. Increase in WPI was about 7% and Civil cost index was 14.28%

5.O SCOPE OF WORK OF MASTER PLAN '2008

Master Plan now covers only following two aspects:

i) **Dealing with fire**, which includes identification of fire areas, selection of technologies to deal with the fires, prioritization for implementation and assessment of tentative fund requirement.

ii) **Rehabilitation & Resettlement** of the affected people from the areas affected by fire & subsidence including identification of affected sites, identification of resettlement sites and assessment of tentative fund requirement.

Note: "BCCL vide letter no GM(Env)/F- /06 dated 22nd April, 2006 suggested that diversion of railway lines and NH 32 road passing through coal bearing areas of JCF should also be included in the Master Plan'2006.

Diversion of rails and roads passing over the coal bearing areas are affected by fire and subsidence at many places and may further be affected. As the diversion will affect the operation of other coal producing companies like TISCO & SAIL, other industries operating in the coalfield and State Govt. as well as Railway, a joint decision is to be taken involving all the above stakeholders.

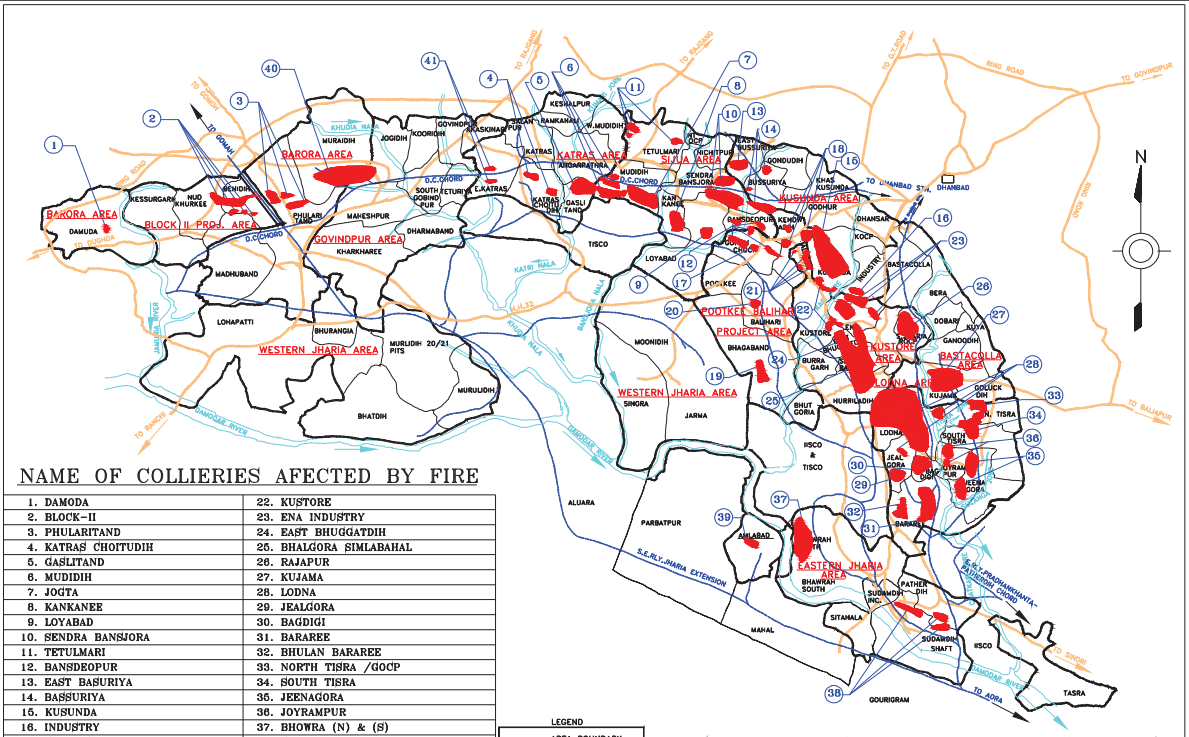
Moreover, the diversion of rail and road requires survey of the alternative routes, detail layout planning by expert agencies like RITES and likely to take about two years time.

Therefore, in this Master Plan, a lump sum provision of Rs.20 Crs has been kept for survey and planning only as an advance action. The detail proposal for diversion may be taken up as a separate Master Plan in future. "

As per the recommendation of the committee constituted by DGMS, all the sites proposed for stabilization in the Master Plan '99, have now been considered for rehabilitation. The time frame for implementation of Revised Master Plan has been considered as 10 years proposed to be implemented in two Phases (Phase – I & II each of 5 years duration), excluding 2 years of pre-implementation period.

Implementation of the Fire control measures and rehabilitation of BCCL houses from the endangered area will be the responsibility of BCCL, where as rehabilitation of Non-BCCL houses/structures from the endangered areas will be the responsibility of State Govt. of Jharkhand and West Bengal. Land acquisition for BCCL employees shall be done in association with State Govt. of Jharkhand.

Rehabilitation sites will be located on non-coal bearing area along the fringe / periphery of Jharia coalfield. The sites will have the basic infrastructural facilities like Water & Electricity, School, Banks, Hospitals, Market Complex, Play Ground, and Community Center etc.



NAME OF COLLIERIES AFECTED BY FIRE

1. DAMODA	22. KUSTORE
2. BLOCK-II	23. ENA INDUSTRY
3. PHULARITAND	24. EAST BHUGGATDIH
4. KATRAS CHOITUDIH	25. BHALGORA SIMLABAHAL
5. GASLITAND	26. RAJAPUR
6. MUDIDIH	27. KUJAMA
7. JOGTA	28. LODNA
8. KANKANEE	29. JEALGORA
9. LOYABAD	30. BAGDIGI
10. SENDRA BANSJORA	31. BARAREE
11. TETULMARI	32. BHULAN BARAREE
12. BANSDEOPUR	33. NORTH TISRA /GOCP
13. EAST BASURIYA	34. SOUTH TISRA
14. BASSURIYA	35. JEENAGORA
15. KUSUNDA	36. JOYRAMPUR
16. INDUSTRY	37. BHOWRA (N) & (S)
17. GOPALICHAK	38. SUDAMDIH & PATHERDIH
18. KENDWADIH	39. AMLABAD
19. BHAGABAND	40. SHATABDI OCP(MURAIDIH COLLIERY)
20. KACHHI BALIHARI	41. EAST KATRAS COLLIERY
21. ALKUSA	

LEGEND
- AREA BOUNDARY
- COLLIERY BOUNDARY
- RIVER/JORE
- RAILWAY LINE
- ROAD
- SURFACE FIRE

COLLIERYWISE TENTATIVE LOCATIONS OF FIRE AREAS IN JHARIA COALFIELD

A/C No. F:\MASTER PLAN\41FIRE

TABLE -1

LIST OF FIRES IN THE LEASEHOLD OF BCCL

Sl. No.	Name of the fire	Fire Status
1	Ganeshpur X, XI , XII & XIII seam fire	Active
2	Burwabera X seam fire	Active
3	Phularitand X, XI, XII seam fire	Active
4	Angarpathra XII, XI, X, IX Spl. seam fire	Extinguished
5	Gaslitand XVT, XVB seam fire	Active
6	Jogta XV, XIV, XIII, XII, XI seam fire	Active
7	Kankanee XIII & XIV seam fire	Active
8	Ekra XI & XII seam fire	Active
9	Ekra XIII & XIV seam fire	Active
10	Loyabad XV, XIV, XIII seam fire	Active
11	Bassuriya XIV, XIII & XII, XI and X seam fire	Active
12	Sendra Bansjora XIV, XIII, XII, XI seam fire	Active
13	Bansdeopur XIV, XII seam fire	Active
14	Gopalichak XVI, XV, XIV, XIII, XII,XI seam fire	Active
15	Industry XII, XI seam fire	Active
16	Kusunda XII, XI seam fire	Active
17	Alkusa XII, XIV seam fire	Active
18	Kustore XIV, XIII, XII, XI seam fire	Active
19	Ena XII, XI seam fire	Active
20	Pure jharia X seam fire	Active
21	K.P. Dobari X, V/VI/VII/VIII/VIIA seam fire	Active
22	Rajapur X seam fire	Active
23	Kujama XII, XI seam fire	Active
24	Kujama IX, X seam fire	Active
25	Bhalgora XIV seam fire	Dormant
26	Bhalgora XV seam fire	Dormant
27	East Bhuggatdih XV, XIV seam fire	Active
28	Ena XIV seam fire	Active
29	Ena XV seam fire	Active
30	Simlabahal XIV seam fire	Dormant
31	N.S. Lodna XIII, XIIIA, XIV seam fire	Active
32	Bagdigi XIV, XIA, XV seam fire	Active
33	Baniahar XV, XIVA, XIV seam fire	Active
34	Bhaga XV seam fire	Active
35	South Tisra VII, VIII, IX, X seam fire	Active
36	Bhowra XIII, XIV seam fire	Active
37	Bararee XV, XIVA, XIV seam fire	Active
38	Bhulan Bararee XIII, XIV seam fire	Active
39	Bhulan Bararee XVI, XV seam fire	Active
40	Sudamdih IX to XIV seam fire	Active
41	Patherdih IX to XIII seam fire	Active

Sl. No.	Name of the fire	Fire Status
42	Bhowra IX , X seam fire	Active
43	Block –II XII, XI/XII, X Spl. seam fire	Active
44	Katras-Choitudih XIII seam fire	Active
45	Katras-Choitudih XIV, XV seam fire	Active
46	Tetulmari IV seam fire	Active
47	Tetulmari VI/VII seam fire	Active
48	Kendwadih XIII seam fire	Dormant
49	Kendwadih XIV, XIII seam fire	Dormant
50	Pootkee XV seam fire	Extinguished
51	East Bassuriya V/VI seam fire	Active
52	East Bassuriya VIII seam fire	Active
53	Kessurgarh V, VI, VII seam fire	Extinguished
54	Bhagaband XVI seam fire	Dormant
55	Amlabad XIV seam fire	Dormant
56	Sudamdih XV seam fire	Extinguished
57	Moonidih XVIIT seam fire	Extinguished
58	Damoda V, VI, VII seam fire	Dormant
59	Mudidih fire	Dormant
60	Jogidih X seam fire	Extinguished
61	Kooridih X seam fire	Extinguished
62	Nudkhurkee X seam fire	Extinguished
63	West Mudidih IX/X seam fire	Extinguished
64	East Katras XIV seam fire	Extinguished
65	North Tisra VII, VIII, IX seam fire	Active
66	North Tisra X seam fire	Active
67	Jeenagora IX, X, XI seam fire	Active
68	Jeenagora IX, X, XI,XII seam fire	Active
69	Joyrampur XI, XII, XIII seam fire	Active
70	Jealgora XV, XIV, XIIIB, XIIIA seam fire	Dormant
71	Bassuriya IX,I X Spl. seam	Active
72	Industry X seam	Active
73	Kachhi Balihari XV seam	Dormant
74	Kendwadih XI, XII seam	Active
75	Shatabdi V/VI/VII seam	Active
76	Sendra Bansjora X seam	Active
77	East Katras XI,XIII & XIV seam fire	Active

7.0 MASTER PLAN FOR REHABILITATION OF INHABITATED FIRE & SUBSIDENCE PRONE AREAS.

7.1 Introduction:

In the updated Master Plan of April'04, altogether 532 sites (271 in full & 261 in part) were considered for rehabilitation as the houses over these sites were declared unstable & uncontrollable (UU) as ground movement can not be controlled by stowing. Total no. of houses proposed to be evacuated from 532 sites were 65300 which includes

BCCL houses	:	36208
Non-BCCL : Private houses	:	15571
Non- BCCL : Un-authorised houses (Encroacher)	:	12719
Others : (Religious places, schools, Hospitals, Post offices, Police stations etc).	:	802

Apart from these 532 sites, 121 sites were considered unstable but controllable (UC) i.e where ground movement could be controlled by stowing.

In accordance with the directive of Supreme court of India, on 3rd May, 2005, Director General of Mines Safety (DGMS) constituted a Committee to go through the Action Plan and subsequent affidavit/ATR filed by UOI and to verify the same in connection with PIL case filed by Sri Haradhan Roy, Ex MP.

The Committee concluded that as there are no scientific methods available to check long term stability, it might not be possible to certify that the areas thus stabilized. The present stabilization work may restrict the effect of subsidence and allow some time. The final and permanent solution is evacuation of the affected area and rehabilitation.

In view of the above, 121 sites which were proposed for stabilization have now been considered for rehabilitation.

7.2 Total no. of houses in the endangered areas

Over the period of time from original Master Plan of March'1999 to date, 24 Nos. of sites have been demolished and shifted to other places by BCCL management. These sites have been deleted from this Master Plan.

Where fire dealing has been proposed by excavation method some stable parts are necessarily to be evacuated for digging out the fire. Such stable parts have now been

10 The community facilities like primary schools, community centre, small dispensary and shopping centre will also be included in the town planning. These common facilities will be constructed as per the plan under the proposed compensation package. However, the running cost of all the facilities, i.e. water supply, power supply, schools, dispensary etc. shall not be the part of compensation package and will have to be looked after by the Panchayat and other bodies of the State Government.

11 Common structures such as religious places etc. shall be built at resettlement site on mutual agreement basis from Rehabilitation fund of Master Plan.

12 The proposed location of resettlement site is guided by the following considerations:-

a) Preferably the proposed resettlement site should be either land owned by BCCL or vested to the state Government.

b) In case such land are not available, then the required land may be purchased from private owner by State Govt.

13. No employment shall be offered for any rehabilitation under the Master Plan

7.4.2 BCCL Houses:

BCCL houses from the endangered areas are proposed to be rehabilitated in four Satellite Township in non-coal bearing areas along the periphery of JCF. The houses over endangered houses will be rehabilitated with equivalent type of house in satellite township in triple storied building having all basic infrastructural facilities. As soon as an employee residing in the identified endangered area retires, the house shall be demolished.

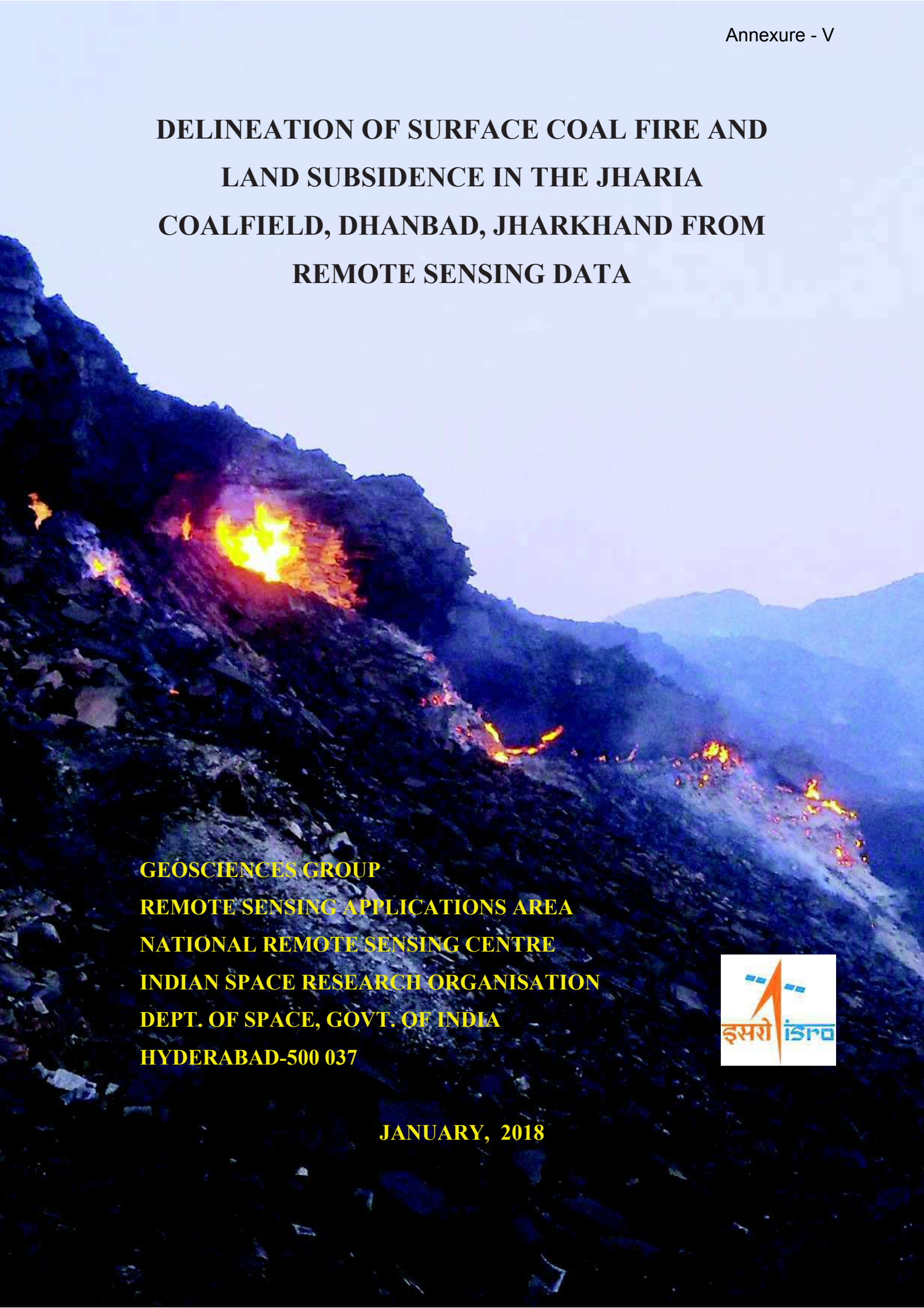
It is proposed that Rehabilitation/resettlement work of BCCL houses shall be the responsibility of BCCL whereas the same for Non BCCL houses including encroachers shall be the responsibility of concerned state Govt. However acquisition of land for rehabilitation of BCCL employees shall be done in association with State Govts of Jharkhand/West Bengal.

7.5 Amenities & Infrastructures:

The resettlement sites of the affected population for BCCL & Non-BCCL has been identified exclusively on non coal bearing areas sufficiently away from the impact of future mining. For this purpose, it is proposed that satellite township should be constructed along the fringe of Jharia Coal Field. The size of township should be large enough to accommodate at least 12500 Non-BCCL families and 6000 BCCL families. In each locality, there will be separate town ship for BCCL houses and Non-BCCL (both private & encroachers) adjacent to each other. In each township the following amenities will be provided as per BPE norm.

40	E. Jharia	Sudamdih Inc.	Main Colony Miners house/05	19200
41	E. Jharia	Sudamdih Inc.	Main Colony/ O3	16000
42	E. Jharia	Sudamdih Inc.	Old Incline Colony/06	4800
43	E. Jharia	Sudamdih S.M.	New Miners colony/02	33600
44	E. Jharia	Sudamdih S.M.	River side colony/01	30400
45	**Gobindpur**	Akashkinaree	Akashkinare Colony/ O6	3837
46	Gobindpur	Akashkinaree	Labour Qtrs. Along PWD Road/ O2	19139
47	Gobindpur	Akashkinaree	Part of Bhatmurna Bastee/O3	6996
48	Gobindpur	Akashkinaree	Qtrs. Along office compound/O4	37973
49	Gobindpur	Akashkinaree	Qtrs.on South side of Akashkinaree/O5	32070
50	Gobindpur	Block-IV / Kooridih	Kooridih 3 seam Area Hutment/ O4	1870
51	Gobindpur	Block-IV / Kooridih	LCH Dhowrah Govindpur/18	720
52	Gobindpur	Block-IV / Kooridih	Near Block-IV Office/15	26846
53	Gobindpur	Block-IV / Kooridih	Near Gobindpur Hospital/14	24280
54	Gobindpur	Block-IV / Kooridih	NHS Qrts/12	1400
55	Gobindpur	Block-IV / Kooridih	South Gobindpur Bastee/16	7040
56	Gobindpur	Block-IV / Kooridih	South Gobindpur Dhowra/17	1562
57	Gobindpur	Gobindpur	Agardih Labour Qtrs/O7	17580
58	Gobindpur	Gobindpur	Darpan Bastee/O5	132
59	Gobindpur	Gobindpur	Imli Dhowrah/O3	31145
60	Gobindpur	Gobindpur	IV Seam Colony/O1	57408
61	Gobindpur	Gobindpur	Labour Qrts./O6	1174
62	Gobindpur	Gobindpur	Mehtadih Colony & Bunglow/O4	31145
63	Gobindpur	Jogidih	Baihardih Colony 'B'/ 1B	8365
64	Gobindpur	Jogidih	Baihardih Village/1A	5118
65	Gobindpur	Kharkharee	Nawagarh More & Phularitand Village/ O3	14400
66	Gobindpur	Kharkharee	Part of Phularitand Village/ 3A	24000
67	Gobindpur	Maheshpur	Maheshpur Bastee/O1	33309
68	Gobindpur	Maheshpur	NHS Qtrs. & House North of DB Road/11	43823
69	Gobindpur	Maheshpur	Premnagar Colony Bastee etc./ 14	13418
70	Gobindpur	Maheshpur	Staff Qtrs. & Hutment/O4	2806
71	Gobindpur	S.Gobindpur	Bilbera - C/13	8000
72	Gobindpur	S.Gobindpur	Bilbera 'A'/ O7	1600
73	Gobindpur	S.Gobindpur	Kali Nagar Bilbera/12	8000
74	Gobindpur	S.Gobindpur	South Govindpur 'B/O6	2400
75	Gobindpur	S.Gobindpur	Tandabari-A/O1	18400
76	Gobindpur	Teturia	Colliery Office Area/O3	22400
77	Gobindpur	Teturia	NHS Qtrs.& Hutment/O1	43600
78	Gobindpur	Teturia	No.2 Locality/O2	32800
79	**Katras**	Angarpathra	AP Section-2 /O2	16800
80	Katras	Angarpathra	JK Khas/O4	2200
81	Katras	Angarpathra	JK Section/O3	62400
82	Katras	Angarpathra	National Angarpathra-2/O6	6500
83	Katras	East Katras	Akashkinaree 04/06	2800
84	Katras	East Katras	Akashkinaree -2/O2	400
85	Katras	East Katras	Akashkinaree 3/O4	3840
86	Katras	East Katras	Akashkinaree 5/O7	1000
87	Katras	East Katras	Akashkinaree-6/O8	4350
88	Katras	East Katras	Bhandardih 2 /11	2500
89	Katras	East Katras	Koiludih 01/03	3900
90	Katras	East Katras	Koiludih 3/10	40180
91	Katras	East Katras	Koiludih 4/15	65752

DELINEATION OF SURFACE COAL FIRE AND LAND SUBSIDENCE IN THE JHARIA COALFIELD, DHANBAD, JHARKHAND FROM REMOTE SENSING DATA



GEOSCIENCES GROUP
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INDIAN SPACE RESEARCH ORGANISATION
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HYDERABAD-500 037

JANUARY, 2018

DELINEATION OF SURFACE COAL FIRE **AND** LAND SUBSIDENCE IN THE JHARIA COALFIELD, DHANBAD, JHARKHAND FROM REMOTE SENSING DATA

Report for

BHARAT COKING COAL LIMITED (BCCL)

(A SUBSIDIARY OF COAL INDIA LTD.)

ENVIRONMENT DEPARTMENT, KOYLA BHAWAN

KOYLA NAGAR, DHANBAD – 826 005, JHARKHAND

GEOSCIENCES GROUP

REMOTE SENSING APPLICATIONS AREA

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JANUARY, 2018

EXECUTIVE SUMMARY

Coal fire is a serious problem in Jharia coal field, where high ranking coals are gradually burnt due to these fires. The combined effect of surface and sub-surface fires and mining related subsidence has endangered the environmental stability of Jharia coal field. Coupled with the ecological changes instigated by open cast mining, the landscape in and around Jharia have changed drastically over the years. In the present study, delineation of coal fire and mining related land subsidence have been addressed. Thermal band of Landsat-8 (100m resolution) have been used to demarcate the coal mine fire areas from non fire areas. For this study, Landsat-8 data of May, 2017 have been used. The band 10 (10.60-11.19 μm) of Landsat-8 data is used to derive the relative radiant temperature. Further ALOS-PALSAR 2, L band microwave data has been used to delineate zone of probable land subsidence (using differential interferometry) due to mining. The study reflects that, compared to 2012, the eastern flanks (Lodna and Tisra) show a larger fire area. The western flank (Nadkhurkee and Shatabdi) and the northern flank (Katras and Gaslitand) show isolated fire pockets in active mines as well as OB dumps. Among all the colliery areas, Kusunda and Lodna area is most affected by coal mine fire. The current fire area mapped is 3.28 sq.km. Apart from this, five distinctive areas of land subsidence have been identified using interferometric method. These are primarily caused by older or active underground mining. The Moonidih Project is most affected by subsidence. The coal mine fire and subsidence areas are further verified on the ground. The final coal mine fire and subsidence map of Jharia coal field is prepared by using remote sensing data analysis with field validation.

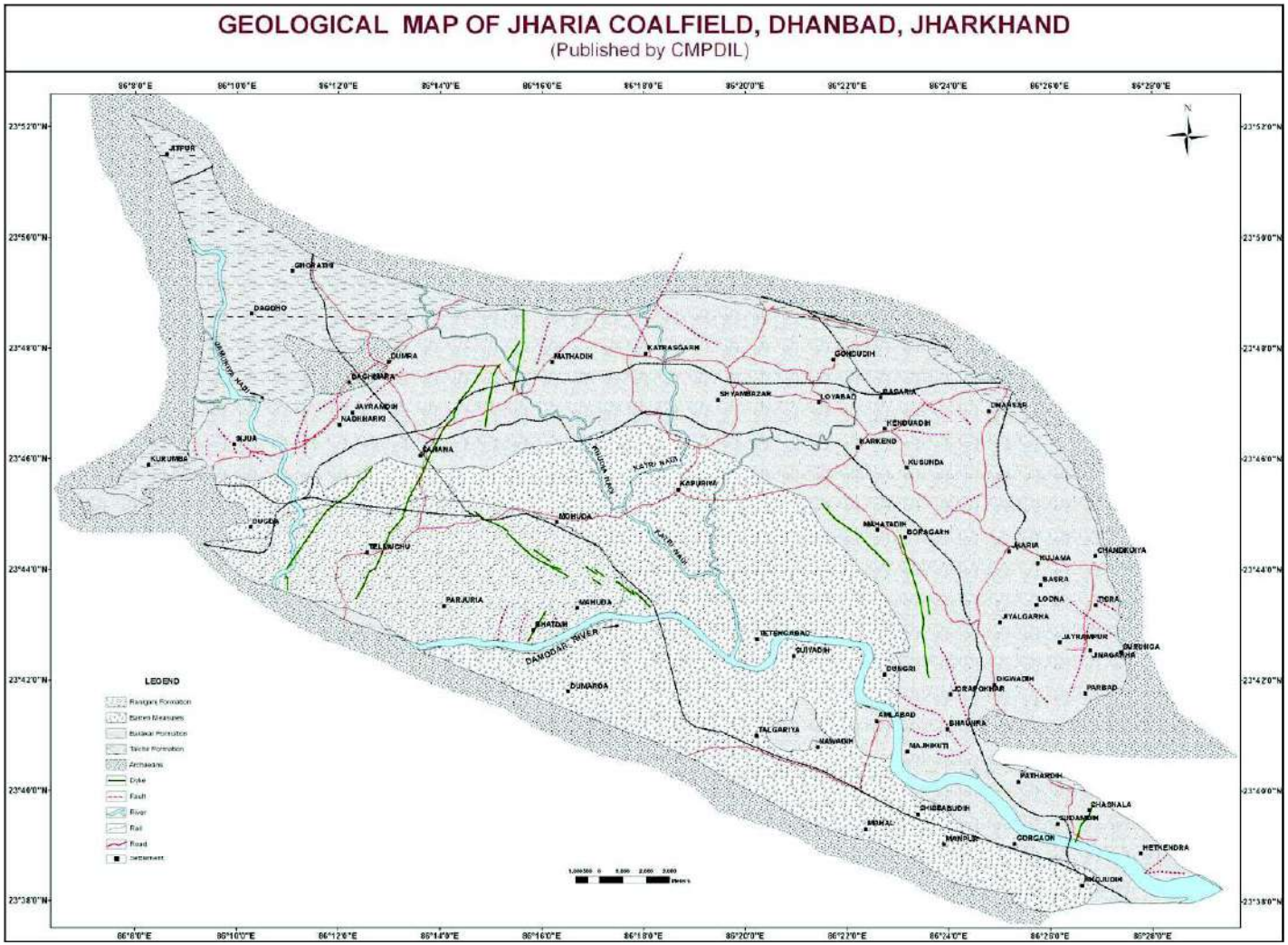


Figure 2 : Geological map of Jharia coal field, Dhanbad, Jharkhand (published by CMPIDL)

CHAPTER VII

DISCUSSIONS AND CONCLUSIONS

7.1 Discussions

7.1.1 Coal fire analysis

The present study is aimed to provide the status of coal fire in the Jharia coal field for the period of 2017. Landsat-8 data of May, 2012 was used to prepare the coal mine fire map (Figure 5) for the year 2017. The data have 100 m spatial resolution in the thermal bands and is as on study date, the best thermal satellite data available. The Coal fire maps of 2017 when compared to map of 2012 (NRSC, 2014) depicts the dynamics of coal fire. Coal fire is difficult to mitigate because of its dynamic nature. But the understanding the trend in the shift of coal fire zones and over all distribution of coal fire will help in environmental and risk management related to coal mining activities.

The coal mine fire map for the year 2017 (Figure 5 illustrates the overall fire distribution in the area). The maps reveal that the coal fires are distributed across the Jharia coal field in pockets associated with major open cast mining activities. All most all the coal mine fires are restricted to the Barakar Formation where coal seams are exposed. In the eastern flank of the arcuate shaped mining extent, the collieries in Lodna and Tisra (North and South) is the highest fire affected mining blocks and Bhowra, Bhulanbarari, Kujama and Jharia are also affected by multiple smaller fire pockets. The fire in the areas is mostly manifested by high temperature fume cracks with occasional presence of active flames especially the the Lodna-Tisra area. Further, towards the north east, in Ena and Kusunda active fires are more prevalent and the area is extensively affected. The highest radiant temperatures (in order of ~50°C) are recorded by the satellite sensors in these areas. In the north, a large number of moderate to small fire pockets are seen in the areas around Shyambazar (Figure 5 & 6). These are related to the mining areas of Katras, Gaslitand, Mudidih and Kankanee. Mining activity, over the last few of years has exposed new, isolated and discontinuous fires in these regions.

In the western flank, three distinguishable fire affected zones are seen. Toward the western end of the mining area, the Benedih and Block II OCP are affected by smaller fires from isolated coal seams. These again are surfacialy manifested in the

form of fume cracks with smoke emanating from them. The Shatabdi OCP are also affected but fire is manifested in the along vertical mining wall sections.

Comparison of the 2017 coal fire map with that of 2012 (NRSC, 2014) indicated the dynamism in the spatial extent and distribution of the coal fires. The changes are highlighted as follows:

i. In reference to the map generated in 2012, the 2017 map shows that the emergence/re-emergence of fires in the eastern flank, namely Kujama, Tisra, Lodna and Jharia etc. The entire zone has been affected by multiple fire occurrences. The spatial disposition of fires in Bastacolla, Jharia and Bhulanbarari appear to have a minor increase.
ii. The areal extent of major fire zone around Kusunda/Kenduadih and Ena appears to remain the same, though here again the spatial location of the anomalies has changed. This is probably due to the mitigation and active mining in this region.
iii. The fire zones in Benedih/Block II OCP and Shatabdi OCP have also changed/diminished in areal extent with presence of isolated smaller anomalies. There has been a considerable reduction in fire areas in and around the Shatabdi OCP.
iv. The spatial disposition of fire areas around Katras, Gaslitand and Mudidih show minor change. In 2012, a number of small fire pockets were seen, however presently those fire pockets have given away to a few fire zones of moderate disposition.
v. It needs to be noted that the 2012 study was carried out using ASTER data whereas the present study is carried out using Landsat-8 data. Therefore, the difference of sensor sensitivities will have a influence on the way the fires are sensed on the ground. Difference of sensor sensitivities will influence the number of fires identified as well as the areal extent of the fires in the data.

In summary, there is a change in the areal disposition of the fires from 2012 to 2017. Observations suggest the emergence/re-emergence of new areas in the eastern flanks in areas around Lodna and Tisra. Concurrently, there is a decrease in extent of fire areas Shatabdi, Nadkhurkee area in the western flank from 2012 to 2017. A quantitative comparison of the 2012 and 2017 data was carried out. As compared

2012, when the total fire affected extent of about 2.18 km^2; in 2017 total fire affected extent is about 3.28 km^2. The colliery wise break-up of change in fire area from 2012 to 2017 is given in Annexure III.

7.1.2 Subsidence analysis

An attempt to identify subsidence zones in the Jharia Coalfield was also carried out using ALOS-PALSAR-2 L band microwave data using differential interferometric technique. 5 scenes of PALSAR-2 data spanning over a period of 2014 to 2017 were used to delineate the subsidence if any in the region and separately identify them from the terrain changes due to mining. Verification of the subsidence zones as seen from data is difficult as it requires visible signatures of subsidence in the form of cracks on the ground and damage to anthropogenic structures. In this study, data analysis and consequent field verification resulted in identification is 5 prominent subsidence areas. Of these, the major area where considerable ground subsidence is occurring is the Moonidih UG project. Long term underground mining has resulted in continuous subsidence in the area. Apart from this, the other four areas are south of Block II OCP, Simlabahal and Bastacolla. No quantitative estimates of the subsidence has been carried out in the study.

7.2 Conclusions

The following conclusions can be made:

1. As of the date of study in the year 2017 and in comparison with the previous study done in 2012, there has been a change in areal extent and disposition of the fire affected areas.
2. Compared to 2012, the eastern flanks (Lodna, Tisra areas) show considerable increase in fire disposition and the western flank (Shatabdi and Block II area) show diminished fire presence.
3. The major new fire areas are observed in the northern flank in the areas around Lodna and Tisra etc. These areas were not mapped as fire in the 2012 study.
4. The mines in Kenduadih and Lodna remain to be the worst affected with maximum presence of active fires.
5. There is a increase in areal extent of the fire (Figure 12) from 2012 to 2017.

Note: *Estimations of fire extent (in terms of sq.km.) both in 2012 and in the present 2017 study are pixel based. They do not represent the actual ground area under fire. These estimations are made for comparative purpose only, to indicate the increase or decrease of areal disposition of fire. Hence, they should not be quoted as fire area on the ground.*

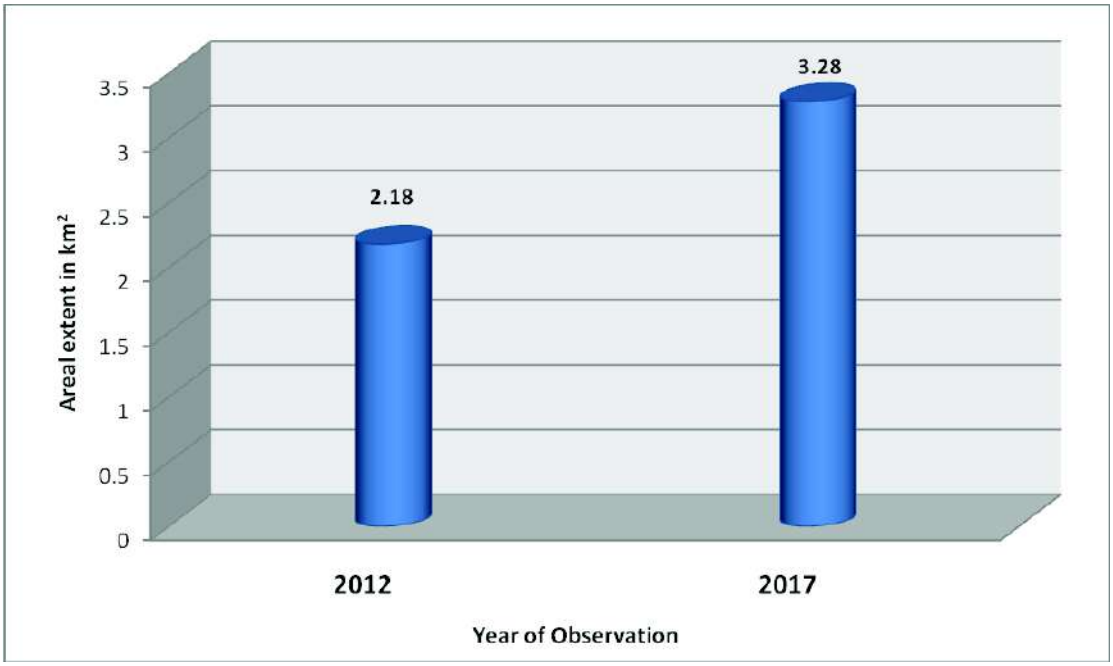


Figure 12: Total fire area statistics

Annexure –III

SL. NO.	COLLIERY AREA NAME	FIRE AREA 2012 (SQ. KM.)	FIRE AREA 2017 (SQ. KM.)	AREA CHANGE (SQ. KM.)	Increase/Decrease
1	DAMODA	0.0000	0.0000	0.000	NO FIRE
2	TISCO (west)	0.0000	0.0000	0.000	NO FIRE
3	IISCO	0.0000	0.0000	0.000	NO FIRE
4	TISCO (north)	0.0885	0.0153	-0.073	DECREASE
5	NUDKHURKEE OCP	0.0000	0.0000	0.000	NO FIRE
6	BENEDIH OCP	0.0530	0.0453	-0.008	DECREASE
7	BLOCK-II OCP	0.0530	0.1353	0.082	INCREASE
8	MURAIDIH OCP	0.1478	0.0022	-0.146	DECREASE
9	SHATABDI OCP	0.0378	0.0361	-0.002	DECREASE
10	TETURIA	0.0000	0.0000	0.000	NO FIRE
11	S.GOVINDPUR	0.0000	0.0000	0.000	NO FIRE
12	KORIDIH BLOCK-IV OCP	0.0000	0.0000	0.000	NO FIRE
13	JOGIDIH	0.0000	0.0000	0.000	NO FIRE
14	DHARAMABAND	0.0000	0.0000	0.000	NO FIRE
15	MAHESHPUR	0.0000	0.0000	0.000	NO FIRE
16	PHULARITAND	0.0133	0.0205	0.007	INCREASE
17	MADHUBAND	0.0000	0.0000	0.000	NO FIRE
18	AKASH KINARI	0.0000	0.0000	0.000	NO FIRE
19	GOVINDPUR	0.0000	0.0000	0.000	NO FIRE
20	E. KATRAS	0.0133	0.0000	-0.013	DECREASE
21	KATRAS-CHOITUDIH	0.1021	0.1368	0.035	INCREASE
22	KESHALPUR	0.0000	0.0013	0.001	INCREASE
23	RAMKANALI	0.0000	0.0000	0.000	NO FIRE
24	NICHITPUR	0.0000	0.0000	0.000	NO FIRE
25	E. BASURIA	0.0000	0.0000	0.000	NO FIRE
26	KHAS KUSUNDA	0.0000	0.0000	0.000	NO FIRE
27	GONDUDIH	0.0000	0.0000	0.000	NO FIRE
28	W. GODHAR	0.0012	0.0000	-0.001	DECREASE
29	BASURIA	0.0000	0.0000	0.000	NO FIRE
30	TETULMARI	0.0223	0.0220	0.000	DECREASE
31	DHANSAR	0.0000	0.0000	0.000	NO FIRE
32	GODHAR	0.1073	0.0000	-0.107	DECREASE
33	INDUSTRY	0.0119	0.0513	0.039	INCREASE
34	KUSUNDA	0.4243	0.7398	0.315	INCREASE
35	SENDRA-BANSJORA	0.0796	0.0275	-0.052	DECREASE
36	BASTACOLLA	0.0663	0.0810	0.015	INCREASE
37	BERA	0.0000	0.0000	0.000	NO FIRE
38	KUYA	0.0000	0.0000	0.000	NO FIRE
39	GOLUCKDIH	0.0301	0.1122	0.082	INCREASE
40	KUJAMA	0.0398	0.2404	0.201	INCREASE

41	S. JHARIA-R. OCP	0.0244	0.1118	0.087	INCREASE
42	DOBARI	0.0000	0.0000	0.000	NO FIRE
43	GONHOODIH	0.0398	0.0322	-0.008	DECREASE
44	SIMLABAHAL	0.0000	0.0000	0.000	NO FIRE
45	HURRILADIH&STD	0.0000	0.0000	0.000	NO FIRE
46	ENA	0.0918	0.0432	-0.049	DECREASE
47	BURRAGARH	0.0000	0.0000	0.000	NO FIRE
48	N. TISRA	0.0098	0.1802	0.170	INCREASE
49	LODNA	0.0000	0.3527	0.353	INCREASE
50	S. TISRA	0.0000	0.1015	0.102	INCREASE
51	BARAREE	0.1037	0.1074	0.004	INCREASE
52	AMLABAD	0.0000	0.0000	0.000	NO FIRE
53	PATHERDIH	0.0000	0.0000	0.000	NO FIRE
54	SUDAMDIH	0.0000	0.0000	0.000	NO FIRE
55	SITANALA	0.0000	0.0000	0.000	NO FIRE
56	MURULIDIH 20/21 PIT	0.0000	0.0000	0.000	NO FIRE
57	MURULIDIH	0.0000	0.0000	0.000	NO FIRE
58	BHATDIH	0.0000	0.0000	0.000	NO FIRE
59	LOHAPATTY	0.0000	0.0000	0.000	NO FIRE
60	IISCO	0.0000	0.0000	0.000	NO FIRE
61	TASRA-IISCO	0.0000	0.0000	0.000	NO FIRE
62	KENDUADIH	0.0610	0.0000	-0.061	DECREASE
63	BULLIHARY	0.0000	0.0000	0.000	NO FIRE
64	GOPALICHUCK	0.0000	0.0000	0.000	NO FIRE
65	POOTKEE	0.0000	0.0000	0.000	NO FIRE
66	BHURUNGIA	0.0000	0.0000	0.000	NO FIRE
67	KHARKHAREE	0.0000	0.0000	0.000	NO FIRE
68	GASLITAND	0.1194	0.1215	0.002	INCREASE
69	KANKANEE	0.0530	0.0525	-0.001	DECREASE
70	MUDIDIH	0.1141	0.1104	-0.004	DECREASE
71	W. MUDIDIH	0.0171	0.0000	-0.017	DECREASE
72	LOYABAD	0.0133	0.0063	-0.007	DECREASE
73	BHAGABAND	0.0000	0.0000	0.000	NO FIRE
74	MOONIDIH PROJECT	0.0000	0.0000	0.000	NO FIRE
75	E.BHUGGATDIH	0.0022	0.0214	0.019	INCREASE
76	ALKUSHA	0.0326	0.0294	-0.003	DECREASE
77	KUSTORE	0.0524	0.0463	-0.006	DECREASE
78	ANGARAPATRA	0.1331	0.0149	-0.118	DECREASE
79	SALANPUR	0.0000	0.0000	0.000	NO FIRE
80	BHOWRAH. N	0.0133	0.0980	0.085	INCREASE
81	BHOWRAH. S	0.0000	0.0000	0.000	NO FIRE
82	BAGDIGI	0.0000	0.0209	0.021	INCREASE
83	JEALGORA	0.0000	0.0067	0.007	INCREASE
84	JEENAGORA	0.0000	0.0470	0.047	NO FIRE

85	JOYRAMPUR	0.0099	0.1042	0.094	INCREASE
86	CHANDAN OCP	0.0000	0.0000	0.000	NO FIRE
87	BANSDEOPUR	0.0000	0.0000	0.000	NO FIRE
	TOTAL AREA	**2.18**	**3.28**	**1.10**	INCREASE

Table 6: Colliery wise break-up of change in fire area from 2012 to 2017

Note:
1) "**NO FIRE**" implicates that the fire has not been identified satellite data *(either absent or below sensor resolution)*
2) "**INCREASE**" implies, increase in fire area OR emergence of fire areas not identified in 2012 study.
3) "**DECREASE**" implies, decrease in fire area OR fire areas of 2012, which are not identified in present study *(either absent or below sensor resolution)*.
4) Estimations of fire extent (in terms of sq.km.) both 2012 and in present 2017 study are pixel based. They do not represent the actual ground area under fire. These estimations are made for comparative purpose only, to indicate the increase or decrease of areal disposition of fire. Hence, they should not be quoted as fire area on the ground.

भारत कोकिंग कोल लिमिटेड

(कोल इंडिया लिमिटेड का एक अंग)

BHARAT COKING COAL LIMITED

(A Subsidiary of Coal India Limited)

Corporate Identity No. (CIN): U10101JH1972GOI000918

Civil Engineering Department, Koyla Nagar, Dhanbad – 826 005 (JH), India.

Phone: 0326-2230338, FAX: 0326-2230338, e-mail: gmcivil@bccl.gov.in

NIT Ref. No.: BCCL/CED/TC/eNIT-20/2018-19/ 1098 **Date: 14.02.2019**

E – Tender Notice

Open E-Tender invited vide BCCL/CED/TC/eNIT-20/2018-19/ dated: 14.02.2019, for the work of "Drilling for establishment of 23 nos. Piezometric wells for cluster of mines of BCCL Command Area for Ground Water Monitoring."

Estimated cost: ₹ 48,93,151.75 **EMD: ₹ 61,200.00** **Period of Work: 180 days**

The tender documents can be downloaded from **01.03.2019 to 12.03.2019**. All prospective bidders are advised to visit website **https://coalindiatenders.nic.in** for further details and to participate against this tender. Full details of this tender are also available on website "**eprocure.gov.in**".

14/02/19.

(Shiv Raj)
Asst. Manager (Civil), TC

Copy to:-

1) CVO/ D (T), P&P/ D (P), BCCL ..... for kind information
2) Prof (Dr.) L.C Singhi, IAS (Retd.), L-31, Third Floor, Kailash Colony, New Delhi-110048
3) Shri Pramod Deepak Sudhakar, IAS (Retd.), A-002, Stellar Park Apartments, C-58/24 Sector-62, Noida (UP) - 201301.
4) CGMs/GMs of all Areas of BCCL.
5) GM (Systems), Koyla Bhawan.
6) General Manager (Civil), CED HQ
7) HOD (Envt.), BCCL, Koyla Bhawan.
8) HOD (Finance), Pay Section, Koyla Bhawan.
9) Builders Association of India, Central Akashkinaree Kanta, Katras Garh, Dhanbad-828113.
10) PRO, BCCL – with 5 copies for wide publication of the following abridged NIT in News Paper as per BCCL norms **on or before 01.03.2019.**
11) Notice Board.

भारत कोकिंग कोल लिमिटेड
एक मिनिरत्न कम्पनी
(कोल इंडिया लिमिटेड का एक अंग)
महाप्रबंधक का कार्यालय, पूर्वी झरिया क्षेत्र
पो.ओ.- भौरा, जिला - धनबाद (झारखण्ड)
पिन - 828302. दूरभाष - 0326-2320077,
ईमेल-cgmej@bccl.gov.in
पंजीकृत कार्यालय: कोयला भवन, कोयला नगर,
धनबाद- 825005, (झारखण्ड)
CIN: U10101JH1972GOI000918

Bharat Coking Coal Limited
A MINI RATNA Co.
(A Subsidiary of Coal India Ltd)
Office of the General Manager, Eastern Jharia Area
P.O. Bhowra, Dist: Dhanbad (Jharkhand),PIN- 828302
Tel.:0326-2320077, Email-cgmej@bccl.gov.in
Regd.Off: Koyla Bhawan, Koyla Nagar, Dhanbad-825005,
CIN: U10101JH1972GOI000918,
Tel.:0326-2230190/FAX: 0326-2230050, Email – cos@bccl.gov.in

Ref. No.: BCCL/EJ/GM/ Env./2019/ Date: 18/04/2019

To,
The Dy. GM / HoD (Env.)
BCCL
Koyla Bhawan

Sub.: To conduct study of the conditions mentioned in EC of Cluster X by CMPDIL

Dear Sir,

Environmental clearance of Cluster X is granted by MoEFCC under the Cluster X vide letter no. J-11015/380/2010-IA.II (M) dated 06.02.2013. Monitoring of Compliance of Conditions of the EC was done by RO, MOEFCC, Ranchi and submitted his report on 15.02.2019. For compliance of the Specific Condition of EC by MOEFCC following study must be conducted through CMPDIL/other agency at the earliest:

Specific Condition no. XVIII quote:

"A part of cluster X is under River Damodar. It was clarified that although the mine is underground, there is no coal underneath River Damodar, which would be mined. The Committee desired that the data of bore wells near River Damodar require to be monitored for permeability and seepage of waster of River Damodar."

Unquote

Therefore, competent authority is hereby requested to take necessary action for conducting the study of permeability & seepage of waster of Damodar River and installation of Bore wells near river.

Enclosed: as above

20/4/19
General Manager
E.J. Area

Copy to:
1. AGM, EJA
2. AM (Env.), EJA
3. Office Copy

भारत कोकिंग कोल लिमिटेड
एक मिनी रत्न कम्पनी
(कोल इंडिया लिमिटेड का एक अंग)
विभागाध्यक्ष (पर्यावरण) का कार्यालय
कोयला भवन, कोयला नगर, धनबाद

Bharat Coking Coal Limited
A Mini Ratna Company
(A Subsidiary of Coal India Limited)
Office of the HoD (Environment)
Koyla Bhawan, Koyla Nagar, Dhanbad

पत्रसंख्या: भाकोकोलि/ विभागाध्यक्ष (पर्या)/फाईल-Plantation/B-3/2021/264-27 (H) दिनांक: 18.02.2021

सेवा में,

वन प्रमंडल पदाधिकारी,

धनबाद

विषय : Work Order for carrying afforestation over 42.5 ha of OB dumps/physically reclaimed land of BCCL.

संदर्भ: (i) Our letter no.भाकोकोलि/उपमहाप्रबंधक(पर्या)/फाईल-B-3/2020/1529-1534(H) dt 10.12.2020
(ii) भाकोकोलि/उपमहाप्रबंधक(पर्या)/फाईल-B-3/2021/10-13/ (H) dt 06.01.2021.
(iii) Your letter no.84 dated 12.01.2021

माननीय महोदय,

This has reference to above mentioned letters, competent authority has approved for carrying afforestation over 42.5 ha of OB dumps/ physically reclaimed land of BCCL through DFO, Dhanbad, for a total estimated value of ₹ 1,19,75,665.00 (Rupees One crore nineteen lakhs seventy five thousand six hundred sixty five only) for four years with the following terms and conditions in respect of above mentioned work:-

1. The Period of work will be 04 years as per the estimate provided by Forest Department.

2. The aforesaid work is to be carried out at below mentioned sites:

S No	Name of the site	Type	Ha
1	NAKC, Govindpur	OB Dump	23.0
2	ASP, EJ Area	Physically reclaimed land	19.5
	TOTAL		42.5

3. The Forest department shall conduct all its afforestation activities subject to all laws, rules, statutory orders and regulations applicable to the site and the nature of the work.

4. The Forest department shall take up afforestation works on company's land with due expertise and supervision as per the scheme & estimates duly sanctioned as per the estimate submitted by forest department.

5. The estimate has been submitted by Forest Department considering 15% enhancement every year in labour wages of preceding year. However, the payment of Completion work, first year maintenance work and second year maintenance work will be made as per the actual labour wages prevailing in the corresponding year.

6. The Forest department shall exercise precautions on the aid and advice of the mine management for the safety of all lives and properties involved in the afforestation activities.

7. **SCOPE OF WORK**
This work shall be done with the following attributes:

(i) Self-sustaining / healthy plantation at the end of project period/ at the handover of the site.

(ii) The plants planted shall be of native species, high root density, soil binding species, thick canopy and/or fruit bearing. The following suggested native species shall preferably but not limited to be planted at the sites:

S.No.	Botanical Name	Common name	S.No.	Botanical Name	Common name
1.	*Ailanthus excelsa*	Mahanim	2.	*Ficus hispida*	Kath gular
3.	*Albizzia lebbeck*	Siris	4.	*Ficus religiosa*	Pipal
5.	*Alstonia scholaris*	Chatni	6.	*Albizia Procera*	Safed Siris
7.	*Azadirachta indica*	Neem	8.	*Madhuca indica*	Mahua
9.	*Bombax ceiba*	Semal	10.	*Melia composita*	Bakain
11.	*Butea monosperma*	Palas	12.	*Tamarindus indica*	Imli
13.	*Cassia fistula*	Amaltas	14.	*Terminalia arjuna*	Arjun
15.	*A. Odoratissima*	Kala Siris	16.	*Aegle marmelos*	Bel
17.	*Dalbergia sissoo*	Shisham	18.	*Mangifera indica,*	Aam
19.	*Ehretia laevis*	Chamror	20.	*Zizyphus nummularia*	Ber
21.	*Ficus glomerata*	Gular	22.	Embilica officianlis	Awala
23.	*Syzygium cumini*	Jamun	24.	Anthocephalus indicus	Kadamb
25.	*Acacia Catechu*	*Desi Kher*	26.	Gmelina arbora	Gamhar
27.	And other fruit bearing native species or the species deemed suitable by the Forest deptt.				

(iii) Survival of the plantation shall not be less than 80 per cent at the end of the project period.

8. Annual Joint Inspection report of the inspection carried out by joint team of Forest Department and BCCL personnel after the completion of each year work should indicate name of the site, year of plantation, number of plants, name of the species present, date of inspection and survival rate.

9. The display boards shall be installed at all the plantation sites indicating, the name of the company, the no. of plantation, species planted, name of site of plantation and plantation year.

10. All the materials & manpower required with regard to the aforesaid work shall be arranged by you at your own cost.

11. The Forest department shall pay wages not less than the minimum wages fixed by the Govt of Jharkhand to the labourers engaged in the execution of the aforesaid work and it will be the responsibility of the Forest department to ensure the compliance of the payment of wages to its workmen/labourers as per law and company shall not be held responsible for the same.

12. In case of revision of minimum wages by the Govt of Jharkhand during the work, a revised estimate of the corresponding year of the scheme as per the work order shall be submitted to the company by Forest Department and claim the amount of difference in wages payable due to increase in labour wages on the basis of man days works on revised wage for which the forest department shall certify.

13. As the afforestation work has been directly monitored by Ministry of Coal, every year on monthly basis; therefore, you will provide the plantation data from June 2021 to October 2021 on monthly basis during the completion year (2021-22).

14. The afforestation sites as mentioned in the this work order shall be handed over to mine management after the Joint inspection at the end of the Maintenance year-2 and having survival rate not less than 80%.

15. **TERMS OF PAYMENT**

Total project cost is ₹ 1,19,75,665.00 (Rupees One crore nineteen lakhs seventy five thousand six hundred sixty five only) as per the estimate submitted by Forest Department. The payment schedule will be as follows: -

S. No	Financial Year	Details of the work	Amount (Rs.)	Remarks
1.	2020-21	Advance Work	44,41,205.00	Wages @ ₹ 295.80 per MD
2.	2021-22	Completion work	46,85,034.00	Wages @ ₹ 340.17 per MD
3.	2022-23	Maintenance work-1	17,03,227.00	Wages @ ₹ 391.19 per MD
4.	2023-24	Maintenance work-2	11,46,199.00	Wages @ ₹ 449.87 per MD
Total			11975665.00	

16. The estimate for the Completion work, Maintenance work-1 and Maintenance work-2 is based on the tentative increase in the labour wages @ 15% of preceding year's wages as submitted in the estimate by the Forest Department. Therefore, the forest department shall certify the rate of labour wages for the corresponding year and demand letter/ bill based on the actual rates of labour wages to that corresponding year.

17. **Paying Authority:** HOD (Pay), Pay Office, BCCL HQ, Koyla Bhawan, Dhanbad.

18. All the payment will be made by ELECTRONIC MODE through bank in the account of DFO, Dhanbad. You are required to fill the format of Electronic Fund Transfer (EFT) in triplicate which is enclosed as annexure-A.

19. For release of the payment, you have to submit
    a) The letter of acceptance of the work order along with the Demand letter/Bill for the Advance work.

    And for further payments regarding this work order
    a) Utilization certificate of the preceding payment made to you in respect of this work order
    b) Joint inspection report of preceding year's work.
    c) Demand letter/Bill based on the actual rates of labour wages to that corresponding year for payment.

    The utilization certificates along with joint inspection report shall be accepted by the accepting authority i.e. HOD (Env), BCCL.

20. BCCL shall not have any liability in case of any accident etc. towards Forest Department's personnel/ staffs /workers during the execution of the work.

21. Child labour is prohibited under Mines Act, therefore, child labour shall not be deployed in the aforesaid work.

22. All other conditions stipulated in aforementioned reference letters shall be complied.

23. Matter relating to any dispute or difference arising out of this work order shall be subject to the jurisdiction of Dhanbad court only.

18/2/21

विभागाध्यक्ष (पर्यावरण)

Copy to:-

1. TS to D (T) OP/ D(T) PP, BCCL..... for kind information please.
2. GM (Vigilance), BCCL..... .....for kind information please.
3. GM, Govindpur/ EJArea ....for kind information please
4. Project Officer, NAK Colliery, Govindpur/ ASP Colliery, EJ Area
5. HOD, (Pay)/ In-charge Pay Office, BCCL HQ, Koyla Bhawan, Dhanbad.
6. Master File/Office Copy

18/2/21

विभागाध्यक्ष (पर्यावरण)

भारत कोकिंग कोल लिमिटेड
एक मिनिरत्न कम्पनी
(कोल इंडिया लिमिटेड का एक अंग)
महाप्रबंधक का कार्यालय, पूर्वी झरिया क्षेत्र
पो.ओ.- भौरा, जिला - धनबाद (झारखण्ड)
पिन - 828302, दूरभाष - 0326-2320077,
ईमेल-cgmej@bccl.gov.in
पंजीकृत कार्यालय: कोयला भवन, कोयला नगर,
धनबाद- 825005, (झारखण्ड)
CIN U10101JH1972GOI000918

Bharat Coking Coal Limited
A MINI RATNA Co.
(A Subsidiary of Coal India Ltd)
Office of the General Manager, Eastern Jharia Area
P.O. Bhowra, Dist: Dhanbad (Jharkhand),PIN- 828302
Tel.:0326-2320077, Email-cgmej@bccl.gov.in
Regd.Off: Koyla Bhawan, Koyla Nagar, Dhanbad-825005,
CIN: U10101JH1972GOI000918,
Tel.:0326-2230190/FAX: 0326-2230050, Email – cos@bccl.gov.in

Ref. No.: BCCL/EJ/GM/ENV/DFO/2021/ 31

Date: 25/03/2021

सेवा में,
वन प्रमंडल पदाधिकारी,
धनवाद।

Sub.: **Work Order for the work of "Plantation of 3900 no. of trees under Riverside Plantation Scheme against the felling of 377 no. of trees in E.J. Area"**

Ref:

(i) **Our letter no.-GM/EJ/ASP/DFO/2020/51 dated 04.05.2020 & BCCL/EJ/GM/2020/71 dated 24.08.2020**

(ii) **Your letter no.293 dated 05.02.2021**

Dear Sir,

In reference to above-mentioned letters, the Competent Authority has granted the approval for carrying out **"Plantation of 3900 no. of trees under Riverside Plantation Scheme"** against the felling of 377 no. of trees of ASP Colliery, through DFO, Dhanbad for a total value of Rs. 20,99,997.93 (Rupees twenty lakhs ninety nine Thousand nine hundred ninety seven and ninety three paise only) with the following terms and conditions:-

1. The Period of work from the date of acceptance of work order will be as follows:
   - 07 years for riverside plantation scheme

2. The aforesaid work is to be carried out at locations namely-
   - River side of Damodar river in leasehold of ASP colliery in Gourigram mouza – River side plantation in 2.6 Ha. area

3. The Forest department shall conduct all its afforestation activities subject to all laws, rules, statutory orders and regulations applicable to the site and the nature of the work.

4. The Forest department shall take up plantation works on company's land with due expertise and supervision as per the scheme & estimates duly sanctioned as per the estimate submitted by the forest department. The estimate has been submitted by Forest Department considering the labour wage @ Rs. 295.80 (i.e. of FY 2020-21).

5. The payment for advance work, Completion work and maintenance work-1 to maintenance work-5 will be made as per the actual labour wages prevailing in the corresponding year.

6. The Forest department shall exercise precautions on the aid and advice of the company for the safety of all lives and properties involved in the afforestation activities.

7. **SCOPE OF WORK:**

This work shall be done with the following attributes:

(i) Self-sustaining / healthy plantation at the end of project period/ at the time of the handover of the site.

(ii) Survival of the plantation at the end of the project period shall be more than 80% for riverside plantation.

8. Annual Joint Inspection report of the inspection carried out by the joint team of Forest Department and BCCL Area officials after the completion of each year work should indicate name of the site, year of plantation, number of plants, name of the species present, date of inspection and survival rate.

9. The display boards shall be installed at all the plantation sites indicating, the name of the company, type of plantation, the no. of plantation, species planted, name of the site of plantation and plantation year.

10. All the materials & manpower required with regard to the aforesaid work shall be arranged by you at your own cost.

11. The Forest department shall pay wages not less than the minimum wages fixed by the Govt. of Jharkhand to the laborers engaged in the execution of the aforesaid work and it will be the responsibility of the Forest department to ensure the compliance of the payment of wages to its workmen/laborers as per law and the company shall not be held responsible for the same.

12. In case of the revision of minimum wages by the Govt. of Jharkhand during the aforesaid work period (i.e. FY 2021-22 to FY 2026-27), a revised estimate of the scheme for the aforesaid work order along with Govt. Notification of Revised wages rates should be forwarded to the company without delay by the Forest department to amend the cost of the work. The Forest department then shall claim the amount of difference in wages payable due to increase in labour wages on the basis of man days works on revised wage which the forest department shall certify.

13. As the plantation work is being directly monitored by the Sustainable Development Cell of Ministry of Coal, GoI every year on monthly basis; therefore, you will provide the plantation data during the completion year (2021-22).

14. The afforestation sites as mentioned in this work order shall be handed over to BCCL after the Joint inspection at the end of the project period and having survival rate as specified at point no. 7 (ii).

15. TERMS OF PAYMENT

Total project cost is Rs. 20,99,997.93 (Rupees twenty lakhs ninety nine Thousand nine hundred ninety seven and ninety three paise only) for seven years. The payment schedule should be as follows: -

S. No	Financial Year	Details of the work	Amount (Rs.)	Estimate based on Wage rate:
1.	2020-21	Advance Work	13,98,576.56	Wages @ Rs 295.80 per MD
2.	2021-22	Completion work	1,82,875.03	Wages @ Rs 295.80 per MD
3.	2022-23	Maintenance work-1	1,81,363.36	Wages @ Rs 295.80 per MD
4.	2023-24	Maintenance work-2	1,71,744.72	Wages @ Rs 295.80 per MD
5.	2024-25	Maintenance work-3	73,148.66	Wages @ Rs 295.80 per MD
6.	2025-26	Maintenance work-4	46,144.80	Wages @ Rs 295.80 per MD
7.	2026-27	Maintenance work-5	46,144.80	Wages @ Rs 295.80 per MD
Total			**Rs. 20,99,997.93**	

16. The estimate calculated for the Advance work, Completion work and Maintenance work-1 to Maintenance work-5 is based on the current labour wages @ 295.80 per MD as submitted in the estimate by the Forest Department. In case of the revision of minimum wages by the Govt of Jharkhand during the aforesaid work period, the forest department shall certify the rate of labour wages for the corresponding year and provide demand letter/ bill based on the actual rates of labour wages to that corresponding year.

17. **Paying Authority:** AFM, Eastern Jharia Area, BCCL, Dhanbad

18. All the payment will be made by ELECTRONIC MODE through bank in the account of DFO, Dhanbad. You are required to fill the format of Electronic Fund Transfer (EFT) in triplicate which is enclosed as annexure-A.

19. For release of the payment, you have to submit
    a) The letter of acceptance of the work order along with the Demand letter/Bill for the payment of Advance work.

    And for further payments regarding this work order
    a) Utilization certificate of the preceding payment made to you in respect of this work order.
    b) Joint inspection report of preceding year's work.
    c) Demand letter/Bill based on the actual rates of labour wages to that corresponding year for payment.

    The utilization certificates along with joint inspection report shall be accepted by the accepting authority i.e. GM, E.J. Area.

20. BCCL shall not have any liability in case of any accident, etc. towards Forest Department's personnel/ staffs /workers during the execution of the work.

21. Child labour is prohibited under Mines Act, therefore, child labour shall not be deployed in the aforesaid work.

22. All other conditions stipulated in your letter no.- 293 dated 05.02.2021.

23. Matter relating to any dispute or difference arising out of this work order shall be subject to the jurisdiction of Dhanbad court only.

25/03/2021

महाप्रबंधक,
पूर्वी झरिया क्षेत्र, भौरा
बी.सी.सी.एल.

Copy to:-
1. TS to D (T) OP/ D(T) PP, BCCL..... for kind information please.
2. GM (Vigilance), BCCL..... .....for kind information please.
3. HoD (Environment), BCCL
4. HoD (Pay), BCCL
5. AGM, E.J. Area
6. AFM, E.J. Area, BCCL
7. Project Officer- ASP Colliery
8. AM(Env.),E.J. Area
9. Master File/Office Copy

कार्यालय : वन प्रमण्डल पदाधिकारी, धनबाद वन प्रमण्डल।

(मिश्रित भवन, लुबी सर्कुलर रोड, धनबाद)

0326-2313385
9471192101, 8987790305

Email– dfodhanbad@gmail.com
dfo-dhanbad@gov.in

पत्रांक :– 695 दिनांक :– 26.03.2021

सेवा में,

महाप्रबंधक,
भारत कोकिंग कोल लिमिटेड,
पूर्वी झरिया क्षेत्र,
धनबाद।

विषय :– नदी के किनारे 3900 पौधों का वृक्षारोपण के संबंध में।

प्रसंग :– आपका पत्रांक– 31 दिनांक– 25.03.2021

महाशय,

उपरोक्त विषयक प्रसंगाधीन पत्र के संबंध में सूचित करना है कि 3900 पौधों का नदी तट वृक्षारोपण हेतु अग्रिम कार्य की राशि 20,99,997.93 रूपया शीघ्र वन प्रमण्डल पदाधिकारी, धनबाद के पक्ष में शीर्ष कोर्ड 878200103010101 में चालान के माध्यम से हस्तान्तरित करने की कृपा की जाय, ताकि अग्रिम कार्य प्रारम्भ किया जा सके।

विश्वासभाजन

26-3-2021
वन प्रमण्डल पदाधिकारी,
धनबाद।
26.03.2021

Mishra G Letter 2021 (C2)

Annexure - VIII

STRICTLY RESTRICTED
FOR COMPANY USE ONLY RESTRICTED
The information given in this report is not to be communicated either directly or indirectly to the press or to any person not holding an official position in the CIL /GOVERNMENT.

ENVIRONMENTAL MONITORING REPORT OF BHARAT COKING COAL LIMITED, CLUSTER –X

(FOR THE MONTH MARCH, 2021)

E. C. no. J-11015/380/2010-IA.II (M) dated 12th June, 2019.

CMPDI
ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

CONTENTS

EXECUTIVE SUMMARY

1.0 Introduction

The purpose of environmental monitoring is to assess the quality of various attributes that affects the fauna and flora. In accordance with the quality of these attributes appropriate strategy is to be developed to control the pollution level within the permissible limits. The three major attributes are air, water and noise level.

Bharat Coking Coal Limited (BCCL), a Subsidiary company of Coal India Limited is operating Underground and Opencast Mines in Jharia Coalfield (JCF) is a part of Gondwana Coalfields located in Dhanbad district of Jharkhand, the JCF is bounded by $23^0$37' N to $23^0$52' N latitudes and $86^0$09' E to $86^0$30' E longitude occupying an area of 450 Sq.km. BCCL has awarded Environmental monitoring work of Jharia Coalfield (JCF) to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per the conditions laid down by the MoEF&CC while granting environmental clearance of project, consent letter issued by the respective SPCB, and other statutory requirements.

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

The ambient air quality monitoring stations were selected to represent core, buffer zone area. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

2.2 Water sampling stations

The Water sampling stations were selected for mine sump water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The noise levels were recorded in mining area, washery and in residential area.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM_{10}), Fine Particulate Matter ($PM_{2.5}$), Sulphur Di-oxide (SO_2) and Nitrogen Oxides (NO_X). Respirable Dust Samplers (RDS) and Fine Dust

Sampler ($PM_{2.5}$ sampler) were used for sampling of $PM_{10,}$ SO_2, & NO_X and Fine Dust Sampler ($PM_{2.5}$ sampler) were used for sampling of $PM_{2.5}$ at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analyzed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

Water samples were collected as per standard practice. The Mine effluent samples were collected and analyzed for four parameters on fortnightly basis. Thereafter the samples were preserved and analyzed at the Environmental Laboratory of CMPDI, RI- II, Dhanbad.

3.3 Noise level monitoring

Noise level measurements in form of 'L_{EQ}' were taken using Integrated Data Logging Sound Level Meter. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB(A).

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like $PM_{10,}$ $PM_{2.5}$, SO_2 and NO_X are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM_{10}& $PM_{2.5}$ exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

The following preventive and suppressive mitigative measures can be undertaken to contain the pollution level within prescribed level:-

- Wet drilling and controlled blasting should be practice.
- Explosive used should be optimised to restrict the dust generation.
- Transportation roads should be permanently asphalted free of ruts, potholes etc.
- Water should be sprayed on coal transportation road, service road more frequently and at regular interval.
- Dust from roads should be removed physically or mechanically.
- Greenbelts around industrial sites, service building area besides Avenue plantation along roads should be created.
- Coal dust should be suppressed by using fixed sprinklers.
- Regular maintenance of plant and machinery should be undertaken.

4.2 Water quality

The test results indicate that the major parameters compared with MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mineswere within permissible limits.

4.3 Noise Level

During the noise level survey it has been observed that the noise level in the sampling locations is within the permissible limits prescribed as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines for Industrial Area and Noise pollution (Regulation and Control) Rules, 2000.

INTRODUCTION

1.0 Any industry and development activities including coal mining is bound to affect environmental attributes. There are positive as well as negative impacts of such operations. For controlling the adverse impacts a regular monitoring is essential. The environmental monitoring is being done as per the guide-lines stipulated by Ministry of Environment, Forest and Climate Change (MoEF&CC), Govt. of India.

The very purpose of environmental monitoring is to assess the quality of various attributes which affects the environment. As per quality of these attributes appropriate strategy is to be developed to control the pollution level within the permissible limits. The three major attributes are air, water and noise level.

Bharat Coking Coal has awarded Environmental Monitoring work of all Projects, Cluster wise, to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per conditions laid down by MoEF&CC while granting environmental clearance to different projects. CMPDI has trained manpower and well equipped laboratory to carry out monitoring, analysis and R&D work in the field of environment.

1.1 The Cluster-X is in the Eastern part of the Jharia coalfield. It includes a group of 6 Mines (viz. Amlabad UG, Bhowra north UG/OC, Bhowra South UG/OC , Amalgamated Sudamdih Patherdih Mine, Sudamdih Shaft, Sudamdih Coal Washery The Cluster–X is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster–X are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Damodar River.

1.2 The Cluster-X is designed to produce 1.762 MTPA (normative) and 2.289 MTPA (peak) capacity of coal and coal washery of 2.08 MTPA.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 1.762 MTPA (normative) and 2.289 MTPA (peak) capacity of coal production vide letter no. J-11015/380/2010-IA.II (M) dated 12thJune, 2019.

Ministry of Environment, Forest and Climate Change while granting environmental clearance has given one of the General conditions that " Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM_{10}, $PM_{2.5}$, SO_2, NOx monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets, other conditions regarding water / effluent and noise level monitoring in consultation with the State Pollution Control Board."

In compliance of these conditions the Environmental Monitoring has been carried out & report prepared for submission to MoEF&CC & JSPCB and other statutory authorities.

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

(As per G.S.R. 742 (E) dt. 25th December, 2000)

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Bhowrah North (A14): Industrial Area

The location of the sampling station is 23°41'37.00"N 86°23'54.00"E. The sampler was placed at an elevated platform of around 1.5m height from ground level at Guest House of EJ Area.

ii) Sudamdih Washery (A15): Industrial Area

The location of the sampling station is 23°39'31.00"N 86°25'48.00"E. The sampler was placed at elevated platform of around 1.5m height from ground level at Coal lab near washery.

II. BUFFER ZONE Monitoring Location

i) Jeenagora (A13): Industrial Area

The location of the sampling station is 23°42'31.00"N 86°26'38.00"E. The sampler was placed elevated platform of around 1.5m height from ground level at Safety Office.

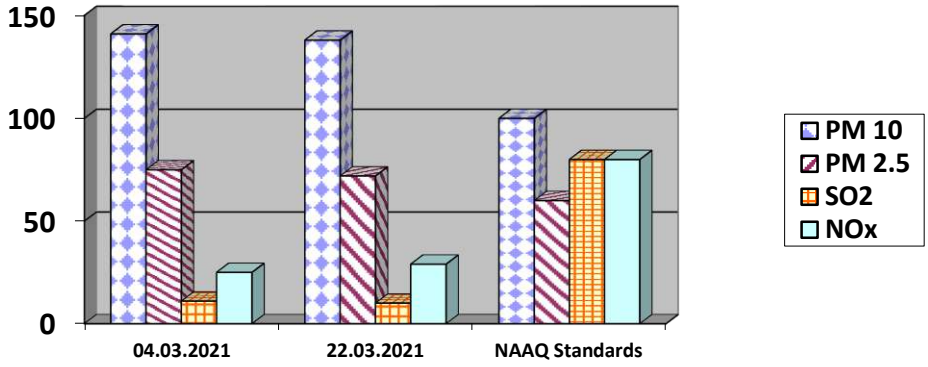
ii) Sitanala (A30): Industrial Area

This location of the sampling station is 23°41'15.00"N 86°22'39.00"E, at the Amlabad Project office which is currently in-operational. It has been selected to study the impact of Air pollution in the buffer zone on the Cluster.

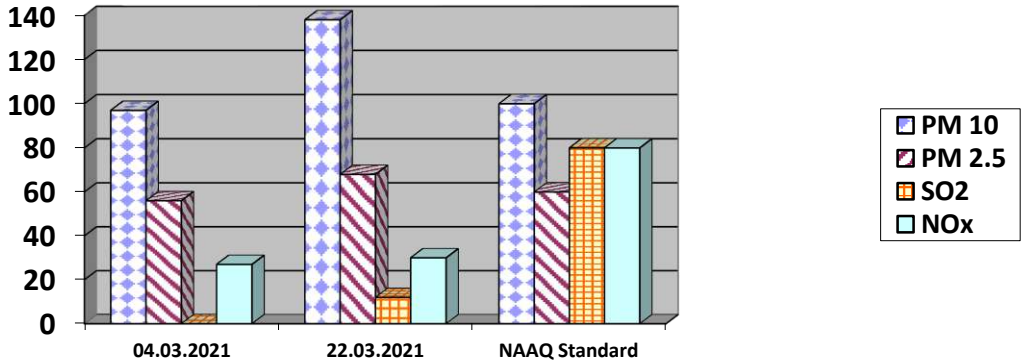
AMBIENT AIR QUALITY DATA

Cluster – X, Bharat Coking Coal limited Month: **MAR. 2021** Year: **2020-21.**

Station Name: A14-Bhowrah North		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	04.03.2021	141	75	11	25
2	22.03.2021	138	72	10	29
	NAAQ Standards	100	60	80	80



StationName: A15-Sudamdih Washery		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO_2**	**NO_X**
1	04.03.2021	97	56	<10	27
2	22.03.2021	138	68	12	30
	NAAQ Standard	100	60	80	80

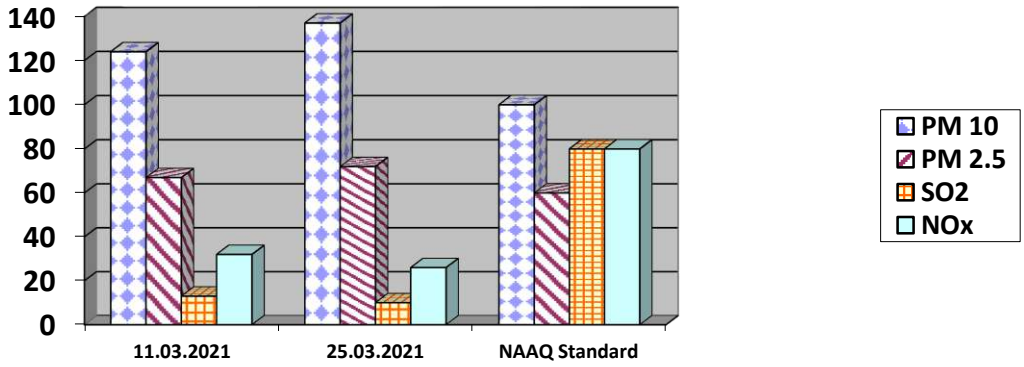


Analysed By
JSA/SA/SSA

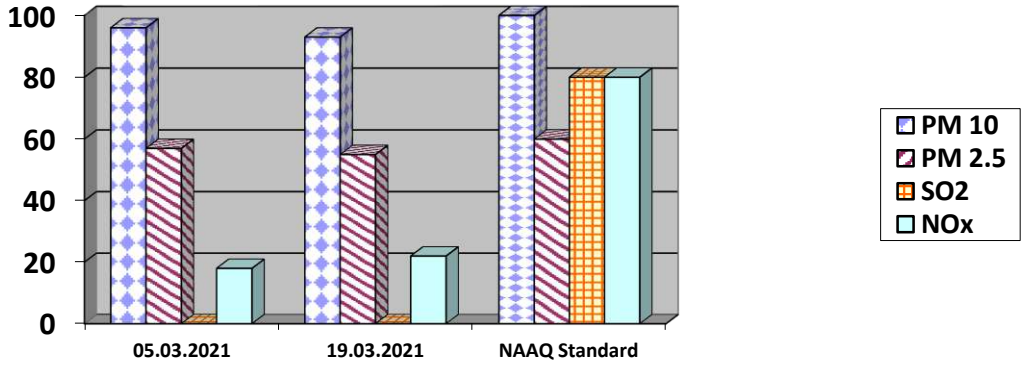
Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(In-charge) Environment
RI-2, CMPDI, Dhanbad

Station Name: A13 – Jeenagora		Zone: Buffer		Category: industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO_2	NO_X
1	11.03.2021	124	67	13	32
2	25.03.2021	137	72	10	26
	NAAQ Standard	100	60	80	80



Station Name: A30 – Sitanala		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	05.03.2021	96	57	<10	18
2	19.03.2021	93	55	<10	22
	NAAQ Standards	100	60	80	80



- *All values are expressed in microgram per cubic meter.*
- *24 hours duration*

Analysed By
JSA/SA/SSA

Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(In-charge) Environment
RI-2, CMPDI, Dhanbad

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) Mine Discharge of Bhowrah North (MW10)

A sampling point is fixed to assess the effluent quality of Mine discharge. This location is selected to monitor effluent discharge in to Kashi jore.

3.2 Methodology of sampling and analysis

Water samples were collected as per standard practice. The effluent samples were collected and analyzed for four parameters on fortnightly basis at the Environmental Laboratory of CMPDI RI-II, Dhanbad.

3.3 Results & Interpretations

The results are given in tabular form along with the applicable standards. Results are compared with Schedule - VI, effluent prescribed by MoEF&CC. Results show that most of the parameters are within the permissible limits.

WATER QUALITY DATA

(EFFLUENT WATER- FOUR PARAMETERS)

Name of the Cluster: **Cluster -X**		Month: **MAR. 2021**	Name of the Station: **Mine Discharge of Bhowrah North**	
Sl. No.	**Parameters**	**MW10** First Fortnight	**MW10** Second Fortnight	**As per MOEF General Standards for schedule VI**
		15.03.2021	22.03.2021	
1	Total Suspended Solids	44	45	*100 (Max)*
2	pH	7.92	7.97	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	20	28	*250 (Max)*

All values are expressed in mg/lit. except pH.

Analysed By
JSA/SA/SSA

Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(In-charge) Environment
RI-2, CMPDI, Dhanbad

NOISE LEVEL QUALITY MONITORING

4.1Location of sampling sites

1. **Bhowrah North (N14)**
2. **SudamdihWashery (N15)**
3. **Jeenagora (N13)**
4. **Sitanala (N30)**

Methodology of sampling and analysis

Noise level measurements in form of 'L_{EQ}' were taken using Integrated Data Logging Sound Level Meter (NL-52 OF RION CO. Ltd. Make) during day time. Noise levels were measured for about one hour time in day time. Noise levels were measured in Decibels, 'A' weighted average, i.e. dB (A).

4.2 Results & Interpretations

Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day time on fortnightly basis are presented in tabular form along with the applicable standard permissible limits. The observed values in terms of L_{EQ} are presented**.** The observed values at all the monitoring locations are found to be within permissible limits.

NOISE LEVEL DATA

Name of the Project: **Cluster -X**			Month: **MAR. 2021**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	Jeenagora (N13)	Industrial area	11.03.2021	57.7	*75*
2	Jeenagora (N13)	Industrial area	25.03.2021	57.4	*75*
3	BhowrahNorth(N14)	Industrial area	04.03.2021	55.2	*75*
4	BhowrahNorth(N14)	Industrial area	22.03.2021	55.7	*75*
5	SudamdihWashery (N15)	Industrial area	04.03.2021	56.4	*75*
6	SudamdihWashery (N15)	Industrial area	22.03.2021	56.1	*75*
7	Sitanala (N30)	Residential area	05.03.2021	52.8	55
8	Sitanala (N30)	Residential area	19.03.2021	51.8	55

Permissible limits of Noise Level as per MOEF Gazette Notification No. GSR 742(E) dt. 25.09.2000 Standards for Coal Mines and Noise Pollution (Regulation and Control) Rules, 2000.
*** Day Time: 6.00 AM to 10.00 PM.**

Analysed By
JSA/SA/SSA

Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(In-charge) Environment
RI-2, CMPDI, Dhanbad

Ambient Air Quality Standards for Jharia Coal Field
As per the Environment (Protection) Amendment Rules, 2000 notified vide notification G.S.R. 742(E), dated 25.9.2000.

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
1	2	3	4	5
III Coal mines located in the coal fields of • Jharia • Raniganj • Bokaro	Suspended Particulate Matter (SPM)	Annual Average * 24 hours **	500 µg/m^3 700 µg/m^3	- High Volume Sampling (Average flow rate not less than 1.1
	Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average * 24 hours **	250 µg/m^3 300 µg/m^3	Respirable Particulate Matter sampling and analysis
	Sulphur Dioxide (SO_2)	Annual Average * 24 hours **	80 µg/m^3 120 µg/m^3	1.Improvedwest and Gaeke method 2.Ultraviolet fluorescene
	Oxide of Nitrogen as NO_2	Annual Average * 24 hours **	80 µg/m^3 120 µg/m^3	1. Jacob &Hochheiser Modified (Na-Arsenic) Method 2. Gas phase Chemilumine-scence

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause2.

** 24hourly/8hourlyvaluesshallbemet92%ofthetimeinayear.However,8% of the time it may exceed but not on two consecutivedays.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th FEBRUARY 2009

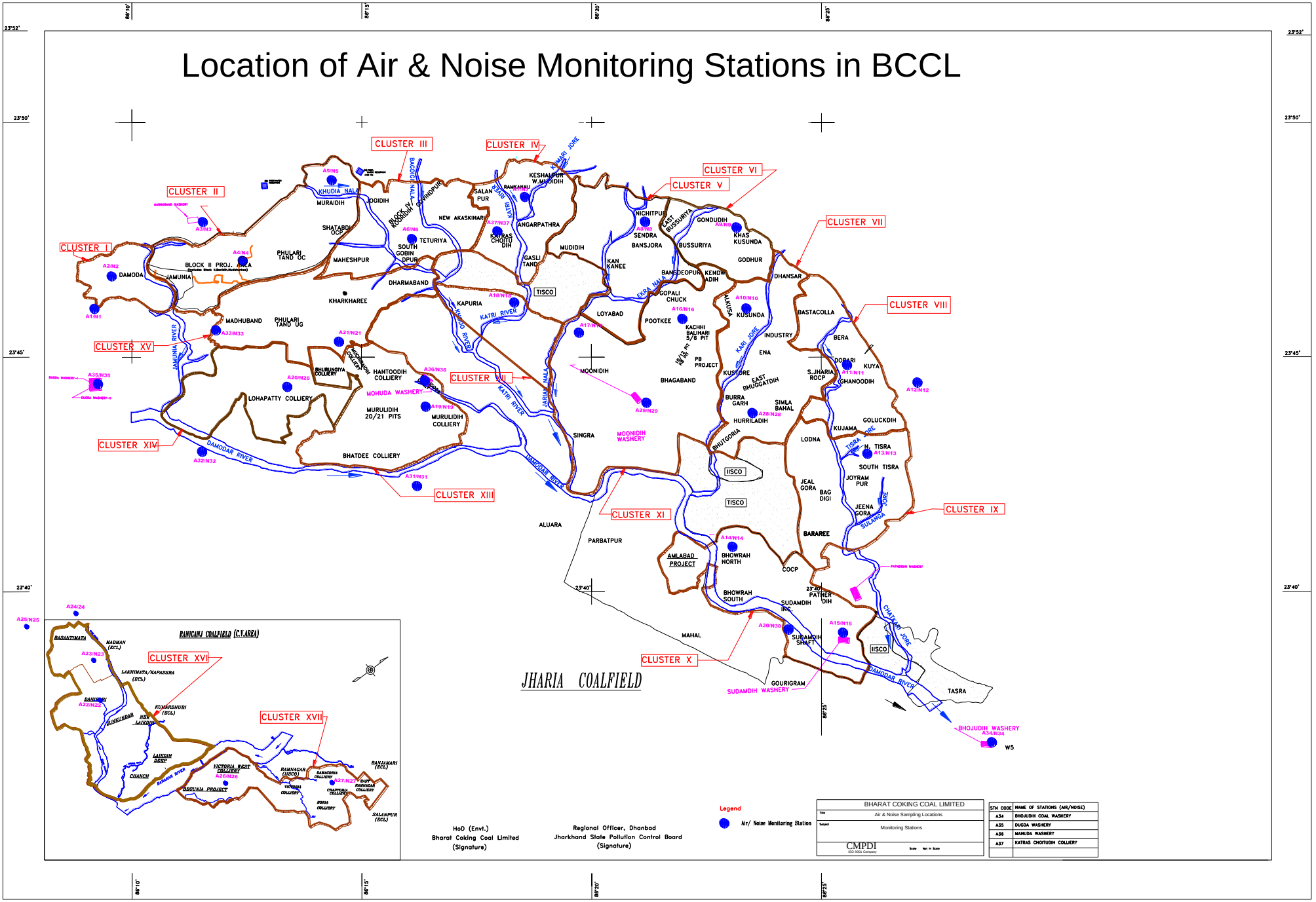
In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No. 14 of 1981), and in supersession of the notification No(s).S.O.384(E), dated 11th April 1994 and S.O.935(E), dated 14th NOVober 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect.

Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO_2), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogendioxide (NO_2), µg/m³	Annual * 24 Hours **	40 80	30 80	-Jacob &Hochheiser modified ($NaOH$-$NaAsO_2$) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM_{10}, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or $PM_{2.5}$, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O_3) , µg/m³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb) , µg/m³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH_3), µg/m³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C_6H_6), µg/m³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m³	Annual *	01	01	-Solvent extraction followed byHPLC/GC analysis
Arsenic (As), ng/m³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

* Annual Arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they AUGUST exceed the limits but not on two consecutive days of monitoring.

NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigations.


Location of Air & Noise Monitoring Stations in BCCL
CLUSTER I
CLUSTER II
CLUSTER III
CLUSTER IV
CLUSTER V
CLUSTER VI
CLUSTER VII
CLUSTER VIII
CLUSTER IX
CLUSTER X
CLUSTER XI
CLUSTER XII
CLUSTER XIII
CLUSTER XIV
CLUSTER XV
CLUSTER XVI
CLUSTER XVII
JHARIA COALFIELD
RANIGANJ COALFIELD (CV AREA)
DAMODA
JAMUNIA
MADHUBAND
PHULARI TAND UG
PHULARI TAND OC
MAHESHPUR
BLOCK II PROJ. AREA
KHARKHAREE
DHARMABAND
SHATABDI OCP
MURAIDIH
JOGIDIH
KHUDIA NALA
BAGDIGI NALA
TETURIYA
SOUTH GOBIN DPUR
NEW AKASKINARI
SALAN PUR
KESHALPUR W.MUDIDIH
RAMKANALI
ANGARPATHRA
KHARAO CHOITUDIH
GASLI TAND
MUDIDIH
KAPURIA
TISCO
KHUDIA RIVER
KATRI RIVER
KHARKHARI JORE
KHARI JORE
KAN KANEE
NICHITPUR
SENDRA
BANSJORA
EAST BUSSURIYA
BUSSURIYA
GONDUDIH
KHAS KUSUNDA
GODHUR
DHANSAR
BASTACOLLA
BERA
DOBARI
KUYA
GHANOODIH
S.JHARIA ROCP
INDUSTRY
ENA
KUSUNDA
ALKUSA
BANSDEOPUR
KENDWADIH
GOPALI CHUCK
POOTKEE
KACHHI BALIHARI 5/6 PIT
LOYABAD
PB PROJECT
KUSTORE
EAST BHUGGATDIH
BHAGABAND
BURRA GARH
HURRILADIH
SIMLA BAHAL
MOONIDIH
MOONIDIH WASHERY
SINGRA
BHUTGORIA
LODNA
KUJAMA
GOLUCKDIH
N. TISRA
SOUTH TISRA
JOYRAM PUR
JEENA GORA
JEAL GORA
BAG DIGI
IISCO
TISCO
BARAREE
COCP
BHOWRAH NORTH
BHOWRAH SOUTH
SUDAMDIH INC
SUDAMDIH SHAFT
PATHERDIH
AMLABAD PROJECT
PARBATPUR
ALUARA
MAHAL
GOURIGRAM
TASRA
SUDAMDIH WASHERY
BHOJUDIH WASHERY
W5
MOHUDA WASHERY
HANTOODIH COLLIERY
BHURUNGIYA COLLIERY
LOHAPATTY COLLIERY
MURULIDIH 20/21 PITS
MURULIDIH COLLIERY
BHATDEE COLLIERY
DAMODAR RIVER
JAMUNIA RIVER
KARI JORE
TISRA JORE
SULANGA JORE
CHANAKI JORE
BASANTIMATA
MADHAN (ECL)
LAKHIMATA/KAPASSRA (ECL)
DAHIBARI
KUNARDHUBI (ECL)
DUNKUNDAR
NEW LAIKDIH
LAIKDIH DEEP
CHANCH
BARAKAR RIVER
BECUNIA PROJECT
VICTORIA WEST COLLIERY
RAMNAGAR (IISCO)
DAKADORIA COLLIERY
VICTORIA COLLIERY
CHAPTADIH COLLIERY
EAST RAMNAGAR COLLIERY
BORIA COLLIERY
BANJAMARI (ECL)
SALANPUR (ECL)
A1/N1
A2/N2
A3/N3
A4/N4
A5/N5
A6/N6
A7/N7
A8/N8
A9/N9
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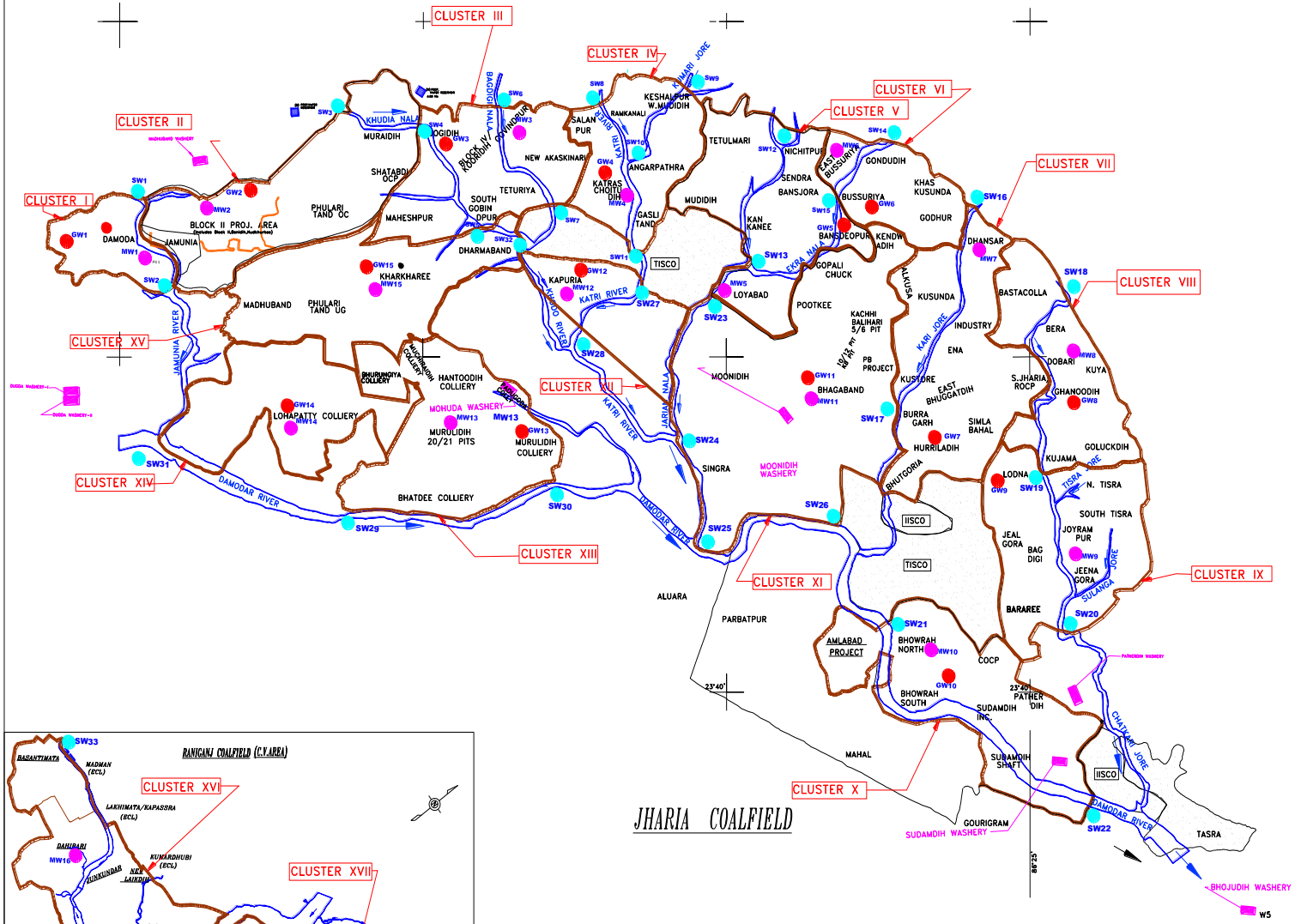
A32/N32
A33/N33
A34/N34
A35/N35
A36/N36
A37/N37
Legend
Air/ Noise Monitoring Station
HoD (Envt.)
Bharat Coking Coal Limited
(Signature)
Regional Officer, Dhanbad
Jharkhand State Pollution Control Board
(Signature)
BHARAT COKING COAL LIMITED
Air & Noise Sampling Locations
Monitoring Stations
CMPDI
STN CODE
NAME OF STATIONS (AIR/NOISE)
A34
BHOJUDIH COAL WASHERY
A35
DUGDA WASHERY
A36
MAHUDA WASHERY
A37
KATRAS CHOITUDIH COLLIERY

Water Sampling Locations in BCCL



INDEX

Cluster	Suface Water (U/S, D/S)	Name of River/ Nala / Jore	Mine/ Effluent	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamunia River	MW1	Damoda Area	GW1	Ghutway Village
II	SW3, SW4	Khudia Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudia Nala, Bagdigi Nala	MW3	Govindpur Colliery	GW3	Jogidih Village
IV	SW8, SW11, SW9, SW10	Katri River, Kumari Jore	MW4	Chotudih	GW4	Kankanee Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Mudidih	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bassuria UGP	GW6	Bansjora Borewell
VII	SW16, SW17	Kari Jore	MW7	Dhansar UGP	GW7	Hurriladih
VIII	SW18, SW19	Kashi Jore	MW8	Dobari UGP	GW8	Ghanudih
IX	SW19, SW20	Kashi Jore	MW9	Jeenagora	GW9	Lodna
X	SW21, SW22	Damodar River	MW10	Bhowrah North	GW10	Bhowrah South
XI	SW23, SW24, SW25, SW26	Jarian Nala, Damodar River	MW11	Bhagaband h UGP	GW11	Bhagabandh
XII	SW27, SW28	Katri River	MW12	Kapuria	GW12	Kapuria
XIII	SW29, SW30	Damodar River	MW13	Murulidih (20/21)	GW13	Murulidih
XIV	SW31, SW29	Damodar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW5, SW32	Khudia Nala	MW15	Kharkharee UGP	GW15	Kharkharee
XVI	SW33, SW34	Khudia River	MW16	Dahibari OCP	GW16	Patlabari Village
XVII	SW35, SW36	Barakar River	MW17	Damagoria Colliery	GW17	Chaptoria

HoD (Envt.)
Bharat Coking Coal Limited
(Signature)

Regional Officer, Dhanbad
Jharkhand State Pollution Control Board
(Signature)

Legend
- Sampling Locations of Surface Water (Upstream/ Downstream)
- Sampling Locations of Mine Water
- Sampling Locations of Ground/ Drinking Water

Customer: BHARAT COKING COAL LIMITED
Title: WATER SAMPLING LOCATIONS
Subject: MONITORING STATIONS
CMPDI (ISO 9001 Company)
Scale: Not to Scale

Progress Report

1st Phase Air Monitoring report for

"Source apportionment of ambient air particulate matter in Jharia coalfields region, Jharkhand"

Sponsor

Bharat Coking Coal Limited (BCCL)

CSIR-National Environmental Engineering Research Institute, Nagpur

2019

Contents

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List of Tables

1. Introduction

1.1 Project Background

Bharat Coking Coal Limited, a subsidiary of Coal India Limited, has been operating the majority of the coal mines in the Jharia coal field regions since its inception in 1972. Jharia coal mines are special for its low ash content and high calorific value coals. Therefore, they are often used directly in iron and steel plants for metal oxide reduction after washing. Although these coal mines are highly priced for their high quality coal, they are notorious for their mine fires, which causes lot of fugitive gaseous and PM emissions. Hence, Jharia region has been under scrutiny by various public authorities and common public with a vision to improve the ambient air quality.

Various sources contribute to high particular matter concentration in the Jharia region: vehicles, mining activities, re-suspended dusts, fugitive emissions, fuel oils, household LPGs, etc. The percentage contribution of these factors in the ambient depends exclusively on the economic activities of that particular region. In order to improve the existing ambient air quality, the major sources of PM emissions first need to be identified. Hence, the environmental clearance committee of MoEF has directed BCCL to conduct a source apportionment study for particulate matter. In this context, BCCL has approached CSIR-NEERI to conduct a source apportionment study of ambient air particulate matter in Jharia coalfields region in order to quantify the various sources PM emissions and suggest an effective environmental management plan.

1.2 Project objectives

The major objective of the study is to assess the current ambient air quality, sources of air pollution and propose the priorities for the actions for improvement of air quality. The study to include the entire Jharia Coalfield along with area up to 10 Km from the periphery / boundary of BCCL mines.

The detailed objectives are as following:

i. Ambient Air Monitoring

- ✓ Monitoring of ambient air quality at selected receptor locations for pollutants including PM10, PM 2.5(limited), SO2, NOx, PAHs to establish the status of the air quality in Jharia Coalfields along with area up to 10 K.M from the periphery/boundary of BCCL mines. Also, review of the available air quality monitoring data from Central Pollution Control Board (CPCB) /Jharkhand State Pollution Control Board (JSPCB).

- ✓ To calibrate dispersion modelling predictions using measured air quality parameters.

- ✓ To draw supportive data through specific site related monitoring regarding impact causing sources such as kerbside monitoring.
- ✓ To establish the impact of meteorological conditions on a few select indicator pollutants in different micro meteorological conditions of the Jharia Coalfields.

ii. Emission Inventory related of Jharia Coalfields along with area up to 10 Km from the periphery / boundary of BCCL mines.

- ✓ To identify the pollution load grid wise for point, line and area source
- ✓ To establish possibilities of receptor level concentrations of air pollutants by matching dispersion modelling and air quality-monitoring data.

iii. Source apportionment related

- ✓ To identify and apportion the pollution load at receptor level to various sources in the Jharia Coalfields along with area up to 10 Km from the periphery / boundary of BCCL mines.
- ✓ To carry out the source apportionment using molecular markers for a limited number of samples through a time resolved sample collection at various period of the day and day-of-the-week.

iv. Any other item in consensus between both BCCL/CIL & NEERI evolved during the study.

2. Field visit

In connection with the above objectives, the NEERI's team and BCCL's team visited BCCL's Jharia coal filed for 3 days from 23 September to 27 September 2018. The team covered the entire Jharia coalfield, which spans roughly 30km in length and 22 km wide in three days with the following purpose.

To identified the location for air monitoring station in entire Jharia Coal Field region.

2.1 Jharia coalfield maps:

BCCL environmental department provided the map of the Jharia region. The site visit was carried out with assistance from BCCL's team. The 15 Jharia mines coal fields were segregated into three parts and details of the visit along with mine cluster names are given in Table 2.1.

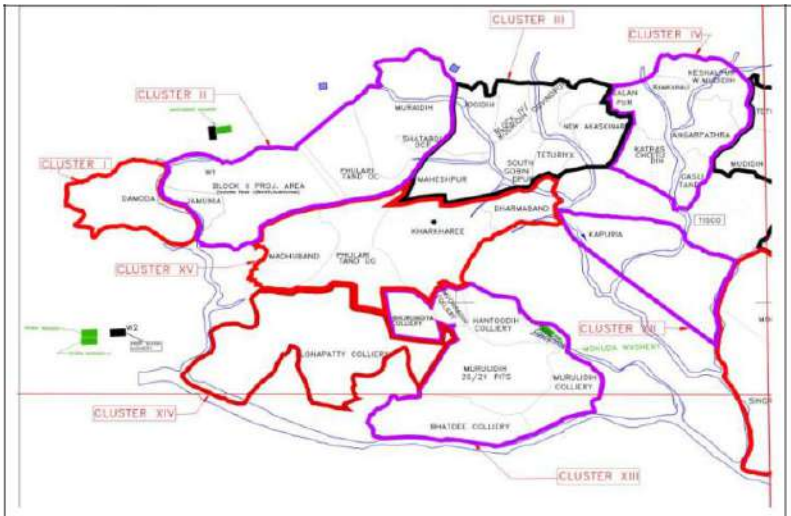
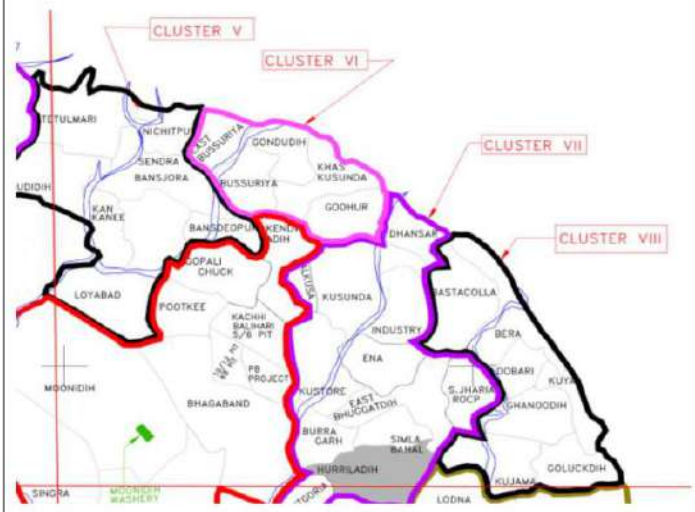
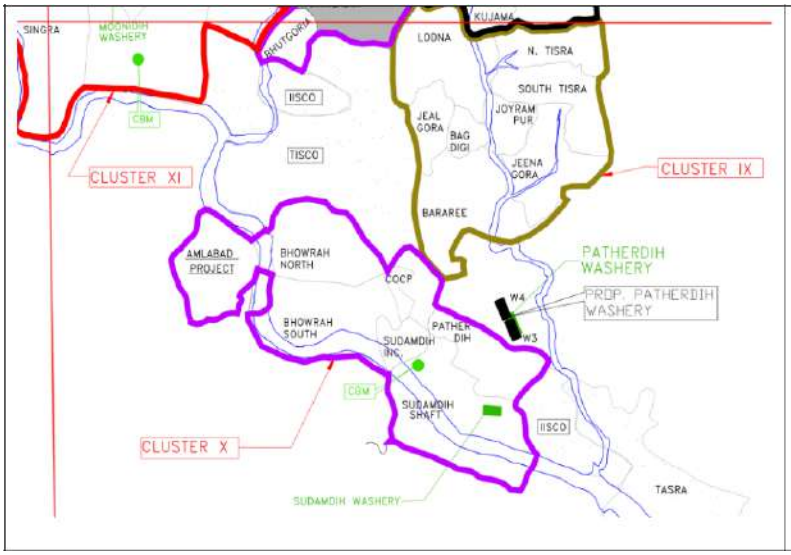
	**Part 1:** Cluster VI, VII, VIII, and X
	**Part 2:** I, II,III, IV, V, XI, XII, XIII, and XV
	**Part 3:** Cluster IX

Table 2.1 Jharia coalfields Site visit on cluster-base

Based on the objectives and outcomes envisaged, the various mine areas were visited to identify sources of emissions such dumpsite emissions, fugitive emissions, blasting emissions. Furthermore, the already existing PM monitoring sites of BCCL were also visited to explore of possibility of installing NEERI's PM monitoring stations.

2.2 Site Identification:

The Entire Jharia Coal Field (JCF) is divided into 16 clusters. Both opencast and underground mines are operational in JCF. Standard mining operations like drilling, blasting, hauling, accumulation, and transfer are the major sources of emissions and air pollution. Apart from that, a typical emission source, mine fire, is prevailing at JCF. Besides, JCF encompasses large non-mining regions, which have their own emission sources like vehicular emission in congested traffics, road dust, Power Plant emission, other industrial emissions (coke oven plants, brick kilns, stone crushers, etc.), crematoria, domestic burning, open burning etc.

Based on the preliminary field visit by CSIR-NEERI Scientists along with BCCL staffs, the following locations are selected for the establishment of Air Quality Monitoring Stations for source apportionment study;

Core Zone

1. Cluster XIV (Lohapatty) – nearby sources: Chandrapura Thermal Power Plant
2. Cluster VII (Mine rescue station)- nearby sources: Coal Mine, Industry
3. Cluster IV or Cluster V – Banssuriya or Katras
4. Cluster IX (Lodhna)
5. Cluster XI (Moonidih)
6. Cluster X (Patherdih): nearby sources: Coal Mine, Steel Industry
7. Cluster VIII (Bastacola)

Buffer Zone

8. Bank More
9. Harina
10. Bhuli
11. Sindri
12. Parbatpur Electrosteel/ Bhaga

13. Background site (Upwind & away from sources) and also secondary Data from DVC, CCL mines Sail Bokaro and Jharkhand pollution Control Board will be obtained.

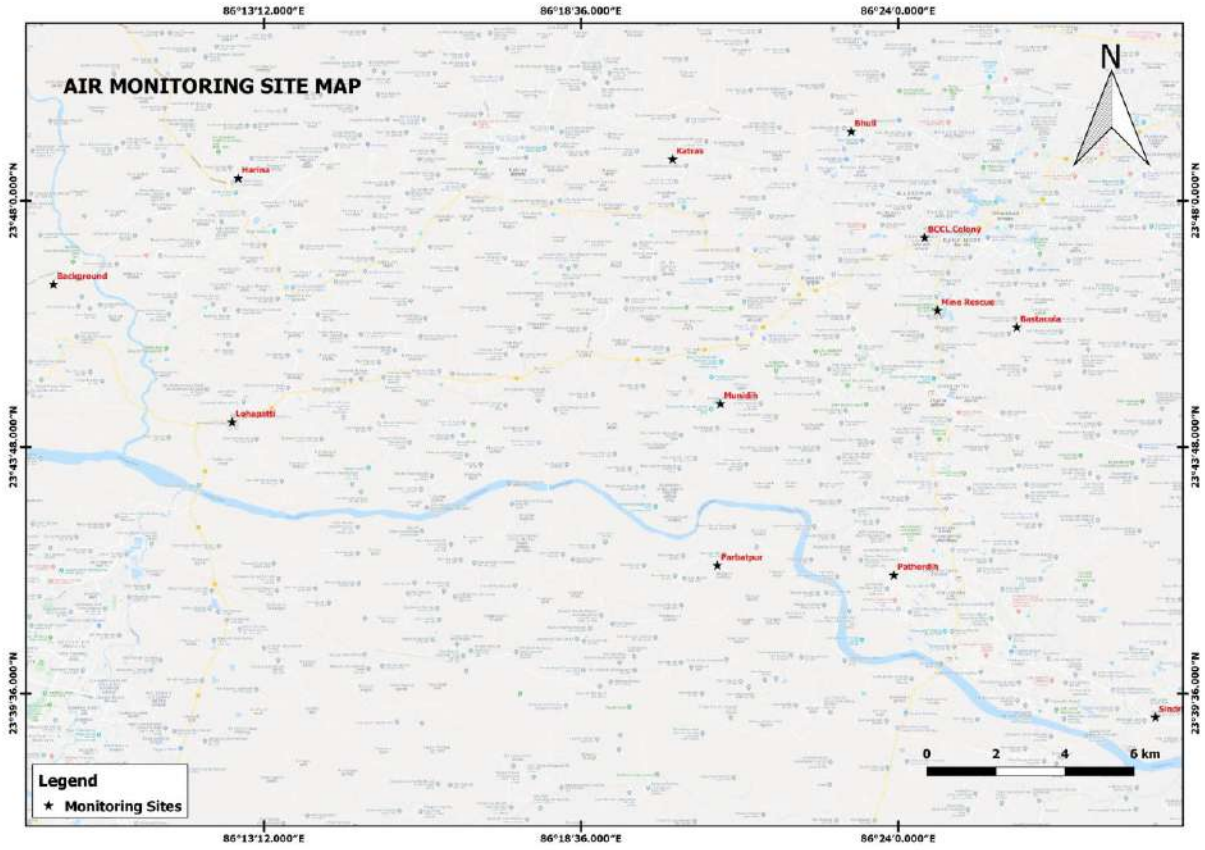


Figure2.1 Identified air monitoring station in Jharia Coalfield

3. Sampler Selection and Procurement

Standard equipment were catered for the parameter required towards ambient air particulate characterization and gaseous sampling in the initial phase of the project.

Table 3.1 Samplers Procured for Monitoring

Sampler	**Brief Description of operating conditions**
Fine Dust Sampler	Sampling Inlets- $PM_{2.5}$, PM_{10} and TSP Flow rate-16.7LPM
FRM Sampler	Versatile inlet configurations for $PM_{2.5}$, PM_{10}, or TSP sampling FRM quality 24-hour sampling at 16.7 LPM
Gaseous Sampler	Sampling Rate-0.5-1.0 LPM Operation time-8 hours

4. Monitoring parameters

Parameters of monitoring were decided based on the objectives of air pollution and source apportionment study. The source apportionment analysis required air monitoring for particulate matter ($PM_{2.5}$ and PM_{10}) and its chemical speciation to develop signature profiles of pollution sources that can be used in chemical mass balance models. The analysis data could also be used to interpret the overall loading of different chemicals contributed varied sources. Monitoring included air quality attributes such as Particulate matter, Sulphur Dioxide (SO_2) and Oxides of Nitrogen as NO_2, to understand not only the regulatory compliance but also their inter-correlations with other species such as Heavy metals, EC, OC etc. Since the objective of source apportionment study is to determine the contributions from various sources such as industries, vehicular and other area sources additional parameters were also monitored such as Polycyclic Aromatic Hydrocarbons (PAHs). List of all parameters, sampling flow rate and analytical methods are provided in Table 4.1

Table 4.1 Ambient Air Quality Sampling/Analysis Methodology for Target Pollutants

Particulars	Parameters			
	PM_{10}	$PM_{2.5}$	NO_2	SO_2
Sampling Instrument	Fine Dust Sampler & FRM Sampler	Fine Dust Sampler & FRM Sampler	APM sampler	APM sampler
Sampling Principle	Cyclonic Flow Technique	Cyclonic Flow Technique/ WINS Impactor	Chemical absorption in suitable media	Chemical absorption in suitable media
Flow rate	16.7 LPM	16.7 LPM	0.5 LPM	0.5 LPM
Sampling Period	24 hourly	24 hourly	8 hourly	8 hourly
Sampling Frequency	10 days continuous, Teflon and quartz on alternate days	10 days continuous, Teflon and quartz on alternate days	10 days continuous	10 days continuous

Analytical Instrument	Electronic Micro Balance	Electronic Micro Balance	Spectrophoto-meter	Spectrophoto-meter
Analytical Method	Gravimetric	Gravimetric	Colorimetric Improved West & Gaeke Method	Colorimetric Improved West & Gaeke Method
Minimum reportable value	5 µg/m^3	5 µg/m^3	9 µg/m^3	4 µg/m^3

4.1 Monitoring Frequency

All pollutants exhibit diurnal and seasonal variations, which have been taken into account while determining the frequency of the sampling. In order to assess the impact of the diurnal variations in source contributions for a given meteorology of the day, 24 hourly monitoring plan was envisaged (8 hourly sampling for gaseous pollutants and 24 hourly sampling for particulate matter). The field study was planned for a period of 10 days at each monitoring site for the season to represent variation in air quality. The sampling frequency details are presented in Table 4.1.

Table 4.1.1 Frequency of Air pollutants sampling in Jharia Coalfield

Parameter	Number of Days	Change of Filter/ absorbing media	Reporting
PM_{10}	10	24 hourly, Teflon: 05 days Quartz: 05 days	24 hourly
$PM_{2.5}$	10	24 hourly Teflon: 05 days Quartz: 05 days	24 hourly
NO_2	10	8 hourly	8 hourly
SO_2	10	8 hourly	8 hourly

The glimpses of air monitoring of some locations are shown in Figure 4.1.

Kataras

Lodhana

Moonidih

Patherdiha

Bastacola

Sindri

Figure 4.1 Glimpses of air monitoring of some locations

4.2 Filter handling and Weighing:

Teflon-membrane and quartz-fibre filter are most commonly used for chemical analysis. Each filter was individually examined prior to labelling for discoloration, pinholes, creases, separation of ring, chaff or flashing, loose material, or other defects.

Gravimetry measured the net mass on a filter by weighing the filter before and after sampling with balance in temperature and relative humidity controlled environment. To minimize particle volatilization and aerosol liquid water bias, $PM_{2.5}$ Filters were equilibrated for 24 hours at a constant (within ±5%) relative humidity between 30% and 40% at a constant (within ±2°C) temperature between 20°C and 23°C. PM_{10} filters were equilibrated at 20% to 45% relative humidity (±5%) and 15°C to 30°C temperature (±3°C).

Methods of Chemical characterization:

Sulphur dioxide (SO_2)	: Modified West and Gaeke method
Nitrogen dioxide (NO_2)	: Sodium Arsenite method
Suspended Particulate Matter (SPM)	: High Volume method (Gravimetric method)
Respirable suspended Particulate Matter (RSPM)	: Gravimetrically with GFA/EPM 2000 filter paper using respirable dust sampler (Cyclonic Flow Technique)

5. Ambient Air Quality Monitoring

Core Zone

Site 1: Cluster XIV (Lohapatty)

The samplers were installed on the roof of area office of Lohapatty (Latitude 23.737066 and Longitude 86.210894). It was located near residential colony. Coal mine was 1 km away from the sampling site. Coal has been transported through railway line which is 1.5 km away on a daily basis and also through trucks. NH-32 construction was going on 500 m away from the site. The major fuel used for cooking is coal in the study area.

Site 2: Cluster VII Mine rescue Station

Monitoring station was positioned in Mine rescue station, Dhansar on the roof of office building (Latitude 23.768746 and Longitude 86.411141). Mine rescue station is next to

the state highway 12 where continuous movement of heavy vehicles takes place. Mining activities were also observed nearby the location.

Site 3: Cluster V Katras

In Katras, samplers were installed at Expert hostel (Latitude 23.811692 and Longitude 86.335910). There was a settlement residential area nearby. Mining activities was in progress within 500m area. Railway track was nearly at 150m distance from the site. Coal was used for cooking. Many other activities were observed during sampling in the nearby area which may contribute. 'Mela' and continuous 'Hawan' were going on within 100m area. Also road construction was in progress near 7km.

Site 4: Cluster IX (Lodhana)

Samplers were installed at office in Lodhna (Latitude 23.721713 and Longitude 86.410260). Near Lodhna, colliery was 2 km away from the site. Nearest Railway track was 1.5 km away. Coal was mostly used for cooling.

Site 5: Cluster XI (Moonidih)

Moonidih mine is one of the underground mine of BCCL. Sampler was stationed in Area office of Moonidih mine (Latitude 23.742228 and Longitude 86.349494). Since monitoring location was 250-300m from the mine, movement of heavy vehicles was continuous. There is washery also at distance of 500m where trucks and conveyor were used for transportation of coal. So the mining activities nearby contributes to particulate matter emission.

Site 6: Cluster X (Patherdih)

Samplers were stationed in guest house of BCCL in Patherdih area (Latitude 23.693577 and Longitude 86.398728). It is situated beside highway where continuous movement of heavy vehicles observed. TATA steel coal mine is situated 1km away from the location where continuous mining activities takes place. Transportation of coal through railway wagons in same area also contributes to particulate matter emission.

Site 7: Cluster VIII (Bastacola)

The samplers were positioned in area office of Bastacola mine (Latitude 23.763966 and Longitude 86.433635). Here also, coal was used as a cooking media. Railway track was

at Jodaphata which was 3-4 km away from the site. Residential area was nearly 0.5-1km. Mine was situated 3km from the site but no Mining activity was observed during monitoring.

Buffer zone

Site 8: Bank More (BCCL Colony)

Sampling station was installed in BCCL colony, Jawahar Nagar on the roof of a resident (Latitude 23.789463 and Longitude 86.407448). No mining activities were observed but the colony was beside the NH 18 highway so it may contribute to particulate matter emission.

Site 9: Harina

At Harina, the site chosen for air sampling was BCCL colony (Latitude 23.806308 and Longitude 86.212641). Since it was BCCL residential area, fuel used for cooking purpose was LPG. Settlement residential area was observed nearby where coal was used as a media for cooking. Colliery and Railway track were 3km and 2 km away from the site respectively. Highway was 1km away from the site and Coal washery at distance of 4.5km.

Site 10: Bhuli

The samplers were installed on the roof of Saraswati Vidya Mandir, Bhuli (Latitude 23.819554 and Longitude 86.386647). The location was in residential area. Mining activity was going at a distance of 8-10km. A closed Brick factory was located in the nearby area. Fuel used for cooking was mostly coal. Railway track used for coal transportation was 4km from the site. Construction of highway was also going on within 1.5km area during the monitoring.

Site 11: Sindri

Air samplers were installed at BIT Sindri college campus (Latitude 23.653214 and Longitude 86.473022). Transportation of coal was done by railway wagons at distance of 2km from monitoring site. LPG was mostly used for cooking rather than coal. A construction activity was going on nearby. The site was near the highway at a distance of <100m.

Site 12: Parbatpur

The sampling station was installed on roof of a house (Latitude 23.696296 and Longitude 86.348609). Mining activity was no longer going nearby. Coal was primarily used for cooking.

Site 13: Background

The air monitoring samplers were installed on roof of resident's house which was near to the highway at a distance of less than 1 km (Latitude 23.776180 Longitude 86.160177). Construction activities were going on nearby the location. Heavy rainfall also occurred during monitoring period. Mine activities were also observed in radius of 2-3km. Settlement resident's uses coal for cooking purposes.

Sample collection Transportation and Preservation

Ambient $PM_{2.5}$ and PM_{10} samples were collected using suitable sampler at a desired flow rate. Filters were wrapped carefully with aluminium foil and stored in re-sealable plastic bags. At sampling site, the filter that collected the particle sample on the previous day was taken out of the filter holder and immediately wrapped with aluminium foil and sealed. The sample filers were transported back to the laboratory in an isolated cooler container with ice and then frozen at -10°C until analysis.

Table 5. 1 Physical and Chemical components for characterization of Particulate matter

Components	**Filter Matrix**	**Analytical Methods**
PM10/ PM2.5	Teflon/Quartz filter paper	Gravimetric
Elements (Na, Mg, Al, Si, P, S, Cl, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, As, Se, Br, Rb, Sr, Y, Zr, Mo, Pd, Ag, Cr, Cd, In, Sn, Sb, Ba, La, Hg, Ti, and Pb)	Teflon/Quartz filter paper	ICP-OES
Ions ($NO2^-$, $NO3^-$, SO_4^{-2}, K+, NH^{4+}, Na^+)	Teflon/Quartz filter paper	Ion chromatography with conductivity detector
Carbon Analysis (OC, EC)	Quartz filter paper	TOR/TOT method
PAHs	Teflon/Quartz filter paper	Extraction followed by GC-MS analysis with and without derivatization

WATER HARVESTING & ARTIFICIAL RECHARGE

Coal mining is the major industrial activity in the area. Ground water pumping is an integral part of mine management for safe and efficient coal extraction. Pumping from both underground and opencast mines may affect groundwater table near the mine area. In coal mining area the impact is observed to be mostly limited to 500 m from the mine boundary. Mining activity also creates high permeability aquifer zones during backfilling activities in opencast mines and depillaring/caving activities in underground mines. Besides this, groundwater utilization is mainly for domestic and irrigation use in the study area.

To minimize the impact of mining on ground water system, the project/mine authority has been adopting all possible measure to increase the ground water recharge potential.

The stage of ground water development in the buffer zone (10 km from the periphery of the core zone) of Cluster-X mines comes to about 40.15%. As per the data collected from the Central Ground Water Board, Ranchi, the stage of ground water development in the Jharia Block in which Cluster-X project and its buffer zone located is 53.62% in year 2004 and 105.63% in year 2008-09. CGWB observation well located at Jharia does not show any declining trend. The area falls within the “Critical” to “Overexploited category but both pre monsoon and post monsoon ground water level do not show any significant long term declining trend. Rather the pre-monsoon water level shows a rising trend. Again, core zone of cluster X is located in the discharge area near Damodar River. Therefore artificial recharge can be done in the buffer zone of the Cluster-X.

Artificial recharge has to be done to check the lowering of water level in the study area using rainwater harvesting and surplus mine water.

Groundwater inflow (11825 m^3/day) and mine influence area (maximum 500 m from the mine edge) have been estimated and the groundwater monitoring would be undertaken as corrective measure to avoid adverse effects. The mine discharge after passing through sedimentation tank is being discharged onto local jore / nala with check dams at suitable locations so that the groundwater gets additional recharge by the return flow.

The impact on ground water level will be minimized by artificial recharge by spreading of pumped out water, creation and filling of ponds with mine water and construction of rainwater harvesting structure.

Rain Water harvesting is a deliberate collection and storage of rain water that runs off on natural and man-made catchment area. The amount of water harvested depends on the frequency and intensity of the rain fall and characteristics of the catchment to allow the precipitate to infiltrate through the sub-soil and percolate down to recharge aquifers.

It is therefore proposed that during mining operation the rain water within the mining area will be accumulated in earthen water pool developed on the surface which will not only be helpful in re-charging the ground water of the area but will fulfil the non-drinking water demand of nearby inhabitants also.
Necessary check dams (Figure No-2) have been/will be made in the nala for recharging ground water aquifer. Roof-top rainwater harvesting (Figure No-3) will be taken up in the project area using the administrative buildings if required. Rainwater harvesting and artificial recharge will also take place through abandoned dug-wells and final voids of old mines for increasing ground water potential and check water level lowering.

Check dams / Nala bunds – Runoff conservation structures like check dams, nala bunds are constructed over the stream / nala bed thereby increasing the contact period of rainwater with the underlying formation. It is commonly

constructed across small streams with gentle slope and there is no submergence beyond stream course. The site selected should have sufficient thickness of permeable bed / weathered formation to facilitate recharge within short span of time. A check dams in Kari jore near Dhansar Colliery (western part) and another one at Nagri jore near Jogta/Nischitpur OC is provided to facilitate groundwater recharge.

Figure No-2: Check Dams / Nala bunds.

Rooftop Runoff Recharge –

- **Recharge through existing Dug/Tube well –** In areas where shallow aquifers have dried up and existing Dug/Tube wells are tapping deeper aquifer, rooftop rainwater harvesting through existing wells can be adopted to recharge the aquifers.
- **Filter Pit –** If the roof area is more, to accommodate excess rainwater a filter pit may be constructed. The shape and size of the filter pit is depending upon available runoff.

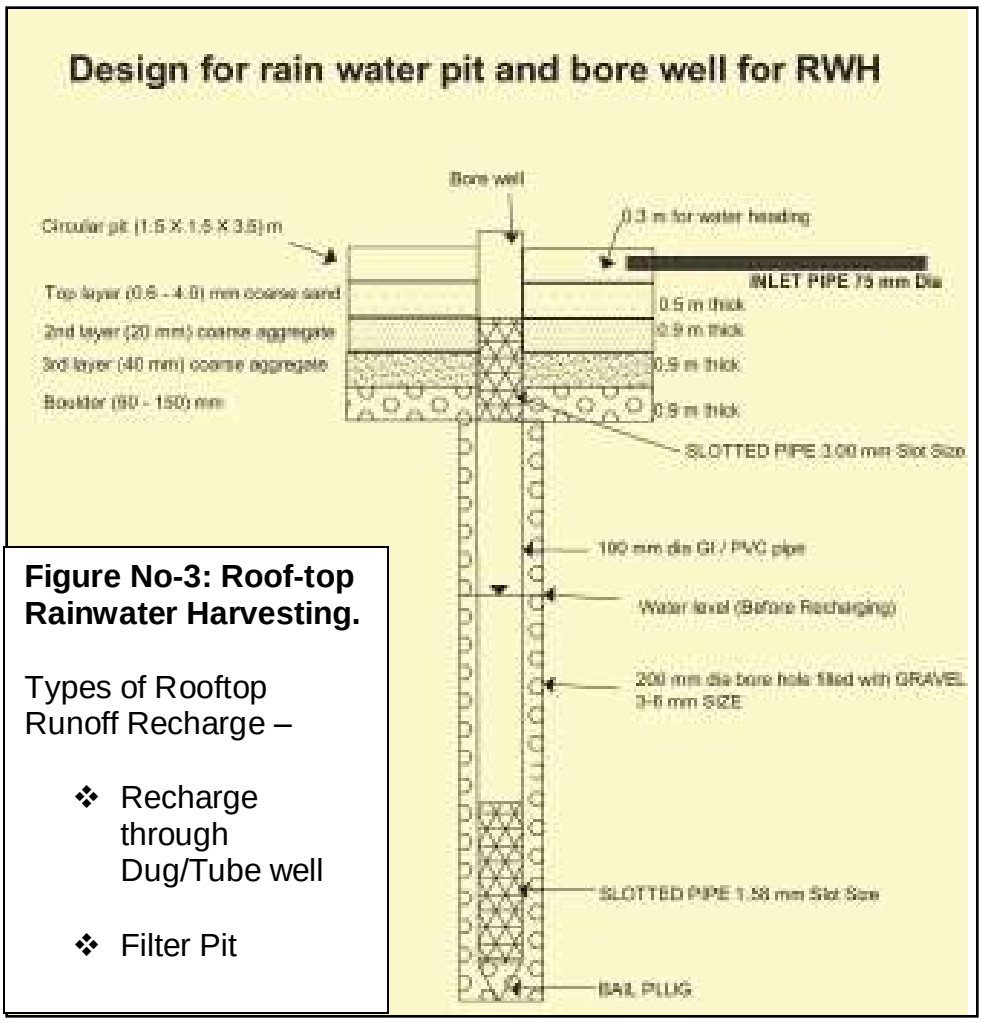


Figure No-3: Roof-top Rainwater Harvesting.

Types of Rooftop Runoff Recharge –

- Recharge through Dug/Tube well
- Filter Pit

Recharge Pit – The abandoned underground mine workings can be used as recharge pit which can act as artificial recharge structure to augment the recharge of deeper aquifers. It behaves as huge ground water reservoirs and contains groundwater runoff (i.e. planned recharge). After mine closure, voids of opencast and underground workings will be waterlogged. This will help in maintaining the water table in the surrounding areas and may become a source of water supply to the community. Out of 115.15 Ha of abandoned quarry in the core zone of Cluster-X, 46.15 Ha has already been backfilled. Remaining area of 69.00 Ha will be act as water body to recharge the groundwater.

Recharge through Dug well – Existing dug wells may also be used as recharge wells, as and when source water become available. In areas where

considerable de-saturation of aquifers have already taken place due to over-exploitation of groundwater resources resulting in the drying up of dug wells and lowering of piezometric head in bore/tube wells. Existing groundwater abstraction structures can be used as cost-effective mechanism for artificial recharge of the phreatic or deeper aquifer zones. Dug well has been made near or within the small streams / nala / jore to augment the groundwater recharge. Water is percolating from flowing stream into groundwater systems through dug wells.

Water harvesting through Settling tank and Percolation tank -These is an artificially created surface water body, submerging in its reservoir a highly permeable land so that surface runoff is made to percolate and recharge the ground water storage. Percolation tank should be located on highly fractured and weathered rock with lateral continuity. The size of the tank should be governed by the percolation capacity of strata in the tank bed.

The surplus mine water will be given to the local people for irrigation. Utilization of mine water for irrigation use will also enhance the ground water recharge potential through artificial recharge in the area.

The pond, tanks, stop dams etc constructed in the rehabilitated and affected villages also augment the groundwater recharge.

Efforts are being made to construct more recharge structures at suitable sites in the nearby villages in consultation with Central Ground Water Board.
Creation of awareness among workers and local peoples about rain water harvesting and artificial recharge will be given priority. This aspect is usually covered during the Environmental Week celebrated every year (5 to 12 June).

Annexure - XI

सेंट्रल माइन प्लानिंग एण्ड डिजाइन इंस्टीट्यूट लिमिटेड
(कोल इंडिया लिमिटेड की अनुषंगी कम्पनी / भारत सरकार की एक लोक उपक्रम)
पंजीकृत कार्यालय : गोन्दवाना प्लेस , कांके रोड , राँची - 834031 (झारखण्ड) भारत
क्षेत्रीय संस्थान-2, पत्रा. बीसीसीएल टाउनशीप, कोयला नगर, धनबाद 826005 (झारखण्ड) भारत
Central Mine Planning & Design Institute Limited
(A Subsidiary of Coal India Limited / Govt. of India Public Sector Undertaking)
Registered Office : Gondwana Place, Kanke Road, Ranchi -834031(Jharkhand)
Regional Institute-II, P.O. BCCL Township, Koylanagar, Dhanbad 826005(Jharkhand) India
Corporate Identity No. U14292JH1975GOI001223

cmpdi
A Mini Ratna Company

पत्रांक: आर.आई.-2/पर्यावरण/एम-30/1967-69 दिनांक: 02.08.2016
03.

सेवा में,
विभागाध्यक्ष (पर्यावरण)
बी. सी. सी. एल.
कोयला भवन
धनबाद

पर्यावरण शाखा
प्रा. सं. 633(H)
03/08/16

विषय: Study of Installation of Rail-cum-Conveyor System in BCCL for transportation of coal.

संदर्भ: पत्र संख्या: 1. सी.एम.पी.डी.आई./पर्यावरण /2016/663, दिनांक: 14.07.2016,
2. BCCL/Dy.GM (Env)/F-EMP/16/1314-15 (M), Dated: 23.06.2016,
3. आर.आई.- 2/पर्यावरन / एम-30/1150, दिनांक : 20.06.2015.
4. E-17719

महोदय,

In reference to your letter no. BCCL/Dy.GM (Env)/F-EMP/16/1314-15 (M), Dated: 23.06.2016, to GM (Env), CMPDI-HQ, it has already been indicated in letter no.आर.आई.-2/पर्यावरन / एम-30/1150, दिनांक : 20.06.2015 that study for installation of Rail-cum-Conveyor System in BCCL for transportation of coal can be started only after the liquidation of coal mine fire, rehabilitation of 595 unstable sites, road realignment and relocation of railway sidings of BCCL and final report of RITES in regard to realignment of railway lines.

This is for your kind information.

भवदीय

(वि.कु. सिन्हा) 3/8/16
क्षेत्रीय निदेशक

Sri Amalesh Asst Mgr (Env)
for record.
4.8.16.

प्रतिलिपि:
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Study to Analyze the Extent of Reduction of Pollution Load Every Year by reducing Coal Transportation by Road

CLUSTER X GROUP OF MINES

Bhowrah North (UG),Bhowrah North (OC),Bhowrah South (UG), 3 Pit OCP,Chandan OCP(Bhowrah),Patherdih (UG),Chandan OCP (Patherdih),Sudamdih Incline (UG),Sudamdih Shaft (UG),Amlabad (UG) Closed,Sudamdih Coal Washery(Within the lease hold of Sudamdih Shaft Mine)

Normative Production : 1.762 MTPA
Peak Production : 2.289MTPA
Lease Hold Area : 2057.47Ha

Bharat Coking Coal Limited

(July,2019)

Prepared by

Environment Division
Central Mine Planning & Design Institute Limited
CMPDI (HQ)
Gondwana Place
Kanke Road, Ranchi-834008

CONTENTS

Chapter – I

Introduction

1.1 Genesis:

MOEF provided Environmental Clearance to the various mines of the Cluster J-11015/380/2010-IA.II (M) Dated 06.02.2013 As per the Environmental Clearance Conditions given by the Ministry of Environment & Forest "A study should be initiated to analyse extent of reduction in pollution load every year by reducing road transport of coal". Therefore the present study has been carried out to quantify the pollution load due to coal transportation.

1.2 Methodology:

In order to find out the pollution load due to coal transportation a Questionnaire was developed by the Environment Division of CMPDI Headquarter and Regional Institute –II, Dhanbad. The Questionnaire was circulated to the various mines of BCCL for collection of the requisite inputs for this study. The quantification of pollution load for PM-10 has been carried out on the basis of the field visit, data provided by BCCL officials and interaction with them.

1.3 General Information about the Cluster:

1.3.1 Brief Description:

Cluster X mines of BCCL consists of six mines, Bhowrah North (Mixed UG and OC), Bhowrah South (Mixed UG and OC that are 3 Pit OCP Chandan OCP), Patherdih (Mixed UG and OC that is Chandan OCP), Sudamdih Incline (UG), Sudamdih Shaft (UG) are operating mines and one closed Amlabad (UG) mine . There is also one existing Sudamdih coal washery. This cluster is located in the Eastern part of the Jharia coalfield. These mines are taken over by BCCL from private mine owners after nationalization through Coal Mines Nationalization Act, 1972-73.BCCL is the proponent of the cluster and it is under the administrative control of Coal India Limited.

1.3.2 Nature and Size of the Cluster:

(Mixed UG and OC), Bhowrah South (Mixed UG and OC that are 3 Pit OCP Chandan OCP), Patherdih (Mixed UG and OC that is Chandan OCP), Sudamdih Incline (UG), Sudamdih Shaft (UG) are operating mines . There is one closed Amlabad (UG) mine. There is also one existing Sudamdih coal washery. The cluster falls in Eastern Jharia Area of Jharia Coalfield part of the Bharat Coking Coal Limited in the Dhanbad District of Jharkhand state. BCCL is the proponent of the cluster and it is under the administrative control of Coal India Limited. Coal India Limited is a Public Sector Undertaking of Government of India and functioning under the Ministry of Coal, Govt. of India.

The details of the mines showing normative/ peak productions, lease hold areas and life are given in Table no. 1.1.

Table 1.1: Details of the Mines of Cluster –X

Sl No	Name of Mines	Production Capacity (MTY)		Lease Hold Area (Ha)
		Normative	Peak	
1	Bhowrah North (UG)	0.11	0.143	208.83
2	Bhowrah North (OC)	0.42	0.546	
3	Bhowrah South (UG)	0.29	0.377	571.58
4	3 Pit OCP	0.235	0.305	
5	Chandan OCP(Bhowrah)	0.158	0.205	
6	Patherdih (UG)	0.054	0.070	244.34
7	Chandan OCP (Patherdih)	0.22	0.286	
8	Sudamdih Incline (UG)	0.09	0.117	254.27
9	Sudamdih Shaft (UG)	0.185	0.240	391.50
10	Amlabad (UG) Closed	0	0	386.95
	Total	1.762	2.289	2057.47
11	Sudamdih Coal Washery (Within the lease hold of Sudamdih Shaft Mine)	1.6	2.08	18

1.3.3 Impact of Fire Control on Ambient Air Quality:

Due to unscientific mining prior to nationalization there are unstable sites identified in the BCCL. Out of 595 unstable sites identified in the Master Plan, 15 sites consisting of 2187 no. of houses/families are affected. The affected families will be rehabilitated in adjacent non coal bearing area at a cost of Rs. 11199.89 lakhs

1.3.4 Impact of Resettlement on Ambient Air Quality:

As per Jharia Action Plan (JAP) household will be shifted for implementation of master plan. The reduction in number of households within the leasehold area of Cluster will lead to reduction in generation of air pollutants due to reduction in movement of man & materials apart from decrease in consumption of coal as a domestic fuel. As per Jharia Action Plan (JAP) household will be shifted as per for implementation.

1.4 Meteorological Data

A meteorological data generated during 1st January 16 to 31st March 2016 has been presented in this report .The micro meteorological set up was established at the roof of BCCL Dugda Guest house and parameters like temperature, relative humidity, wind speed and directions, cloud cover and rainfall were recorded. The data were collected on hourly basis during the entire study period.

Generally, moderate winds prevailed throughout the study period. The wind velocity ranged between ≤ 0.5 m/s to 13.2 m/s. The seasonal average wind speed was observed to be 0.69 m/s. Wind-roses were made by using latest WRPLOT View of Lakes Environmental Software.

The analysis of wind pattern during the season showed that the predominant wind directions were from North-West & West followed by North-East having frequencies 15.71%, 11.45% & 4.67% respectively. The receptors located in the Downwind directions i.e. SE and East from the dust generating sources are likely

to be affected. The dispersion of air borne dust during calm period (45% of time) will be very poor and buildup of pollutant concentration during this period will occur.

The maximum temperature recorded was 39.3^{0}C and the minimum was 6.2^{0}C. The daily average relative humidity values were in the range of 32.2 to 65.0%. The sky was mostly clear during the study period. The average atmospheric pressure value has been found to be around 732.3 mm Hg. Total 94.5mm rainfall was recorded during the study period. The average rainfall during the season was found to be 1.04 mm.

Table 1.2: SEASONAL WIND DISTRIBUTION

Period: 01st JAN.'2016 – 31stMAR.'2016

Wind Direction	Wind Velocity (m/s) & Duration (%)				
	< 0.5	0.6 -1.5	1.6 -3.5	>3.5	Total
N		1.61	0.78	0.00	2.38
NNE		0.83	0.37	0.00	1.19
NE		3.17	1.47	0.05	4.67
ENE		0.41	0.14	0.00	0.55
E		1.10	0.69	0.00	1.79
ESE		0.50	0.37	0.00	0.87
SE		1.28	0.41	0.05	1.74
SSE		0.64	0.18	0.00	0.82
S		0.41	0.09	0.00	0.50
SSW		0.28	0.05	0.00	0.32
SW		2.29	0.60	0.00	2.88
WSW		1.06	0.41	0.00	1.47
W		8.99	2.48	0.00	11.45
WNW		1.24	1.01	0.00	2.24
NW		11.47	4.22	0.05	15.71
NNW		2.11	3.59	0.00	5.7

Wind Direction	Wind Velocity (m/s) & Duration (%)				
	< 0.5	0.6 -1.5	1.6 -3.5	>3.5	Total
CALM	44.97	-	-	-	44.97
Total	44.97	37.32	17.56	0.15	100

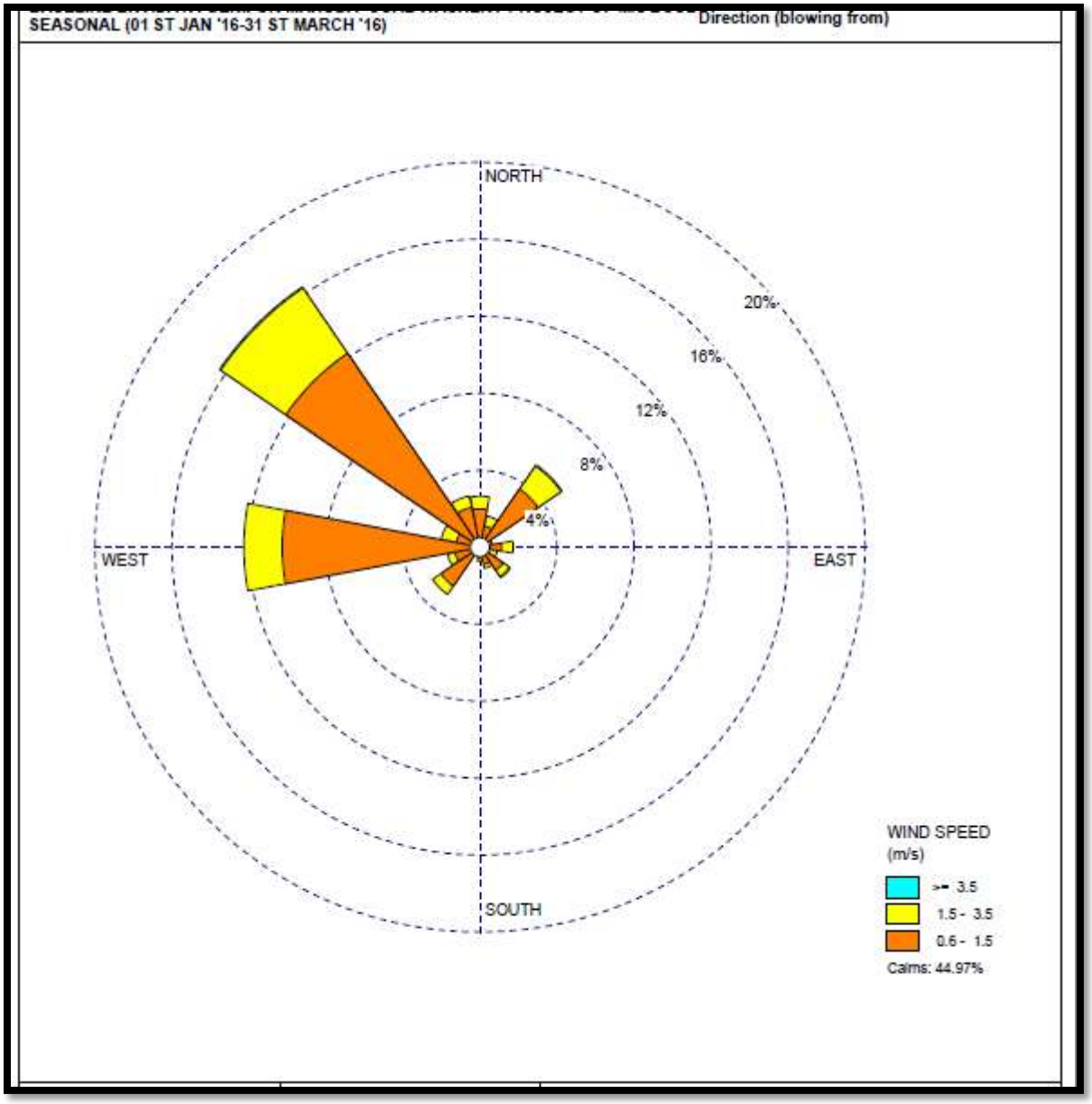


Figure No.-1.1 Wind Rose diagram for the period 1St Jan to 31St March 2016

Chapter – II

Fugitive Dust Generation Due To Movement of Coal

2.1 Introduction

The coal produced moves to the consumers via Road & Rail. Coal from the mine face is brought to the surface dumps and bulk of it goes to the nearby railway sidings for further movement to the consumer- end through rail. The journey from the mine face to the railway siding is covered by road. A portion of the coal produced by the mine directly goes to the consumers via road. Transportation of coal by rail is an environmentally better option than the road transportation. Road Transportation results in generation of fugitive dust from road surface apart from other pollutants released due to consumption of Diesel.

The fugitive dust generated due to coal transportation through road depend upon the following factors:

1. Speed and Weight of the moving vehicles.
2. Silt Content of the Road Dust (Particles less than 200 mesh size is considered as silt)
3. Silt loading of the road dust (Kg/m^2).
4. Moisture Content of the dust lying on the road surface.
5. Ambient Temperature, Humidity & wind velocity.

The dust generation will be lower if the quantity of dust (silt loading) lying on the road surface is minimum and the moisture content of the loose material lying on the road surface is high.

2.2 Movement of Coal

Distance travelled by coal and subsequent release of fugitive dust during its journey towards the consumer end has been described and dust load has been worked out for the year 2013-14, 2014-15 and 2015-16.

2.2.1 Cluster X Dust Generation (Kg/day):

Table: 2.1 Dust Generation (Kg/day)

Dust generated per day (Kg/Day)										
Name of the Mine	**Year**	**Location**	**Distance from Face to Siding (Km)**	**Coal Transferred (Te)**	**Daily Coal Production (Te/Day)**	**Capacity of the Dumper**	**Vehicle Kilometer Travelled**	**Emission Rate for PM 10 (kg/VKT)**	**Pollution Load * Dust Generated Per Day (Kg/day)**	**Dust generated Kg/per tonne**
Bhowra South	13-14	Sudmadih washery	6	11888.66	36.00	14	30.86	0.53	16.354	
	13-14	Other Consumers	20	28226.29	86.00	14	245.71	0.53	130.229	
	13-14	workshop	0.5	120	0.00	14	0.00	0.53	0.000	
		Total for 13-14			**122.00**				**146.583**	1.20
	14-15	Sudmadih washery	6	3495.82	11.00	14	9.43	0.53	4.997	
	14-15	Munidih washery	20	2014.34	6.00	14	17.14	0.53	9.086	
	14-15	workshop	0.5	120	0.00	14	0.00	0.53	0.000	
	14-15	Other Consumers	20	26230.52	79.00	14	225.71	0.53	119.629	
		Total for 14-15			**96.00**				**133.711**	1.39
	15-16	Sudmadih washery	6	4232.18	13.00	14	11.14	0.53	5.906	
	15-16	Other Consumers	20	24238.9	73.00	14	208.57	0.53	110.543	

Dust generated per day (Kg/Day)										
Name of the Mine	**Year**	**Location**	**Distance from Face to Siding (Km)**	**Coal Transferred (Te)**	**Daily Coal Production (Te/Day)**	**Capacity of the Dumper**	**Vehicle Kilometer Travelled**	**Emission Rate for PM 10 (kg/VKT)**	**Pollution Load * Dust Generated Per Day (Kg/day)**	**Dust generated Kg/per tonne**
	15-16	workshop	0.5	120	0.00	14	0.00	0.53	0.000	
		Total for 15-16			**86.00**				**116.449**	1.35
Bhowra (North) u/g mines	13-14	Sudmadih washery	6	4232.18	13.00	14	11.14	0.53	5.906	
	13-14	Other Consumers	20	24238.9	73.00	14	208.57	0.53	110.543	
	13-14	workshop	0.5	120	0.00	14	0.00	0.53	0.000	
		Total for 13-14			**13.00**				**116.449**	8.96
	14-15	Sudmadih washery	6	2366.92	7.00	14	6.00	0.53	3.180	
	14-15	Munidih washery	20	1398.73	4.00	14	11.43	0.53	6.057	
	14-15	workshop	0.5	120	0.00	14	0.00	0.53	0.000	
	14-15	Other Consumers	20	26219.77	79.00	14	225.71	0.53	119.629	
		Total for 14-15			**90.00**				**128.866**	1.43
	15-16	Sudmadih washery	6	3092.46	9.00	14	7.71	0.53	4.089	
	15-16	workshop	0.5	120	0.00	14	0.00	0.53	0.000	
	15-16	Other Consumers	20	21299.27	65.00	14	185.71	0.53	98.429	
		Total for 15-16			**74.00**				**102.517**	1.39
Sudamdih incline (ASP)	13-14	Sudmadih washery	3	14806.94	45.00	14	19.29	0.53	10.221	
	13-	workshop	0.5	29	0.00	14	0.00	0.53	0.000	

Dust generated per day (Kg/Day)										
Name of the Mine	**Year**	**Location**	**Distance from Face to Siding (Km)**	**Coal Transferred (Te)**	**Daily Coal Production (Te/Day)**	**Capacity of the Dumper**	**Vehicle Kilometer Travelled**	**Emission Rate for PM 10 (kg/VKT)**	**Pollution Load * Dust Generated Per Day (Kg/day)**	**Dust generated Kg/per tonne**
	14									
		Total for 13-14			**45.00**				10.221	0.23
	14-15	Sudmadih washery	3	27204.78	82.00	14.00	35.14	0.53	18.626	
	14-15	Munidih washery	20	412.66	1.00	20.00	2.00	0.53	1.060	
	14-15	MPL	20	7862.26	24.00	14.00	68.57	0.53	36.343	
		Total for 14-15			**106.00**				56.029	0.53
	15-16	Sudmadih washery	3	14263.52	43.00	15.00	17.20	0.53	9.116	
		Total for 15-16			**43.00**				**9.116**	0.21
Patherdih u/g (ASP)	13-14	Sudmadih washery	3	14090.58	43.00	14.00	18.43	0.53	9.767	
	13-14	workshop	4	120	0.00	14.00	0.00	0.53	0.000	
		Total for 13-14			**43.00**				**9.767**	0.23
	14-15	Sudmadih washery	3	5128.19	16.00	14.00	6.86	0.53	3.634	
	14-15	workshop	4	20	0.00	14.00	0.00	0.53	0.000	
	14-15	Other Consumers	20	3442.17	10.00	14.00	28.57	0.53	15.143	
		Total for 14-15			**26.00**				**18.777**	0.72
COCP Patherdih (ASP)	13-14	Sudmadih washery	3	27899.58	85.00	14.00	36.43	0.53	19.307	
	13-14	MPL	20	88044.23	267.00	14.00	762.86	0.53	404.314	
	13-	By Rail (Durgapur	1	1535.81	5.00	14.00	0.71	0.53	0.379	

Dust generated per day (Kg/Day)										
Name of the Mine	**Year**	**Location**	**Distance from Face to Siding (Km)**	**Coal Transferred (Te)**	**Daily Coal Production (Te/Day)**	**Capacity of the Dumper**	**Vehicle Kilometer Travelled**	**Emission Rate for PM 10 (kg/VKT)**	**Pollution Load * Dust Generated Per Day (Kg/day)**	**Dust generated Kg/per tonne**
	14	steel plant)								
		Total for 13-14			**90.00**				**424.000**	4.71
	14-15	Sudmadih washery	3	11459.74	35.00	14.00	15.00	0.53	7.950	
	14-15	W-III washery	3	24128.06	73.00	14.00	31.29	0.53	16.581	
	14-15	Other Consumers	20	15074	46.00	14.00	131.43	0.53	69.657	
		Total for 14-15			**81.00**				**94.189**	1.16
	15-16	Sudmadih washery	3	50234.35	152.00	14.00	65.14	0.53	34.526	
		Total for 15-16			**152.00**				**34.526**	0.23

* In terms of PM 10 expressed as kg/day, ** Average distance has been considered .## Emission rate for PM_{10} has been taken from the S&T work (funded by MoC) carried out by CMPDI during 2002-2007.

2.3 Optimum Coal Transportation scheme in the Present Scenario:

Phase – I (for 10 + 05 Years)

As suggested by the Environmental Appraisal Committee, it is proposed to continue the existing Road–Rail transport network system in view of the implementation of the Jharia Action Plan(JAP) for 10 years and another 05 years gestation period after the completion of the JAP for consolidation of the backfilled dug out fire areas and unstable areas is required. Thus the period of 15 years, make the Phase – I. All mitigation measures like covered trucks, green belting on either side of the road, enhanced water sprinkling, proper maintenance of roads, removal of spilled materials etc shall be adopted for 15 years with the existing road – rails transport system.

2.4 Conceptual Plan of Proposed Integrated Coal Transportation Network forthe Cluster:

Phase – II (after 15 Years):

As suggested by the EAC Members, BCCL shall implement conveyor –cum-rail transport to avoid movement of trucks within the cluster for coal transportation in Phase –II. Loading of coal by pay–loaders shall be discontinued.

During 2015-16, the combined daily coal production of the Cluster was 355 tones resulting in 263 kg of daily fugitive dust generation. The dust (PM-10) generation rate at present is 0.10 kg/te.

As a result of replacement of existing road transportation of coal by Conveyor to railway siding will result in reduction of fugitive dust generation to the extent of 5131 kg/day for daily coal production of 6936 tonnes (2.289 MTY) during Phase –II.

Table 2.2: Proposed Infrastructure for Coal Transportation (phase – II)

Cluster	Production Capacity (MTY)	Proposed Transport Infrastructure in Phase – II
X	2.289	**Coal transport by Conveyor to Railway Siding**
	6936 tonnes /Day	

2.5 Conclusion:

On the basis of the study undertaken to assess the impact of coal transportation on pollution load, the followings may be concluded:

Phase – I :(2013-14 to 2028 -29) :

1. During Phase – I, business as usual(BAU) scenario will prevail and the existing road cum rail transport network system will be used for coal dispatch to the consumers. During 2015-16, the combined daily coal production of the Cluster was 355 tones resulting in 263 kg of daily fugitive dust generation. The dust (PM-10) generation rate at present is 0.10 kg/te.
2. The generation of fugitive dust due to transportation of coal by road can be further reduced by enforcing covering of loaded trucks, periodical removal of loose materials lying on the road surface and black topping of coal transportation roads.
3. Avenue plantation, effective wetting of the road surface and proper maintenance of roads will further result in mitigation of the impact of road generated dust on ambient air quality.
4. Better road condition, by the use of Mechanical Sweeper or vacuum cleaner dust generation may be minimized.

Phase – II :(From 2029-30 Onwards):

As a result of replacement of existing road transportation of coal by Conveyor to railway siding will result in reduction of fugitive dust generation to the extent of 5131 kg/day for daily coal production of 6936 tonnes (2.289 MTY) during Phase –II.

1. During Phase –II, dust load will further reduce due to quenching of mine fire and domestic coal consumption after resettlement of general population dwelling within the command area of cluster, as a result of implementation of Jharia Action Plan. It will result in significant improvement in ambient air quality.

2. **Coal Production Vs. Dust Generation due to Road Transportation is presented below:**

Table2.3: Coal Production Vs. Dust Generation due to Road Transportation

Year	Coal Production (Te/day)	Dust Generation(Kg/Day)
2015-16 (By Road transportation)	355	263
2029-30 (Considering peak production and all the coal transported through Road)	6936	5131
2029-30(By Conveyor Transportation)	6936	0

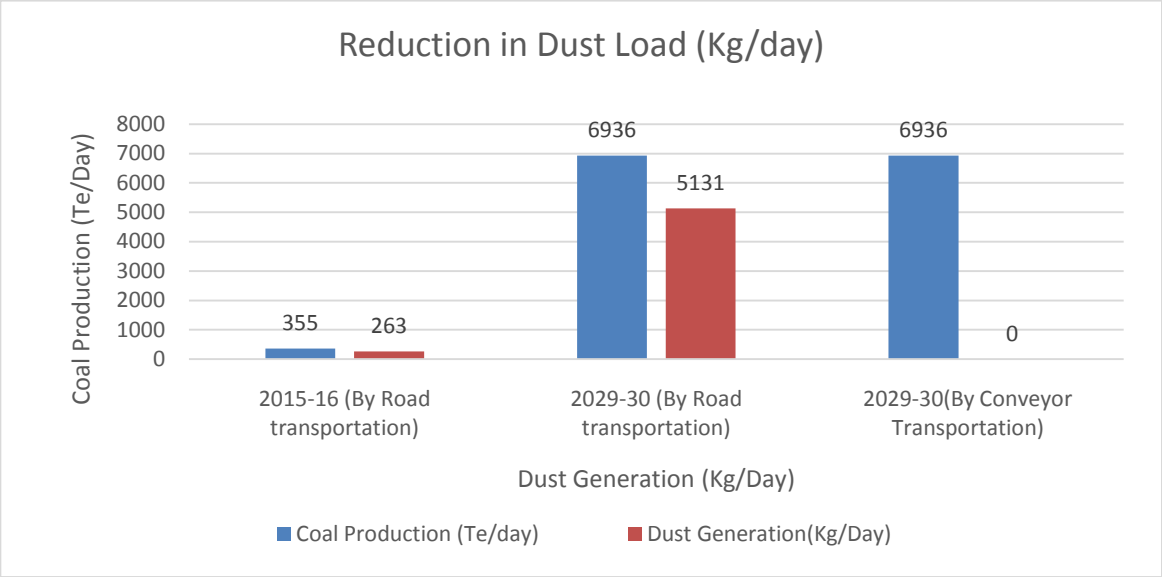


Figure 2.1: Presentation of reduction in dust generation due to replacement of Road transportation by Conveyor system.

CSR ACTIVITY PLAN

OF

CLUSTER – X

AS PER

EC CONDITION (SPECIFIC CONDITION-XLII): Details of transportation, CSR, R&R and implementation of environmental action plan for each of the 17 clusters should be brought out in a booklet for and submitted to Ministry.

MAY, 2017

INTRODUCTION

Coal India has adopted CSR as a strategic tool for sustainable growth. For Coal India in the present context, CSR means not only investment of funds for Social Activity but also Integration of Business processes with Social processes. Even much before the issue of CSR became global concern; Coal India was aware of its Corporate Social Responsibility and was fulfilling the aspiration of the Society through well-defined "Community Development Policy" within the periphery of 8 Kms. of the Project sites. This has resulted into a harmonious relationship between Coal India and the peripheral Communities.

Coal India has identified land oustees, PAP and those staying within the radius of 25 Kms of the Project as primary beneficiaries. Poor and needy section of the society living in different parts of India are second beneficiaries. For carrying out CSR activities, 80% of the budgeted amount are be spent within the radius of 25 Km of the Project Site/Mines/Area HQ/Company HQ and 20% of the budget to be spent within the States in which operating.

SCOPE

As per Schedule VII Section 135 of New Companies Act 2013 the following should be the Scope of Activities under Corporate Social Activities:

i. Eradicating hunger, poverty and malnutrition, promoting healthcare including preventive health care and sanitation and making available safe drinking water.
ii. Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly, and differently able and livelihood enhancement projects;
iii. Promoting gender equality, empowering women, setting up homes and hostels for women and orphans, setting up old age homes, day care centers and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups;
iv. Ensuring environmental sustainability, ecological balance, protection of Flora and Fauna, animal welfare, agro-forestry, conservation of natural resources and maintaining quality of soil, air and water;
v. Protection of national heritage, art and culture including restoration of buildings and sites of historical importance and works of art; setting up public libraries, promotion and development of traditional arts and handicrafts;
vi. Measures for the benefit of armed forces veterans, war widows and their dependents
vii. Training to promote rural sports, nationally recognized sports, Paralympics sports and Olympic sports;
viii. Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government for socio-economic development and relief and welfare of the Scheduled Castes, the Scheduled Tribes, other backward classes, minorities and women;
ix. Contributions or funds provided to technology incubators located within academic institutions whichare approved by the Central Government;
x. Rural development projects

SOURCE OF FUND

The fund for the CSR should be allocated based on 2% of the average net profit of the Company for the three immediate preceding financial years or Rs. 2.00 per tone of Coal Production of previous year whichever is higher.

CURRENT STATUS

Healthcare: Annual CSR (Healthcare) Expenditure for the year 2015-16 and 2016-17.

I. Mobile Medical Van (MMV):

S. No.	Year (financial year)	No. of Mobile Medical VanCamp	Beneficiaries	Amount (inRs.)	Remarks
1	2015-16	229	7012	215927.76	Till Dec. 2016

II. General Medical Camps:

S. No.	Year (financial year)	Name of Medical Camp	Beneficiaries	Date
1.	2015-16	Family Planning Camp	33	03.02.2016
2.		Family Planning Camp	40	16.02.2016

Highlights of CSR Work under taken during 2015-16 and 2016-17 at Cluster-X

S. No.	Details	No. of units		Total Amount (in Rs.)	Remarks
		Girls	Boys		
1.	Construction of toilets in various schools in Saraikela-Kharsawan district of Jharkhand under "Swachh Vidyalaya Abhiyaan"under CSR activities of BCCL.	89	89	29,548,000	Work was done by state government.
	Total	178		29,548,000	

PROPOSED STATUS

CSR Work to be under taken during 2017-18 at Cluster- X

S. No.	Details	Remarks
1.	Construction of Marriage/Multipurpose Hall in Mayurdubhi (मयुरदुभी) village in Amai Nagar (आमाई नगर(Panchayat of Block Chandankyari	Proposed activity

*****

BCCL

C.S.R. PERFORMANCE REPORT MONTHWISE
April 2015 to December 2016
BHowrah REGIONAL HOSPITAL. E.J. AREA.

MOBILE MEDICAL VAN.

Date: 29.04.2016

SL.NO.	MONTH	NO.OF.CAMP	NO.OF.BENEFICIARIES	TOTAL EXPENDITURE
1.	April 15	26	1122	₹ 39,171.33
2.	May	25	937	₹ 35,270.12
3.	June	25	941	₹ 32,950.08
4.	July	27	1028	₹ 38,685.08
5.	August	25	1003	₹ 31,288.24
6.	September	26	634	₹ 17,211.73
7.	October	24	443	₹ 7,963.19
8.	November	24	517	₹ 7870.23
9.	December	27	387	₹ 5,517.76
10.	January 16			
11.	February			
12.	March			
	Total ---	229	7012	₹ 2,15,927.76

Dy.C.M.O. I/C
Sudamdih R/ Hospital
E.J.Area.

NAME OF VILLAGES COVERED UNDER CSR/MMV PROGRAMME

E.J. AREA - VILLAGES

1. Bhowrah 19 No. Basti.
2. Parghabad Basti
3. Supker Basti
4. Manjhi Basti.
5. Mohubani Basti.
6. Sheobabudih
7. Bhowrah 7No Basti.
8. Bhowrah 4 No Basti.
9. Bhowrah Jahaj Tand.
10. Thana Basti.
11. Manpur Basti.
12. Amlabad Basti.
13. New Riverside Basti.
14. Gourkhutti Basti.
15. Sawardih Basti
16. Hattala Basti.

Dy.C.M.O. I/C
Sudamdih R/Hospital

65959

FAMILY PLANNING CAMP

E.J.AREA

1. Sudamdih R/ Hospital date - 0 3.02.2016. Beneficiaries- 33
2. Bhowrah R/ Hospital date - 16.02.2016 Beneficiaries –40

Dy.C.M.O

Sudamdih R /Hospital

ANNEXURE – XIII B

CSR BUDGET & EXPENDITURE

BHARAT COKING COAL LIMITED			
CSR BUDGET AND EXPENDITURE			
Year	**CSR Budget (Rs in lakh)**	**Projects/ Activities**	**Expenditure incurred (In Rs. Lakhs)**
2013-14	3050	Drinking Water/ Water Supply	278
		Education	20
		Infrastructure Development	351.15
		Skill Development	82
		Medical/Healthcare	49
		Others (Uttrakhand Chief Minister Relief fund)	2000
		Total of 2013-14	**2780.15**
2014-15	3080	Drinking Water/ Water Supply & Sanitation	4.69
		Education	2.87
		Infrastructure Development	244.9
		Skill Development	55.73
		Medical/Healthcare	32.55
		Forestry & Environment	73.43
		Others	18.29
		PMNRF	1000
		Total of 2014-15	**1432.46**
2015-16	3300	Drinking Water/ Water Supply & Sanitation	3.33
		Swachh Vidyalaya Abhiyan	5868.51
		Education	17.01
		Infrastructure Development	161.75
		Skill Development	0.12
		Medical/Healthcare	33.06
		Forestry & Environment	2.94
		Conservation of Natural resources	63.76
		Others	13.23
		Transfer of CSR Expenditure spent by BCCL CSR Budget allotted by CIL (CIL the Holding Company has also incurred CSR expenditure to the tune of Rs.10.97 crore through BCCL, which has been borne and accounted for the books of CIL)	-1096.58
		Total of 2015-16	**5067.13**

CSR BUDGET AND EXPENDITURE for FY 2016-17

Expenditure under CSR for the year 2016-17				
S. No.	CSR Project or Activity identified	Sector in which the project is covered	Amount spent on the projects or programs Sub-heads:(1) Direct Expenditure on projects or programs(2) Overheads: (in lakhs)	
			Direct	Overheads
1	Construction of toilets in various school in Paschimi Singhbhum District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	389.32	3.00
2	Construction of toilets in various school in Bokaro District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	8.15	
3	Construction of toilet in various school in Dumka District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	341.96	
4	Construction of toilet in various school in Gumla District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	68.77	
5	Construction of toilet in various schools in Dhanbad District	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	1.17	

6	Construction of toilet in various schools in Simdega District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	132.02	
7	Construction of toilets in various schools in Purbi Singhbhum district of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	2.00	
8	Constn. of Toilets in various School in Koderma District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	16.91	
9	SVA LIABILITY	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	737.86	
10	SVA LIABILITY reversed	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	(1,022.52)	
Total			675.63	3.00
Grand Total			**678.63**	

CSR BUDGET AND EXPENDITURE for FY 2017-18

Sl No	Particulars	Expenditure incurred (in Rs. Lakh)
1	Various health camps & allied activities (Project JYOTI)	2.20
2	Swachh Vidyalaya Abhiyan (toilets bill)	165.60
3	Construction of toilets at SSLNT Mahila Mahavidyalayaand at Bhatinda Pootki	14.30
4	Swachhta Pakhwada activities	0.30
5	Construction of PCC Road in Topchanchi Blocks	4.40
6	Deepening /renovation of ponds in Tundi and East Tundi	11.90
7	Handloom weaving training project	6.00
8	Construction of Community Hall at Johar Asthan, Hirapur,Dhanbad (bill)	0.40
9	BCCL Ke LAAL/BCCL Ki LAADLI	35.40
10	Others (including liability)	33.50
11	**Total**	**273.9**

CSR BUDGET AND EXPENDITURE for FY 2018-19 (upto Nov.2019)

Sl No	Particulars	Expenditure incurred (in Rs. Lakh)
1	Various medical camps under CSR	2.2
2	Swachh Bharat Abhiyan activites	2.2
3	BCCL Ke LAAL/BCCL Ki LAADLI	0.08
4	Deepening /renovation of ponds	4.22
5	Others	2.54
	Total	**11.24**

ANNEXURE –

CSR BUDGET & EXPENDITURE

BHARAT COKING COAL LIMITED			
CSR BUDGET AND EXPENDITURE			
Year	**CSR Budget (Rs in lakh)**	**Projects/ Activities**	**Expenditure incurred (In Rs. Lakhs)**
2013-14	3050	Drinking Water/ Water Supply	278
		Education	20
		Infrastructure Development	351.15
		Skill Development	82
		Medical/Healthcare	49
		Others (Uttrakhand Chief Minister Relief fund)	2000
		Total of 2013-14	**2780.15**
2014-15	3080	Drinking Water/ Water Supply & Sanitation	4.69
		Education	2.87
		Infrastructure Development	244.9
		Skill Development	55.73
		Medical/Healthcare	32.55
		Forestry & Environment	73.43
		Others	18.29
		PMNRF	1000
		Total of 2014-15	**1432.46**
2015-16	3300	Drinking Water/ Water Supply & Sanitation	3.33
		Swachh Vidyalaya Abhiyan	5868.51
		Education	17.01
		Infrastructure Development	161.75
		Skill Development	0.12
		Medical/Healthcare	33.06
		Forestry & Environment	2.94
		Conservation of Natural resources	63.76
		Others	13.23
		Transfer of CSR Expenditure spent by BCCL CSR Budget allotted by CIL (CIL the Holding Company has also incurred CSR expenditure to the tune of Rs.10.97 crore through BCCL, which has been borne and accounted for the books of CIL)	-1096.58
		Total of 2015-16	**5067.13**

CSR BUDGET AND EXPENDITURE FOR FY 2016-17

Expenditure under CSR for the year 2016-17				
S. No.	CSR Project or Activity identified	Sector in which the project is covered	Amount spent on the projects or programs Sub-heads:(1) Direct Expenditure on projects or programs(2) Overheads: (in lakhs)	
			Direct	Overheads
1	Construction of toilets in various school in Paschimi Singhbhum District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	389.32	3.00
2	Construction of toilets in various school in Bokaro District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	8.15	
3	Construction of toilet in various school in Dumka District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	341.96	
4	Construction of toilet in various school in Gumla District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	68.77	
5	Construction of toilet in various schools in Dhanbad District	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	1.17	

6	Construction of toilet in various schools in Simdega District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	132.02	
7	Construction of toilets in various schools in Purbi Singhbhum district of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	2.00	
8	Constn. of Toilets in various School in Koderma District of Jharkhand.	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	16.91	
9	SVA LIABILITY	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	737.86	
10	SVA LIABILITY reversed	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	(1,022.52)	
Total			675.63	3.00
Grand Total			**678.63**	

CSR BUDGET AND EXPENDITURE for FY 2017-18

Sl No	Particulars	Expenditure incurred (in Rs. Lakh)
1	Various health camps & allied activities (Project JYOTI)	2.20
2	Swachh Vidyalaya Abhiyan (toilets bill)	165.60
3	Construction of toilets at SSLNT Mahila Mahavidyalayaand at Bhatinda Pootki	14.30
4	Swachhta Pakhwada activities	0.30
5	Construction of PCC Road in Topchanchi Blocks	4.40
6	Deepening /renovation of ponds in Tundi and East Tundi	11.90
7	Handloom weaving training project	6.00
8	Construction of Community Hall at Johar Asthan, Hirapur,Dhanbad (bill)	0.40
9	BCCL Ke LAAL/BCCL Ki LAADLI	35.40
10	Others (including liability)	33.50
11	**Total**	**273.9**

CSR WORKS AND EXPENDITURE FOR 2018-19

Sl No	CSR Projects identified	Sector	Amt. spent (Rs. lakhs)
Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, conservation of natural resources and maintaining quality of soil, air and water including contribution to the Clean Ganga Fund set-up by the Central Government for rejuvination of river Ganga (04 nos. of pond projects)			
1	Deepening/renovation including construction of steps/ghats for pond at Belardih ,East tundi	Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, conservation of natural resources and maintaining quality of soil, air and water including contribution to the Clean Ganga Fund set-up by the Central Government for rejuvination of river Ganga	4.22
2	Deepening/renovation including construction of steps/ghats at Aam Bandh Sindurpur (Khairabani) village under Sindurpur Panchayat in Baliapur Block	Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, conservation of natural resources and maintaining quality of soil, air and water including contribution to the Clean Ganga Fund set-up by the Central Government for rejuvination of river Ganga	6.06
3	Deepening/renovation including construction of steps/ghats at Aam Bandh at Dardaha village under Dolabhar Panchayat in Baliapur Block	Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, conservation of natural resources and maintaining quality of soil, air and water including contribution to the Clean Ganga Fund set-up by the Central Government for rejuvination of river Ganga	7.09
4	Deepening/Renovation including Construction of steps/ghat for Khas Bandh Pond at Latani under East Tundi by BCCL	Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, conservation of natural resources and maintaining quality of soil, air and water including contribution to the Clean Ganga Fund set-up by the Central Government for rejuvination of river Ganga	0.60
Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water (Medical camps & Swachhta Pakhwada under sanitation)			
5	Medical camps held under CSR	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	1.68

6	Swachhta Marathon (run for cleanliness) to promote awareness about Swachhta under Swachhta Pakhwada (held under under Ministry instructions)	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	2.21
7	Arrangements for Swachhta Pakhwada (held under under Ministry instructions)	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	0.18
8	05 shows of Nukkad Natak held towards promotion of cleanliness under Swachhta pakhwada (held under under Ministry instructions)	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	0.50
Promoting education,including special education & employment enhancing vocation skills especially among children,women,elderly,and the differently abled & livelihood enhancement projects (03 nos. of projects)			
9	BCCL Le LAAL/BCCL Ki LAALDI	Promoting education,including special education & employment enhancing vocation skills especially among children,women,elderly,and the differently abled & livelihood enhancement projects	26.12
10	Skill development: Providing 100 nos. of sewing machines for training towards empowering SGH women through Jharkhand State Livelihood Promotion Society	Promoting education,including special education & employment enhancing vocation skills especially among children,women,elderly,and the differently abled & livelihood enhancement projects	5.00
11	Training Scheme for preparing "Trainees" for Mining Sirdars	Promoting education,including special education & employment enhancing vocation skills especially among children,women,elderly,and the differently abled & livelihood enhancement projects	16.03
Rural development projects (02 nos. of projects)			
12	Construction of bamboo huts with thatched roof in Barwa village under Green Haat Project	Rural development projects	2.05
13	Construction of Community Centre at Jiramuri village, Ratanpura panchayat under Govindpur Block, Dhanbad	Rural development projects	16.18

Others (Monthly expenditure incurred towards HR expenses of NCSR Hub TISS as per its MoU)			
14	Payment to NCSR Hub TISS Mumbai towards human resource expenses	Others	2.29
Liability			
15	NCSR Hub, TISS Liability for impact assessment study	Rural development projects	3.94
16	BCCL Ke LAAL/BCCL Ki Laadli liability	Promoting education, including special education & employment enhancing vocation skills especially among children, women, elderly, and the differently abled & livelihood enhancement projects	23.44
17	Others including liabilities of CSR works (Swachhta Pakhwada, installation of hand pumps, Various construction works at RBB High School, Rajganj etc.)	Sanitation, safe drinking water, promoting education	25.09
Total			**142.69**

CSR BUDGET AND EXPENDITURE FOR FY 2019-20

Sl No	CSR Projects identified	Sector	Amt. Spent (₹ lakhs)
1	Deepening/renovation including construction of steps/ghats for ponds at Tundi, East Tundi & Baliapur	Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agroforestry, **conservation of natural resources** and maintaining quality of soil, air and water including contribution to the Clean Ganga Fund set-up by the Central Government for rejuvination of river Ganga	9.53
2	Installation of hand pumps at different locations in Dhanbad district through Dept. of drinking water and Sanitation, Dhanbad via depository mode	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and **making available safe drinking water**	18.02
3	Medical camps under Block II Area	Eradicating hunger, poverty and malnutrition, **promoting health care including preventive health care** and sanitation including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	0.42
4	Green Haat project at Barwa village, Govindpur block (under Swachhta Pakhwada)	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and **sanitation** including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	0.81
5	Sanction of the amount to Municipal Commissioner, Dhanbad for procurement of fogging machine and sprayer for Dhanbad Municipal Corporation towards tackling COVID-19, under CSR initiatives of BCCL	Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and **sanitation** including contribution to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water	10
6	Works in Pehla Kadam School- a School for the underprivilaged located at Jagjeevan Nagar	Promoting education, **including special education** & employment enhancing vocation skills especially among children, women, elderly,and the differently abled & livelihood enhancement projects	7.21

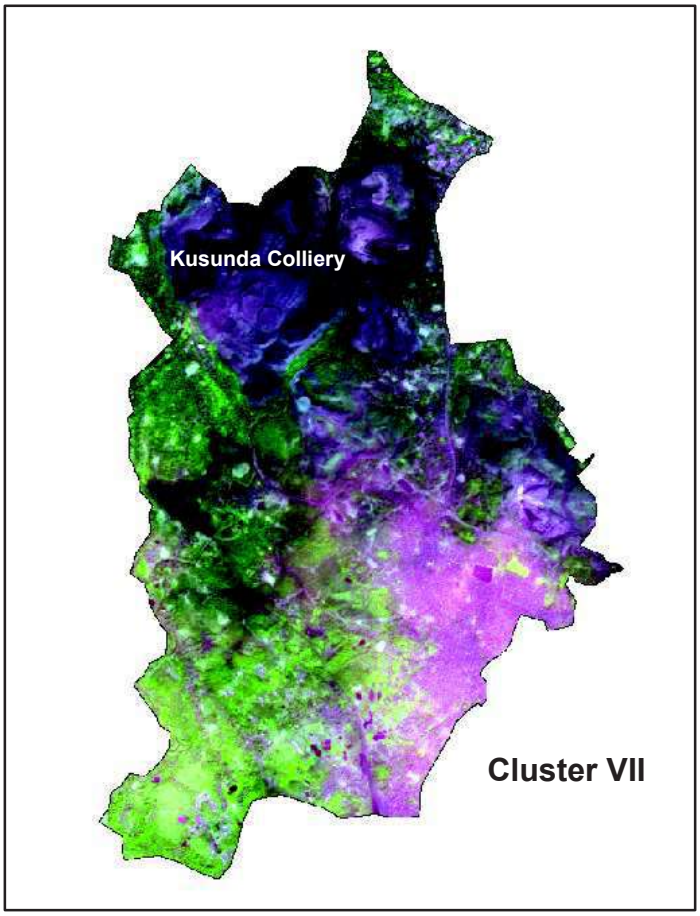
7	Works in RBB School, Rajganj	Promoting education,including **special education** & employment enhancing vocation skills especially among children,women,elderly,and the differently abled & livelihood enhancement projects	84.39
8	BCCL Ke LAAL/BCCL Ki Laadli	**Promoting education**, including special education & employment enhancing vocation skills especially among children, women, elderly, and the differently abled & livelihood enhancement projects	4.73
9	Development of smart classes in different high Schools, higher secondary Schools and other Schools in Dhanbad District for a total of 129 schools through District administration via depository mode	**Promoting education**, including special education & employment enhancing vocation skills especially among children, women, elderly, and the differently abled & livelihood enhancement projects	193.5
10	Mining Sirdars training to SC/ST candidates (preference to PAPs)	Promoting education,including special education & employment enhancing **vocation skills** especially among children,women,elderly,and the differently abled & **livelihood enhancement projects**	8.93
11	Construction of PCC road at Topchanchi Block	Rural development projects	2.12
12	Construction of Marriage Hall at Ratanpur Village, Ratanpur Panchayat, Govindpur Block	Rural development projects	33.63
13	Construction of Community Center at Jiramuri Village ,Ratanpur Panchayat, Govindpur Block	Rural development projects	1.25
14	Depository mode transfer to D.C. Dhanbad towards preparatory efforts to tackle COVID-19 situation in Dhanbad", under CSR initiatives of BCCL	Disaster Management	200
15	Depository mode transfer to Chief Minister's Relief Fund, Jharkhand	Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government for socio-economic development and relief and welfare of the Scheduled Castes, the Scheduled Tribes, other backward classes, minorities and women	50

16	Miscellaneous: Yoga Diwas, Handloom handing over expense, final bill settlement of constructed marriage mandap	Others	0.12
17	Liability reversed	Others	(23.4)
Total			**601.22**

CSR BUDGET AND EXPENDITURE FOR FY 2020-21* (upto Sept., 2020)

Sl No	CSR Projects identified	Expenditure incurred (₹ lakhs)	Status
A.	**Non-COVID-19 Expenditures**		
1.	Works in RBB School, Rajganj which includes construction of classrooms, toilets, auditorium & cycle stand	27.57	Work completed
2	Construction of marriage hall at Ratanpur Panchayat, Govindpur Block	3.73	Work completed
3.	Miscellaneous Civil Works (construction works in Pehla Kadam School at Jagjeevan Nagar, community hall at Ratanpur etc.)	1.69	Work completed
4	Aspirational district project-Giridih	121.82	Depository mode transfer made
B.	**COVID-19 Expenditure**		
1	Procurement of bleaching powder- 6.40 Work completed	6.40	Work completed
2	Procurement of face masks	0.16	Work completed
3	Financial assistance to D.C. Dhanbad to combat COVID-19 In Dhanbad	200.0	Fund transferred under depository mode of work execution
4	Lodging and boarding of doctors and paramedical staff deployed in COVID- 19 Hospital	24.50	In Progress; Out of sanctioned amount of Rs. 95.97 lakhs, Rs. 24.50 lakhs has been paid
Total		**385.87**	

Land Restoration / Reclamation Monitoring of Clusters of (Opencast + Underground) Coal Mines of Bharat Coking Coal Limited based on Satellite Data for the Year 2018



Submitted to

Bharat Coking Coal Limited

cmpdi
A Mini-Ratna Company

Land Restoration / Reclamation Monitoring of Clusters of (Opencast + Underground) Coal Mines of Bharat Coking Coal Limited based on Satellite Data for the Year 2018

March-2019

Remote Sensing Cell
Geomatics Division
CMPDI, Ranchi

CONTENTS

Executive Summary

1. Project

Land restoration / reclamation monitoring of clusters of (Opencast + Underground) coal mines of Bharat Coking Coal Ltd. (BCCL), based on satellite data, on every three year basis.

2. Objective

Objective of the land restoration / reclamation monitoring is to assess the area of backfilled, plantation, social forestry, active mining area, water bodies, and distribution of wasteland, agricultural land and forest in the leasehold area of the project. This will help in assessing the progressive status of mined land reclamation and to take up remedial measures, if any, required for environmental protection.

3. Salient Findings

- Four Clusters viz. I, IV, VII, X were selected in 2018-19 for land reclamation/restoration monitoring. These clusters consist of mainly opencast mines.

- Out of the total leasehold area of 5883.96 Ha., total mined out area is only 1075.76 Ha., belonging to the OC mines.

- It is evident from the analysis that 58.11% of excavated area is under technical reclamation and 35.02% of the excavated area is under active mining. Cluster wise details are given in Table-1 & Fig-1.

- 13.61% of total leasehold area has come under plantation (% green cover)

- Study reveals that out of total mine leasehold area of 5883.96 Ha. of the above mentioned 04 nos. clusters of BCCL taken up for the land reclamation monitoring during the year 2018-19; total excavated area is 1075.76 Ha. (18.28%) out of which 73.92 Ha. (6.87%) has been planted *(Biologically Reclaimed)*, 625.15 Ha. (58.11%) is under backfilling *(Technical Reclamation)* and

balance 376.69 Ha. (35.02%) is under active mining

- This report and the findings will act as the basis for further monitoring and reclamation related activities.

- Out of the four clusters of BCCL, maximum land reclamation has been done in Cluster VII (76.09%) followed by Cluster X (71.00%).

Table 1

Land Reclamation Status in Clusters of (Underground + Opencast) Projects of BCCL based on Satellite Data of the Year 2018

(Area in Hectare)

Sl. No.	Cluster No.	Total Leasehold Area	Technical Reclamation	Plantation			Area under Active Mining	Total Excavated Area	Total Area under Plantation (% Green Cover	Total Area under Reclamation
				Biological Reclamation	Other Plantations					
			Area under Backfilling	Plantation on Excavated / Backfilled Area	Plantation on External Over Burden Dumps	Social Forestry, Avanue Plantation Etc.				
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9 (=4+5+8)*	*10 (=5+6+7)*	*11(=4+5)*
1	Cluster I	575.00	10.11	7.29	47.99	25.53	28.39	45.78	80.80	17.40
			22.08%	15.91%			62.00%		14.05%	38.00%
2	Cluster IV	1123.79	147.22	0.00	27.11	165.09	166.67	313.88	192.20	147.22
			46.90%	0.00%			53.10%		17.10%	46.90%
3	Cluster VII	2127.70	351.54	37.47	15.52	238.67	122.23	511.24	291.67	389.01
			68.76%	7.33%			23.91%		13.71%	76.09%
4	Cluster X	2057.47	116.28	29.16	66.09	140.75	59.41	204.86	236.00	145.44
			56.76%	14.23%			29.00%		11.47%	71.00%
	TOTAL	**5883.96**	**625.15**	**73.92**	**156.71**	**570.04**	**376.69**	**1075.76**	**800.66**	**699.07**
			58.11%	**6.87%**			**35.02%**	**18.28%**	**13.61%**	**64.98%**

(% is calculated with respect to Excavated Area as applicable)

Note: In reference of the above Table, different parameters are classified as follows:

1. Area under Biological Reclamation includes Areas under Plantation done on Backfilled Area Only.
2. Area under Technical Reclamation includes Area under Barren Backfilling only
3. Area under Active Mining Includes Coal Quarry, Advance Quarry Site and Quarry filled with water etc., if any.
4. Social Forestry and Plantation on External OB Dumps are not included in Biological Reclamation and are put under separate categories as shown in the above Table.
5. (%) calculated in the above Table is in respect to Total Excavated Area except for “”Total Area under Plantation”” where % is in terms of “Leasehold Area””.

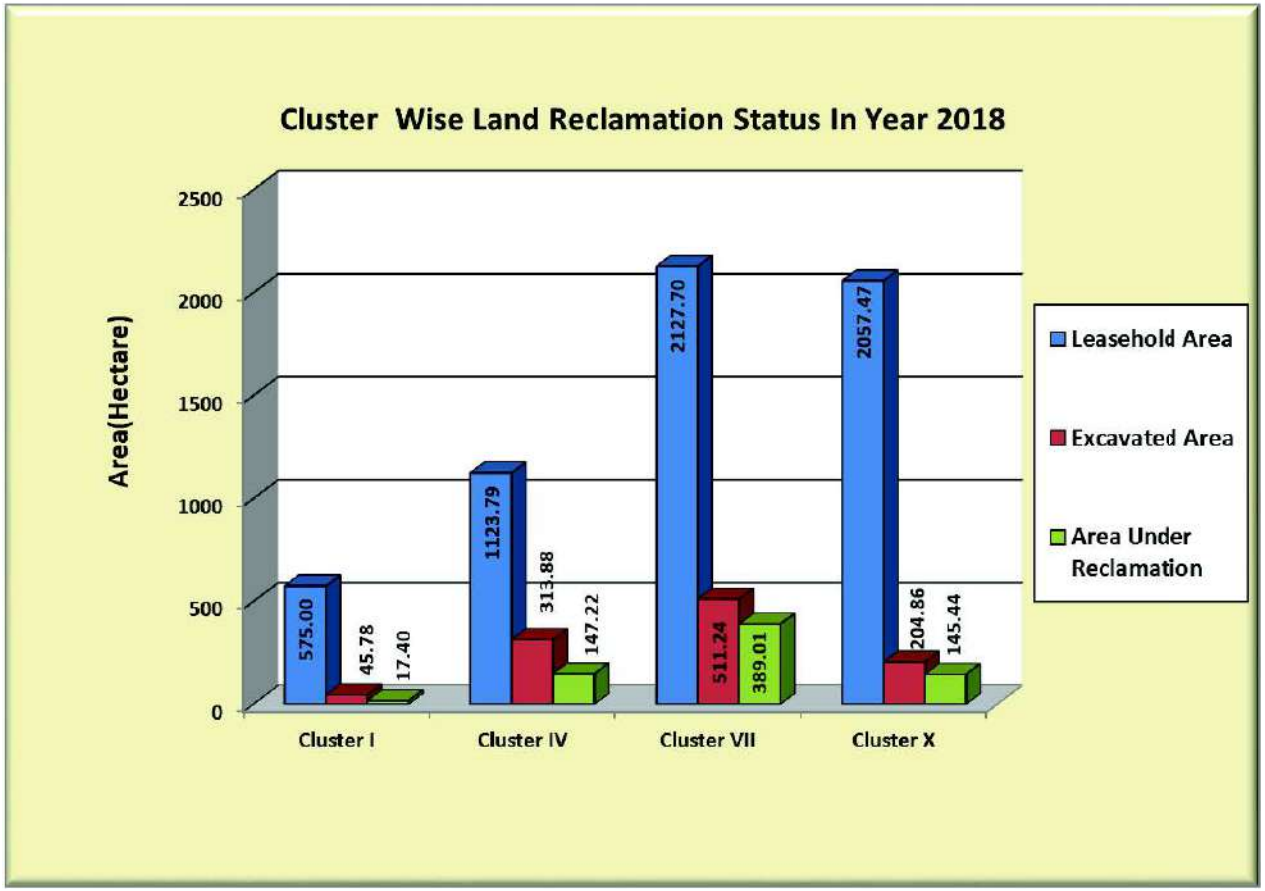


Fig. 1: Cluster wise Land Reclamation Status-2018 (BCCL)

4. Land Reclamation Status in Bharat Coking Coal Ltd.

4.1 In BCCL, a total of twelve clusters of mines are selected for land reclamation monitoring. Following four clusters of mines comprising both underground and OC projects of Bharat Coking Coal Ltd. have been taken up for land reclamation monitoring in 2018.

- Cluster I (Damoda OCP)
- Cluster IV (Salanpur Colliery, Katras Choitudih Colliery, Gaslitand Colliery, Amalgamated Keshalpur West Mudidih Colliery, Angarpathra Colliery & Ramkanali Colliery)
- Cluster VII (Amalgamated East Bhuggatdih Simlabahal Colliery, Ena OC, Vishwakarma OCP, Kustore OCP)
- Cluster X (Bhowrah North, Bhowrah South, Patherdih)

4.2 All the four above clusters, have been mapped during the year 2018 for assessing the progress of land reclamation.

4.3 Area statistics of different land use classes present in OC projects till the year 2018 is given in Table 2. Land use maps derived from the satellite data are given in Plate nos.1, 2, 3 & 4. The land use status are shown in Fig. 3, 4, 5 & 6.

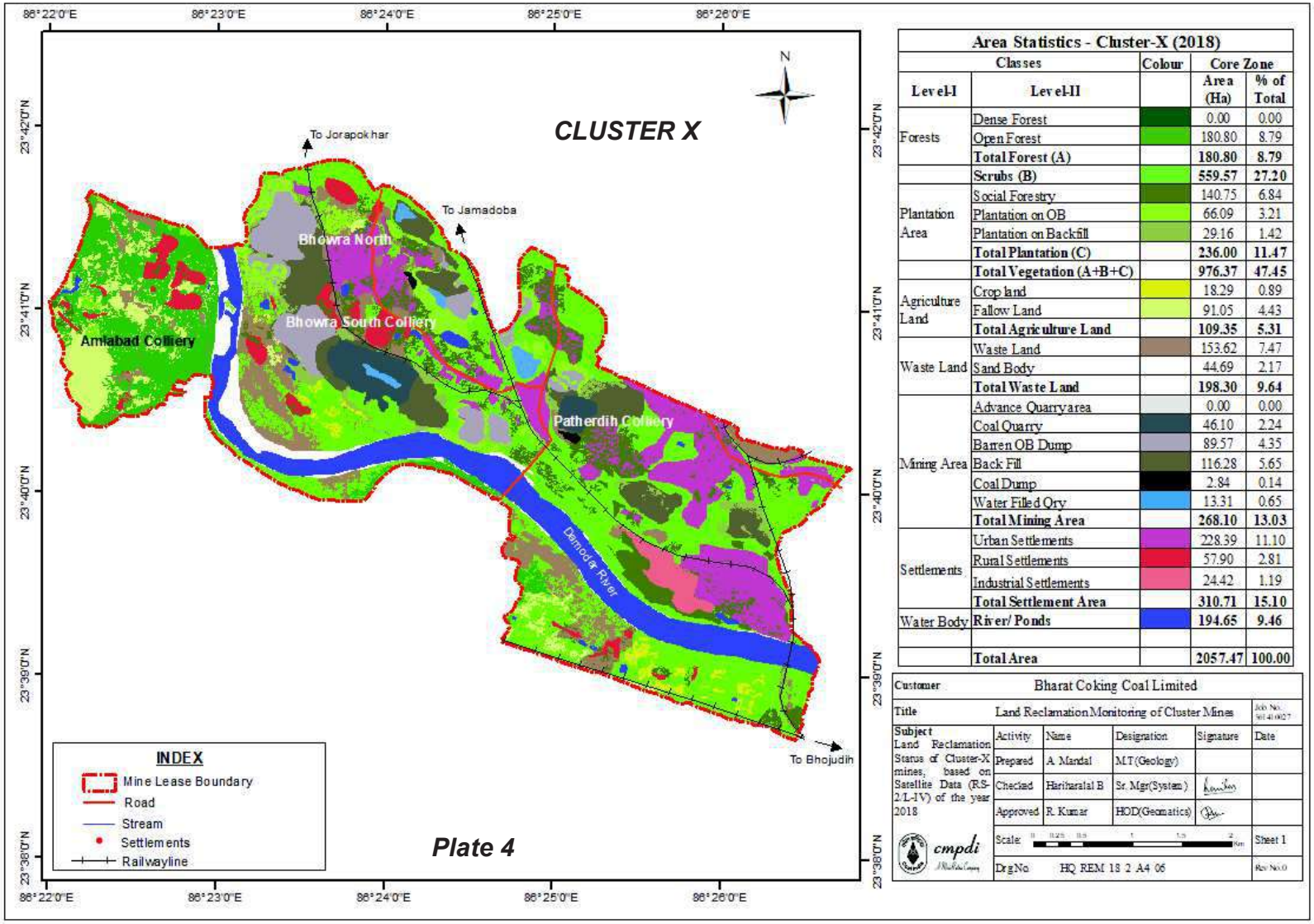
4.4 Study reveals that majority of the mines under the clusters considered for monitoring are of opencast type. 35.02% of excavated area is under active mining in the opencast mines. 58.11% of the excavated area have come under technical reclamation till 2018

Table 2

Status of Land Use/Reclamation Status in Clusters of (OC + Underground) mines of Bharat Coking Coal Limited based on Satellite Data of the year 2018

(Area in Hectare)

		CLUSTER I		CLUSTER IV		CLUSTER VII		CLUSTER X		TOTAL	
		Area	%	Area	%	Area	%	Area	%	Area	%
FORESTS	Dense Forest	5.36	0.93	0.00	0.00	0.00	0.00	0.00	0.00	5.36	0.09
	Open Forest	29.81	5.18	0.00	0.00	0.00	0.00	180.80	8.79	210.61	3.58
	Total Forest	35.17	6.12	0.00	0.00	0.00	0.00	180.80	8.79	215.97	3.67
SCRUBS	Scrubs	194.77	33.87	154.53	13.75	618.49	29.07	559.57	27.20	1527.35	25.96
PLANTATION	Social Forestry/Avenue Plantation	25.53	4.44	165.09	14.69	238.67	11.22	140.75	6.84	570.04	9.69
	Plantation on OB Dump	47.99	8.35	27.11	2.41	15.52	0.73	66.09	3.21	156.71	2.66
	Plantation on Backfill (Biological Reclamation)	7.29	1.27	0.00	0.00	37.47	1.76	29.16	1.42	73.92	1.26
	Total Plantation	80.80	14.05	192.20	17.10	291.67	13.71	236.00	11.47	800.66	13.61
	Total Vegetation	**310.75**	**54.04**	**346.73**	**30.85**	**910.15**	**42.78**	**976.37**	**47.45**	**2543.99**	**43.24**
	Coal Dump	5.26	0.91	20.40	1.82	16.03	0.75	2.84	0.14	44.53	0.76
ACTIVEMINING	Coal Quarry	8.79	1.53	158.87	14.14	119.18	5.60	46.10	2.24	332.94	5.66
	Advance Quarry Site	3.24	0.56	0.00	0.00	0.00	0.00	0.00	0.00	3.24	0.06
	Quarry Filled With Water	16.36	2.84	7.80	0.69	3.05	0.14	13.31	0.65	40.52	0.69
	Total Area under *Active Mining*	**28.39**	**4.93**	**166.67**	**14.83**	**122.23**	**5.74**	**59.41**	**2.89**	**376.69**	**6.40**
	Barren OB Dump	20.58	3.58	154.32	13.73	75.79	3.56	89.57	4.35	340.25	5.78
RECLAIMED	Area Under Backfilling (Technical Reclamation)	10.11	1.76	147.22	13.10	351.54	16.52	116.28	5.65	625.15	10.62
	Total Area under *Technical Reclamation*	**10.11**	**1.76**	**147.22**	**13.10**	**351.54**	**16.52**	**116.28**	**5.65**	**625.15**	**10.62**
	Total Area under Mine Operation	**64.33**	**11.19**	**488.60**	**43.48**	**565.59**	**26.58**	**268.10**	**13.03**	**1386.62**	**23.57**
WASTELAND	Waste Lands	69.03	12.00	51.99	4.63	162.76	7.65	153.62	7.47	437.40	7.43
	Fly Ash Pond / Sand Body	9.94	1.73	0.00	0.00	0.00	0.00	44.69	2.17	54.63	0.93
	Total Wasteland	**78.97**	**13.73**	**51.99**	**4.63**	**162.76**	**7.65**	**198.30**	**9.64**	**492.02**	**8.36**
WATERBODIES	Reservoir, nallah, ponds	14.43	2.51	14.84	1.32	18.39	0.86	194.65	9.46	242.30	4.12
	Total Waterbodies	**14.43**	**2.51**	**14.84**	**1.32**	**18.39**	**0.86**	**194.65**	**9.46**	**242.30**	**4.12**
AGRICULTURE	Crop Lands	3.52	0.61	3.45	0.31	37.65	1.77	18.29	0.89	62.91	1.07
	Fallow Lands	79.43	13.81	34.97	3.11	20.73	0.97	91.05	4.43	226.18	3.84
	Total Agriculture	**82.95**	**14.43**	**38.42**	**3.42**	**58.37**	**2.74**	**109.35**	**5.31**	**289.09**	**4.91**
SETTLEMENTS	Urban Settlement	7.17	1.25	160.59	14.29	380.73	17.89	228.39	11.10	776.88	13.20
	Rural Settlement	13.83	2.41	22.63	2.01	9.93	0.47	57.90	2.81	104.29	1.77
	Industrial Settlement	2.58	0.45	0.00	0.00	21.79	1.02	24.42	1.19	48.80	0.83
	Total Settlement	**23.58**	**4.10**	**183.21**	**16.30**	**412.45**	**19.38**	**310.71**	**15.10**	**929.96**	**15.80**
	Grand Total	**575.00**	**100.00**	**1123.79**	**100.00**	**2127.70**	**100.00**	**2057.47**	**100.00**	**5883.96**	**100.00**



Area Statistics - Cluster-X (2018)				
Classes		Colour	Core Zone	
Level-I	Level-II		Area (Ha)	% of Total
Forests	Dense Forest		0.00	0.00
	Open Forest		180.80	8.79
	Total Forest (A)		**180.80**	**8.79**
	Scrubs (B)		**559.57**	**27.20**
Plantation Area	Social Forestry		140.75	6.84
	Plantation on OB		66.09	3.21
	Plantation on Backfill		29.16	1.42
	Total Plantation (C)		**236.00**	**11.47**
	Total Vegetation (A+B+C)		**976.37**	**47.45**
Agriculture Land	Crop land		18.29	0.89
	Fallow Land		91.05	4.43
	Total Agriculture Land		**109.35**	**5.31**
Waste Land	Waste Land		153.62	7.47
	Sand Body		44.69	2.17
	Total Waste Land		**198.30**	**9.64**
Mining Area	Advance Quarry area		0.00	0.00
	Coal Quarry		46.10	2.24
	Barren OB Dump		89.57	4.35
	Back Fill		116.28	5.65
	Coal Dump		2.84	0.14
	Water Filled Qry		13.31	0.65
	Total Mining Area		**268.10**	**13.03**
Settlements	Urban Settlements		228.39	11.10
	Rural Settlements		57.90	2.81
	Industrial Settlements		24.42	1.19
	Total Settlement Area		**310.71**	**15.10**
Water Body	**River/ Ponds**		**194.65**	**9.46**
	Total Area		**2057.47**	**100.00**

Customer	Bharat Coking Coal Limited				
Title	Land Reclamation Monitoring of Cluster Mines				Job No. 561410027
Subject: Land Reclamation Status of Cluster-X mines, based on Satellite Data (RS-2/L-IV) of the year 2018	Activity	Name	Designation	Signature	Date
	Prepared	A Mandal	M.T (Geology)		
	Checked	Hariharalal B	Sr. Mgr(System)		
	Approved	R. Kumar	HOD(Geomatics)		
cmpdi	Scale: 0 0.25 0.5 1 1.5 2 Km				Sheet 1
	Drg No. HQ REM 18 2 A4 06				Rev No.0

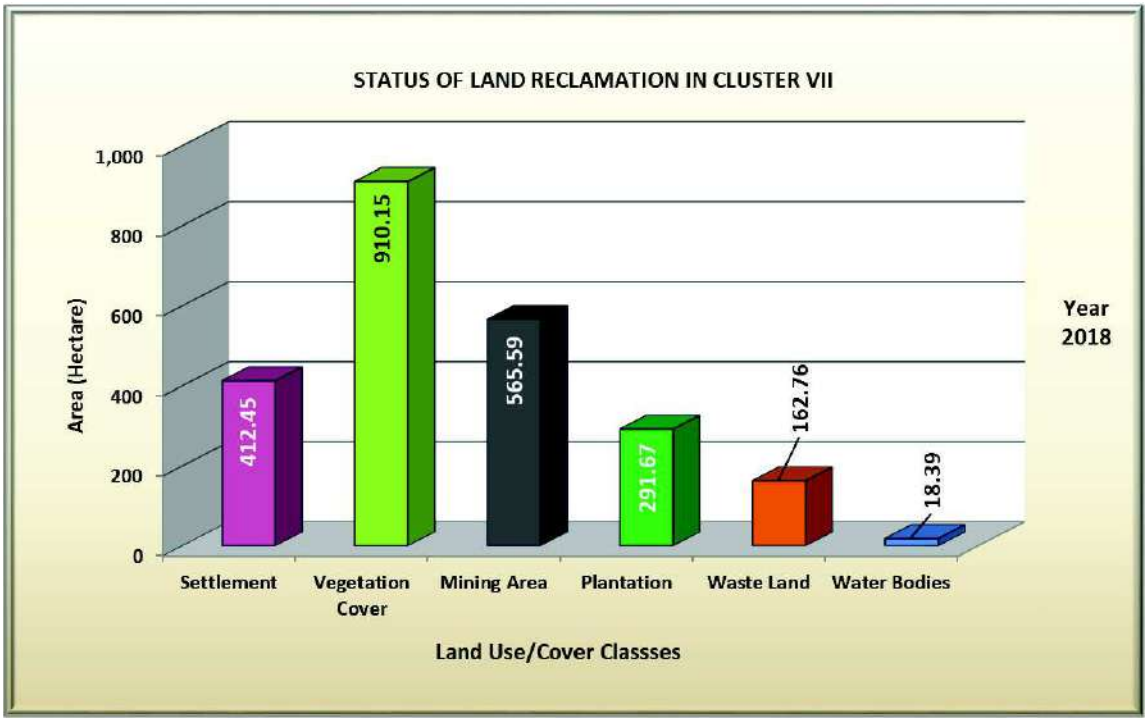


Fig. 5: Land Reclamation status of Cluster VII

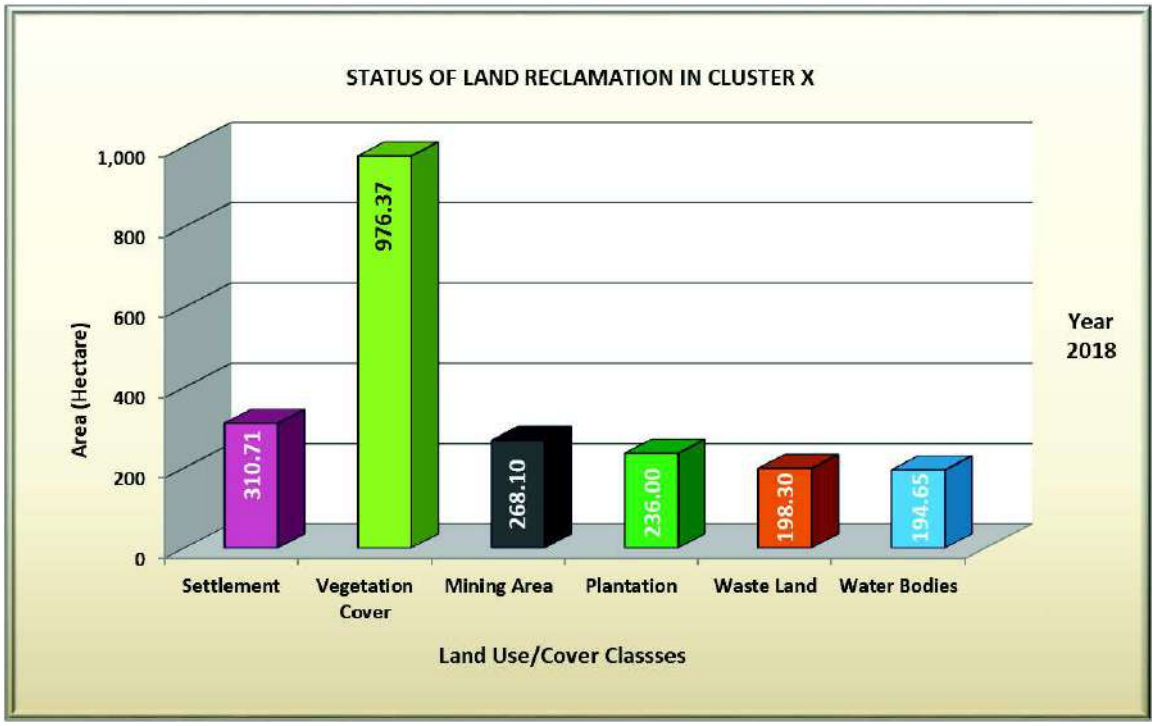


Fig. 6: Land Reclamation status of Cluster X

Photo 1: Ecological Restoration Site, Damoda Colliery, Cluster I

Photo 2: Ecological Restoration Site in Cluster IV

Photo 3: Ecological Restoration Site in Cluster VII

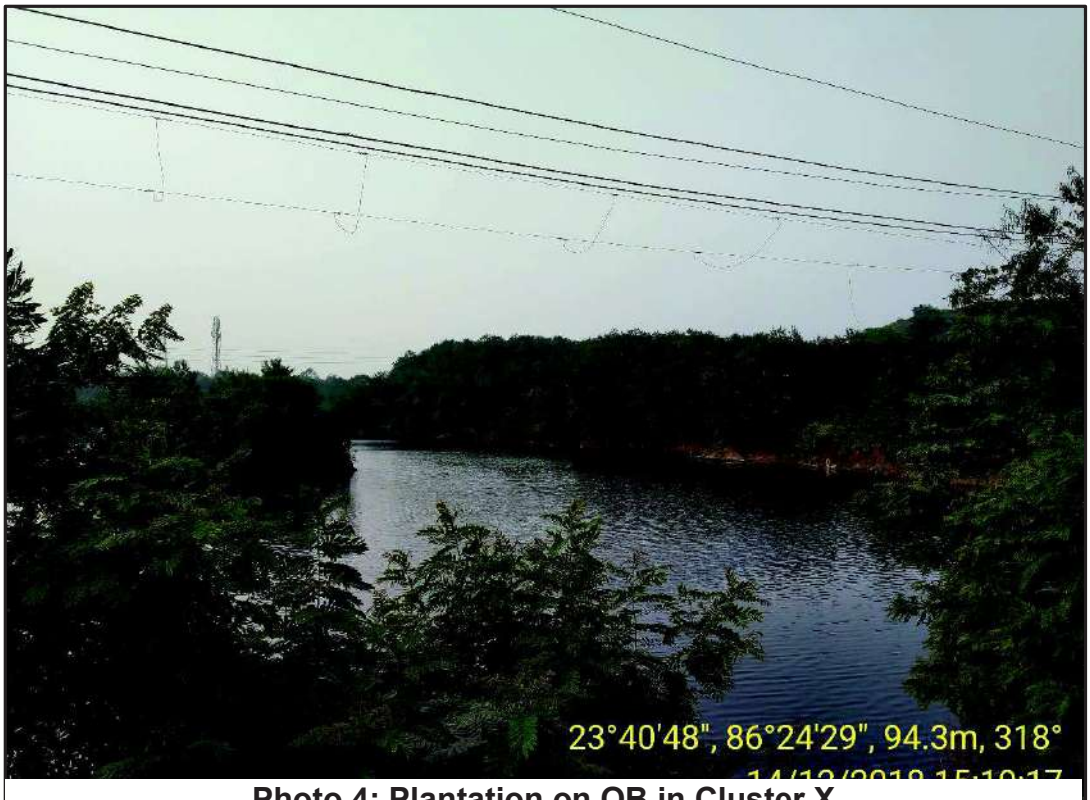


Photo 4: Plantation on OB in Cluster X

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BHARAT COKING COAL LIMITED

MINING PLAN AND MINE CLOSURE PLAN

FOR

AMALGAMATED SUDAMDIH PATHERDIH MINE

(UPTO {-} 60m RL HORIZON)

(EASTERN JHARIA AREA)

SEPTEMBER – 2018

CENTRAL MINE PLANNING & DESIGN INSTITUTE LTD.
REGIONAL INSTITUTE NO.-II
DHANBAD

CHAPTER - XII

PROGRESSIVE AND FINAL MINE CLOSURE PLAN

12.0 MINE CLOSURE PLANNING

12.1 OBJECTIVES OF CLOSURE PLANNING

Mine closure planning has to be carried out at the starting of the mine and needs periodic reviewing and revision during its life cycle to cope with the geo-technical constraints, safety and economic risks, social and environmental challenges. Various other objectives are as follows:

- To allow a productive and sustainable after-use of the site which is acceptable to the mine owner and the regulatory authority;
- To protect public health and safety;
- To alleviate or eliminate environmental damage and thereby encourage environmental sustainability;
- To minimize adverse socio-economic impacts.

12.2 DIFFERENT ASPECTS OF MINE CLOSURE PLANNING

The mine closure planning broadly involves the following aspects:

(a) Technical aspects;

The following technical aspects would be reviewed in the final mine closure planning. Details can be worked in closure plans envisaged to be prepared.

Safety hazards including management of fire and subsidence: In the mine closure plan, action will be taken to cover all the safety aspects including management of fire & subsidence and mine inundation.

Management of Pit Slopes: During operation of the mine, overall slope will be maintained at an angle not exceeding 22^0-28^0. Vegetation cover will also be provided along the slopes to arrest any failure.

As regards stability of back-filled dumps, the final level of reclaimed backfill will be matched with the levels of surrounding areas leaving a final residual void which will serve as a lagoon which may be utilised as water reservoir for the locality.

During operation, the external and internal OB dump will be developed with 30 m berm width and maximum height of 90m in case of external OB dump and the overall dump slope shall not exceed 22 to 28 degrees. The waste dumps will be provided with toe wall and garland drains. The dump will be technically reclaimed and vegetation will be grown after spreading the top soil. The above measures will prevent slope failure and improve the aesthetic value.

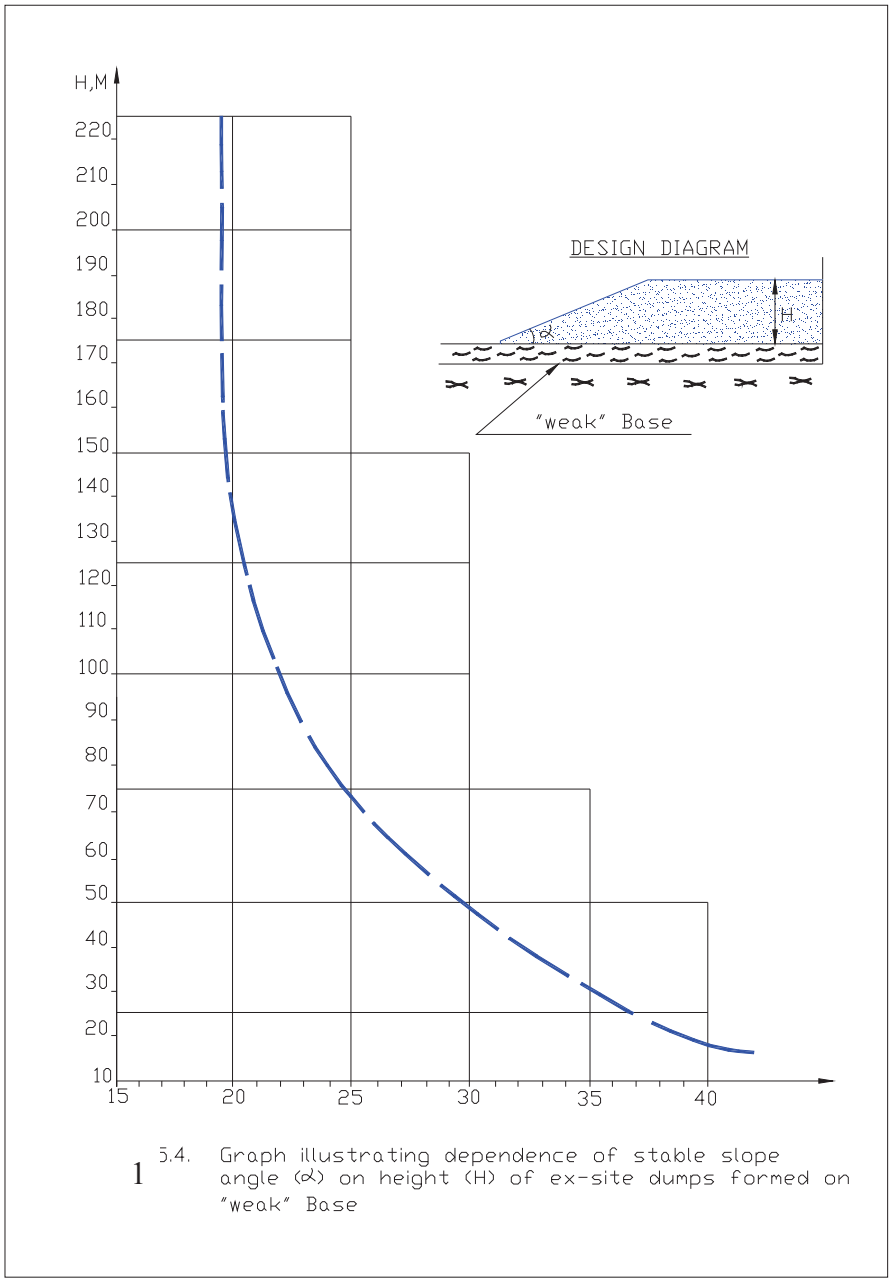


Fig. 5.4. Graph illustrating dependence of stable slope angle (α) on height (H) of ex-site dumps formed on "weak" Base

Backfilling will be started in the OCP and the final level of reclaimed backfill will be matched with the levels of surrounding areas leaving a final residual void which will also serve as a lagoon which may be utilised as water reservoir for the locality. Most of the back filled area shall be afforested by selecting proper plant species in consultation with State Forest Department. A part of the back filled area would also be developed for agricultural purpose with the help of the concerned State Authority.

- **Management of hydrology and hydro-geology**: In the mine closure plan, the surface flow pattern of precipitation and mine water would be clearly developed and water channel suitably laid down so that it does not disturb the general hydrology of the area.

  Mining operation may reduce the water table of the area. To recharge the water table, it is proposed that the mine water during operation will be discharged into surface water settling tank over flow of settled water from the tank will be used for water sprinkling, plantation, domestic purpose, etc. Therefore, the excess over flow water will be discharged into the nearby river. After closure of the mine vegetation will be grown on the entire vacant area.

- **Details of decommissioning of the infrastructures:** The decommissioning of the various infrastructures developed for the mine like office complex, roads, pipelines and transmission line etc. shall be planned in details so that the land occupied by these infrastructures are released. However, before such decommissioning, the possibility of re-use of these infrastructures for the neighboring mines shall be explored.

i) **Closure of entry to the open-cast mine:** After closure of the mining activities, all the entries to the mine will be effectively sealed off to avoid any accident and to prevent access to any unauthorized person. The area that is not reclaimed shall be properly fenced/ sealed to prevent any

unauthorized entry into the area. However, the guidelines / instructions from DGMS, if any, will be followed.

(b) Environmental aspects

This would include the following:

- **Management of final voids**: In the mine closure plan, voids due to mining are to be dealt and the final land use plan will include filling of the voids for land reclamation where possible and for hydro reclamation where feasible.

- **Reclamation of forests/vegetation:** It is to be ensured that in the final land use plan, all vacant land acquired for the project is afforested

- **Channelisation of available water:** If the mine is having sufficient water and if on closure, the mine water flows into the surface water courses, channelising this water for surrounding community for their irrigational/domestic uses may be taken up. This can be planned by providing structures involving one time costing

- **Management of Recharge Areas**: The pre-mining and post mining scenario on the hydrogeological recharge system would be included in the closure plan.

- **Acceptable Surface and Ground Water Flows**: In the final closure plan of the mine, wherever the mine water is likely to flow out to surface and meet the surface water sources; the quality of water from such mines would be assessed and flow pattern designed in the final plan.

(c) Social aspects;

The social aspects of land use planning relating to mine closure would include the following:

- **Re-deployment of Workforce:** The company employees will be gainfully engaged in the neighboring projects after cessation of mining activities.

- **Management of Community Facilities:** In view of the short life of the project no new community facility will be created. However, the existing facilities of adjoining areas will be strengthened.

(d) **Financial aspects**.

Mine Closure activities would be a constant exercise for the mine which would begin with the commencement of mining operations and continue till post closure. The mine closure activities would naturally entail certain expenditures, which will have to be borne by the mine operator. There are two types of Closure, namely, Progressive Mine Closure (Concurrent) and Final Mine Closure. This would cover the activities which are being executed along with normal mining operation and would continue to be executed in course of execution of the project.

The Final Mine closure cost has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure.

(e) Maintenance of records pertaining to Progressive Mine Closure

The Mine management shall maintain following 2 Nos. of Progressive mine closure plans for every 5 year period:

A Progressive mine closure plan for surface activities

This plan shall be maintained at a scale of 1: 4000 showing the entire progressive mine closure activities (surface) carried out on yearly basis. The plan shall be updated on annual basis and shall be signed by appropriate authorities from the Project and the Area. After every annual renewal, the plan shall be placed before HOD (Env.) of the Company for scrutiny and approval.

Execution of progressive mine closure activities and 5 yearly monitoring

Besides the above plan, a progressive mine closure register shall also be maintained by the mine management. This register shall carry details of the progressive mine closure activities to be carried out on yearly basis. The details to be maintained in the said register shall cover inter alia the name of the activity, place, period of execution, executing agency, expenditure incurred, proof of the expenditure incurred, final status of the area where activity was executed, plan on which such activity has been shown etc.

The entries into the said register shall be signed by the appropriate authorities from the mine and the area. At the end of each year the said register (along with two plans) shall be placed before HoD (Env)/GM(Env.) of the company for scrutiny and approval.

After observing the necessary administrative/financial formalities, the mine authorities shall execute the identified progressive mine closure activities, whenever and wherever required. The executed activities shall be shown on the above said plans and recorded in the said registers.

The executed progressive mine closure activities shall be monitored on 5- yearly basis by 3rd party (ISM, CMPDI, NEERI etc.).

The 5 yearly return from escrow fund would be equal to expenditure incurred on progressive mine closure activities during last 5 years or 80 % of total deposited amount in the escrow account (including interest) whichever is less. The said return would be subject to above said monitoring of progressive MCP by a third party (ISM/CMPDI/NEERI etc.).

As the 5 yearly return from escrow fund is linked with the expenditure incurred on progressive mine closure activities during last 5 years, it is very important that progressive mine closure records, plans, expenditure details along with proof are properly maintained.

At this juncture it is important to note that some of the progressive mine closure activities, enumerated in the preceding paragraphs, are legal obligations specified in Project reports, EMP, permissions obtained from statutory bodies such as CPCB, SPCB, DGMS etc. The Project authorities are bound to comply with these obligations.

12.3 MINE CLOSURE OBLIGATIONS

There is need to define the liabilities, responsibilities and authorities of the mine management, other regulatory bodies, Central and State Governments after mine closure. Some obligations relating to the Mine Management Companies are as follows :

(a) **Health & Safety:** Regulation Nos. 6, 61, 106, 112 of Coal Mines Regulations, 2007 and its related DGMS Circulars;

(b) **Environment :** Water (Prevention & Control of Pollution) Act, 1974; Air (Prevention & Control of Pollution) Act, 1981;

Environmental (Protection) Act, 1986 and Environmental Protection (Amendment) Rule, 2000;

DGMS Directives on Noise & Ground Vibration;

(c) **Forest :**

Forest (Conservation) Act, 1980.

(d) **Rehabilitation :**

CIL's policy, however, applicable for land oustees only.

(e) Decommissioning/asset disposal, etc**.**

12.4 IMPACT ASSESSMENT REMEDIAL MEASURES

Environmental Impact on Landscape, Water Source, air and noise pollution during mine life has been discussed earlier. It is imperative that the environmental monitoring may be continued for 3 years after closure of mines in order to assess corrective measures to be implemented to sustain pre-mining ecosystem and environment in the core and buffer zone (to the extent possible).

12.5 STAKEHOLDERS INVOLVEMENT

Various stakeholders effected due to mine closure need to be identified and they may be as follows :

The Company	:	Employees, Management & Stakeholders
The Community	:	Local business and service providers, landholders, neighbours and nearby residents, local Government and NGOs and Community Groups.
The State	:	The State Government. The Central Government and concerned Government Agencies.

There is need of regular consultations between the stakeholders to evolve the needs of the stakeholders and their involvement in the process.

12.6 CLOSURE ACTION PLAN

Closure planning is a whole-of-life exercise that begins at the start of a mine and continues till post-closure. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances as a result of any operational change, new regulation, and new technology and remain flexible enough to cope with unexpected events.

The following steps have to be undertaken in relation to Mine Closure Planning:

Prior to the surface demolition/restoration a surface audit should be undertaken on all surface structures, spoil heaps, lagoons, etc. to assess whether there are any hazardous materials that could cause problems; viz. explosives, chemicals, etc. A list of surface assets should be prepared and made available to potential purchasers, prospective purchasers could be invited and asked to submit sealed bids, this could ensure that the sale of assets give better financial gain.

In order to identify potential impact, necessary hydro-geological studies into post-mining ground water recharge have to be done.

Work force on roll of BCCL may be re-deployed for gainful utilization in the same or other mines of BCCL.

As a detailed component of the Closure Plan, a Decommissioning Plan is to be developed towards the final stages preferably 5 years prior to tentative closure of the mine. Once established, it may be updated annually.

12.7 PROTECTIVE MEASURES TO BE TAKEN

Protective measures must include the following :

- The protection of mine Entries , building and other structure on the project site against access by unauthorized persons;
- The maintenance of all mechanical, hydraulic and waste management system;
- The continuation of all monitoring programmes;
- The control of all contaminated effluents;
- The securing of all petroleum products, chemicals and waste;
- The rendering of all tailings, dams and piles of earth, rock and waste resulting from work done on the project site in a stable and safe condition.

12.8 CLOSURE COSTS

As per MOC guidelines, a corpus escrow account @ Rs.1.0 lakhs (August, 2009 Price Level) per Ha (for UG) and @ Rs. 6.0 lakhs (for OC) of the project area shall be opened with the coal controller organization to meet the expenses of final mine closure. The current Guidelines read as:

"It has been estimated that typically closure cost for an opencast mine will come around Rs. 6.00 lakh per Hectare of the project area and it would be Rs. 1.00 lakh per Hectare for underground mine project area at current price levels (August, 2009) and these rates will stand modified based on Wholesale Price Index as notified by Government of India from time to time".

It is difficult to conclusively predict the mining parameters on a long term basis owing to rapidly changing mining technology, developments in the field of

clean coal technologies and R&D activities in development of alternative energy sources.

As per the latest Guidelines issued by the MoC, GoI(dt. 07.01.2013) the *"annual closure cost is to be computed considering the total project area at the above mentioned rates and dividing the same by the entire life of the mine in years for new projects and balance life of mine in years for operating/existing mines."*

Jharia Coalfield is characterized by occurrence of a number of working coal horizons, giving a leverage of extended working life of the mines. Some more seams can come in the lap of workable horizons due to improvement in mining technology in times to come. The underground mines in leasehold of JCF are generally small capacity mines, giving a false impression of very long lives due to small level of current production level. There may be a strategy in future to amalgamate the mines for higher production level to attain the economics of scale. The existing OC Mines working at shallow depth may be worked at a greater depth, In such a situation, the life of the mine arrived at with current level of production for the balance reserve may not be workable in the long run. **In such a situation, it is envisaged that a revised mine closure plan should be prepared as per relevant guidelines and submitted for approval of the competent authority.**

The Mine Closure Plan for Sudamdih Incline Mines and Patherdih Group of Mines was prepared in October, 2013 and was approved by BCCL Board in 301st Board meeting held on 30.10.2013. As per the approved Mine Closure Plan, the closure cost was estimated at approximately Rs.396.316 lakhs for Sudamdih Incline Mine and Rs. 831.155 lakhs for Patherdih Group of Mines under the conditions envisaged in the aforesaid closure plan. The amount already deposited in the escrow account (Account no. 00150100008872 and 00150100008871 at Bank of Baroda, Dhanbad Branch) in the name of Sudamdih Incline Mines and Patherdih Group of Mines is Rs. 403.46 Lakhs upto 31.03.2018.

The earlier mine closure plan was prepared considering Sudamdih Incline Mine and Patherdih Group of Mines as mixed mine i.e. running of both underground & opencast operation. However now it has been decided by BCCL management to discontinue underground mining operation and to extract coal only by opencast mining operation in the Amalgamated Sudamdih Patherdih Colliery. Therefore, given the changes in mining parameters of the mine since the preparation of approved Mine Closure Plan, a new Mine Closure Plan is required for this mine. Accordingly this mining plan and mine closure plan is prepared considering only opencast operation at Amalgamated Sudamdih Patherdih Colliery. However a new escrow account may be opened in the name of Amalgamated Sudamdih Patherdih Colliery and the existing two accounts may be discontinued as per the policy decision of BCCL.

In ASP Colliery, the leasehold area after boundary adjustment is 505.85 Ha, as per the plan supplied by the colliery authority, out of which 284.83 Ha is not considered workable area at present, due to Damodar river (52.23 Ha), coal barriers, DGMS restrictions, non-coal bearing area (Barren Area), Railway acquired land and surface built-up. The remaining area of 221.02 Ha is considered as project area, out of which 135.0 Ha area is considered for opencast mining in the near future and 85.39 for OB dump/Phase-II mining. Thus, 221.02 Ha area is considered for calculation of closure cost as per opencast norms.

The overlapping area (where UG & OC operations have been done in different vertical levels) has been considered for calculation of closure cost as per opencast norms.

The money deposited in the Escrow Account has to deal with the following:

- Cost of closure activities.
- Cost towards organization for executing the closure activities.
- Cost of the post project monitoring.
- Creation of a corpus fund for the final mine closure

As per the above guidelines these rates will stand modified based on Whole Sale Price Index as notified by Government of India from time to time. Thus the total expenditure on this front may be calculated in following manner:

12.8.2 As per Mine Closure guidelines, the total expenditure to be incurred at the notified rate of the year (August 2009) may be calculated in following manner:

Particulars	OC Unit	Remarks
Area	221.02	Area X Notified Rate
Notified Rate (Rs.Lakh)	6	
Total Amount (in base year) (Rs. Lakh)	1326.12	

12.8.4 As per the guidelines *"these rates will stand modified based on whole Price Index as notified by Government of India from time to time".*

An escalation factor has been calculated based on WPI of June 2018 (119.1). As per the directives from Office of the Economic Adviser, WPI series has been revised. In the revised series, base year has been changed to 2011-12 from 2004-05. To account for the aforesaid change WPI linking factor has been taken as 1.561. Converting WPI of June 2018 to that of base year 2004-05, we arrive at figure of 185.9151. Escalation factor vis-a-vis WPI of August '09 (129.6) comes out to be 1.43453

Particulars	OC Unit	Remarks
Total Amount (in base year) (in Rs. Lakh)	1326.12	Total Amount (in base year) X Escalation Factor
Escalation Factor	1.43453	
Escalated Amount (in Rs. Lakh)	1902.359	

12.8.4 As per the earlier approved Mine Closure Plan the total deposited amount in Escrow Account till 31.3.2018 was Rs. 403.46 Lakhs. Out of which 104.25 lakh deposited in OC Unit and 299.21 lakh were deposited in UG unit. The

amount already accrued in the escrow account shall be adjusted against the new closure cost calculated.

Particulars	OC Unit	UG Unit	Remarks
Escalated Amount (Rs. Lakhs)	1902.359	-	
Amount already deposited in escrow account (Rs. Lakhs)	104.25	299.21	
Balance Escalated Amount (Rs. Lakhs)	1498.899		

12.8.5 To arrive at the annual cost to be deposited in each year in an escrow account, the escalated amount shall be divided by the life of the mine.

Particulars	OC Unit	Remarks
Escalated Amount	1498.899	Balance Escalated Amount / Life
Life	33	
Amount per year	45.421	

As per the guidelines, the arrived annual cost has to be escalated by 5% every year for the remaining life of the mine. The amount to be deposited every year after 5% escalation is given below:

Break-Up cost of Mine Closure of Amalgamated Sudamdih - Patherdih (ASP) Colliery Year wise

Year	OC Unit	Total
1	45.42	45.42
2	47.69	47.69
3	50.08	50.08

4	52.58	52.58
5	55.21	55.21
6	57.97	57.97
7	60.87	60.87
8	63.91	63.91
9	67.11	67.11
10	70.46	70.46
11	73.99	73.99
12	77.69	77.69
13	81.57	81.57
14	85.65	85.65
15	89.93	89.93
16	94.43	94.43
17	99.15	99.15
18	104.11	104.11
19	109.31	109.31
20	114.78	114.78
21	120.52	120.52
22	126.54	126.54
23	132.87	132.87
24	139.51	139.51
25	146.49	146.49
26	153.81	153.81
27	161.50	161.50
28	169.58	169.58
29	178.06	178.06
30	186.96	186.96
	196.31	196.31
	206.12	206.12
	216.43	216.43
TOTAL	**3636.591**	**3636.591**

The amount calculated above shall be deposited every year by BCCL in the Escrow Account in the name of Amalganated Sudamdih Patherdih Colliery.

Thus, total amount that shall be further deposited for final mine closure activities of Amalgamated Sudamdih Patherdih Colliery during the balance life of 33 years stands out to be Rs. 3636.591 lakhs as per the present status of the mine.

The amount already deposited in the escrow account will also be available for mine closure activities and should be included to arrive at the total funds available for mine closure activities.

Particulars	Amount (in Rs. lakhs) OC Unit	Amount (in Rs. lakhs) UG Unit	Total
Amount Already Deposited in Escrow Account	104.25	299.21	403.46
Amount to be Deposited in the Escrow Account in the Future	3636.591	-	3636.591
Total Amount available for Mine Closure Activities			4040.051

12.8.6 Based on the existing mine closure planning norms, the above calculated cost at current WPI of June 2018 on mine closure may be tentatively grouped under different heads as given in Tables below as per guidelines of CMPDI(HQ).

Break up Cost of Mine Closure of Amalgamated Sudamdih Patherdih Colliery

Sl. No.	Activity	Mine Closure Cost
A	**Dismantling of Structures**	
	Service Buildings	7.273
	Residential Buildings	97.097
	Industrial Structures like CHP, Workshop, field sub-station, etc.	10.910
B	**Permanent Fencing of Mine Void and other dangerous area**	
	Random Ruble masonry of height 1.2 metre including levelling up in cement concrete 1:6:12 in mud mortar	54.549

Sl. No.	Activity	Mine Closure Cost
C	**Grading of Highwall slopes**	
	Levelling and grading of highwall slopes	64.368
D	***OB Dump Reclamation**	
	Handling/Dozing of external OB Dump into mine void	3224.202
	Bio-Reclamation including soil spreading, plantation and maintenance	14.546
E	***LANDSCAPING**	
	Landscaping of the cleared land for improving its esthetic	10.910
F	***Plantation**	
	Plantation over area obtained after dismantling	18.183
	Plantation around fencing	7.273
	Plantation over the cleared external OB Dump	0.727
G	**Monitoring/Testing of parameters for three years**	
	Air Quality	8.001
	Water Quality	7.273
H	***Enterpreneuship Development(Vocational/skill development training for sustainable income of affected people**	9.455
I	***Miscellaneous and other mitigative measures**	72.732
J	**Manpower Cost for Supervision**	29.093
	TOTAL	**3636.591**

Note: *: To be covered under Progressive Mine Closure activities also.

Thus, total amount that shall be deposited for final mine closure activities of Amalgamated Sudamdih Patherdih Colliery (ASPC) mine during the period of 33 years has been estimated as 3636.591 lakhs for OC Units based on OC norms at WPI of June 2018.

Mining is to be carried out in a phased manner initiating afforestation/reclamation work in the mined out area of the first phase while commencing the mining in the second phase i.e. continuation of mining activities from one phase to other indicating the sequence of operations

depending on the geo-mining conditions of the mine. Up to 80% of the total deposited amount including interest accrued in the ESCROW account may be released after every five years in line with the periodic examination of the Closure Plan as per Clause 3.1 of the Annexure of the Guidelines. The amount released should be equal to expenditure incurred on the Progressive mine closure in past five years or 80% whichever is less. The balance amount shall be released to mine owner/leaseholder at the end of the final Mine Closure on compliance of all provisions of Closure Plan. This compliance report should be duly signed by the lessee and certify that said closure of mine complied all statutory rules, regulations, orders made by the Central or State Government, statutory organisations, court etc. and certified by the Coal Controller.

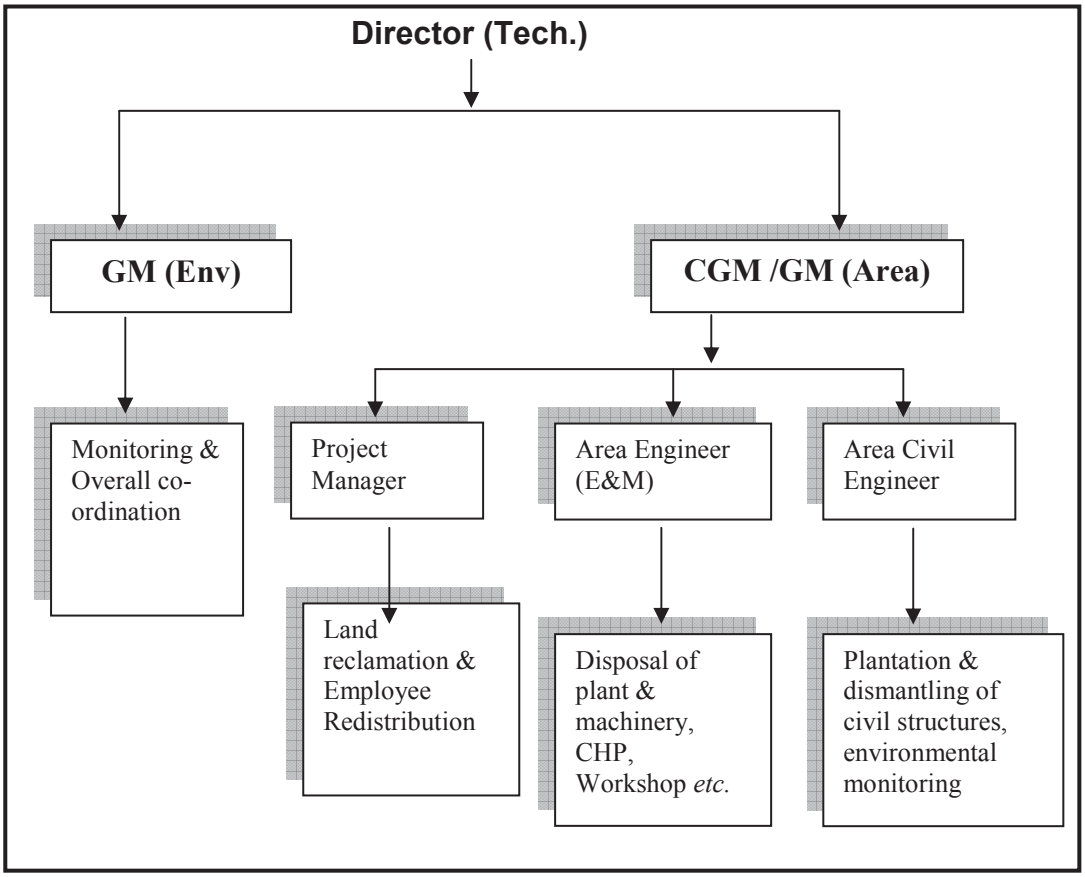
However, the additional amount beyond the escrow account, if any estimated later on, will be provided by the mine operator after estimating the final mine closure cost five years prior to mine closure (as per the mine closure guideline**.**

12.9 IMPLEMENTATION PROTOCOL

As the mine closure activities would continue even after cessation of mining activities, an organization consisting of different discipline would be formed to undertake the implementation of mine closure activities as well as monitoring of the same**.** Such activity shall continue for a period of three years after the closure of mining activity in the mine. Once the closed mine becomes stabilized in respect of safety, environmental and social aspects, the monitoring team would be withdrawn.

Mine closure activities (in opencast section as well as underground section) should be implemented as per implementation schedule given herewith.

For implementing the mine closure activities and monitoring thereof, the following organisational structure at corporate level has been proposed:



Environmental monitoring for three years after closure of mine will be carried out to evaluate the environmental quality of the area. If need be, proper mitigation measures will be taken up after evaluating the environmental quality. Before closure of the mine, Area GM will prepare survey and disposal report and the same will be submitted to DGMS for acceptance.

When the mine closure activities would take final shape and the entire area under influence is brought to an acceptable shape, BCCL would obtain a mine closure certificate from Coal Controller to the effect that the protective, reclamation and rehabilitation works in accordance with the approved mine closure plan/final mine closure plan have been carried out for surrendering the reclaimed land to the State Government concerned.

IMPLEMENTATION SCHEDULE FOR MINE CLOSURE IN AMALGAMATED SUDAMDIH PATHERDIH

(LIFE OF THE MINE: 33 YEARS)

S.N	Activity	Time Frame	YEAR					
			Operational Phase			Post Closure Phase		
			1st - 10th	11th - 20th	21th - 33th	PC1	PC2	PC3
A	**Dismantling of Structures**							
	Service Buildings	2 years						
	Residential Buildings	2 & ½ years						
	Industrial structures like CHP, Workshop, field sub-station, etc.	2 & ½ years						
B	**Permanent Fencing of mine void and other dangerous area**							
	Random rubble masonry of height 1.2 metre including leveling up in cement concrete 1:6:12 in mud mortar	2 years						
C	**Grading of highwall slopes**							
	Levelling and grading of highwall slopes	2 years						
D	**OB Dump Reclamation**							
	*Handling/Dozing of OB Dump and backfilling	Throughout the life of the mine including 3 years after cessation of mining operation						
	*Technical and Bio-reclamation including plantation and post care	Throughout the life of the mine including 3 years after cessation of mining operation						
E	**Landscaping**							
	Landscaping of the open space in the leasehold area for improving its esthetics and eco value	Throughout the life of the mine including 3 years after cessation of mining operation						
F	**Plantation**							
	Plantation over cleared area obtained after dismantling	2 years						

S.N	Activity	Time Frame	YEAR					
			Operational Phase			Post Closure Phase		
			1st - 10th	11th - 20th	21th - 33th	PC1	PC2	PC3
	*Plantation around the quarry area and in safety zone	Throughout the life of the mine including 3 years after cessation of mining operation						
	*Plantation over the OB Dump	Throughout the life of the mine						
G	**Post Closure Env Monitoring / testing of parameters for three years**							
	Air Quality	3 years						
	Water Quality	3 years						
H	***Entrepreneurship Development (Vocational/skill development training for sustainable income of affected people**	Throughout the life of the mine						
I	***Miscellaneous and other mitigative measures**	Throughout the life of the mine including 3 years after cessation of mining operation						
J	**Post Closure Manpower cost for supervision**	3 years						

NOTE: *: To be covered under Progressive Mine Closure activities also.

NOTE: The progressive mine closure will be done as per the provisions made out in the Mining Plan and as per the situation/requirement that may arise in course of execution of the Mining Plan

Item No. 351.3D

Quarterly Review for the Quarter October to December, 2018 & January to March, 2019 on Safety, Environment & Quality as per the directive of MoC letter no. 23/3/2015-ASO/BA dated 26.04.2017.

Board reviewed the quarterly report of **October to December 2018** and **January to March 2019** on Safety, Environment & Quality as per the directive of MoC letter no. 23/3/2015-ASO/BA dated 26.04.2017.

Item No. 351.4G
Corporate Environment Policy (CEP) of Bharat Coking Coal Limited.

Background

Coal India Ltd. had brought out its Corporate Environment Policy (CEP) in 2012 Based on CIL Environment Policy 2012, incorporating the Jharia Master Plan, CEP of BCCL was approved by 285th BCCL board on 21.04.2012 (ANNEXURE C of the agenda note). As per the provisions of the policy, it is to be revised every 05 years as per which the policy would have been revised in 2017. However, there was delay in revising the policy at CIL's end due to which there is a delay in revising BCCL's CEP. CIL has revised its Corporate Environment Policy and approved in its 377th CIL Board Meeting dated 20th Dec., 2018(ANNEXURE D of the agenda note).

The CAG during its exit meeting held on 16.11.2018 also pointed out for the need of revising BCCL's Corporate Environment Policy adopted in 2012(ANNEXURE E of the agenda note). Modifying CIL's CEP to suit BCCL's prevailing conditions, the Corporate Environment Policy of BCCL has been revised.

Two versions of Policy was attached herewith out of which any one may be approved as deemed suitable by the Board.

a. An abridged version of the policy as adopted earlier by BCCL in 2012. (ANNEXURE A of the agenda note)
b. A detailed version of the policy similar to the CEP, 2018 of CIL with modifications suited to BCCL's condition. (ANNEXURE B of the agenda note)

Decision:
After detailed deliberation the Corporate Environment Policy, 2018 of CIL was approved by the Board.

Board further directed that the Policy as adopted above to suit the conditions in BCCL should be modified with information to Coal India.

Certified to be True Copy

B. K. Parul
Company Secretary
Bharat Coking Coal Limited
Koyla Bhawan
005

ENVIRONMENTAL POLICY STATEMENT:

Bharat Coking Coal Limited (BCCL) is committed to promote sustainable development by protecting the environment through integrated project planning & design, prevention / mitigation of pollution, conservation of natural resources, restoration of ecology & biodiversity, recycling/ proper disposal of wastes, addressing climate change and inclusive growth. It also aims to bringing awareness amongst its stakeholders for continual improvement in environmental performances following best practices.

OBJECTIVES:

Bharat Coking Coal Limited shall endeavour to:
1. Plan & design projects with due consideration to environmental concerns for Sustainable Development.
2. Conduct mining and associated operation in an environmentally responsible manner to comply with applicable laws and other requirements related to environmental aspects.
3. Prevent pollution of surrounding habitation by continuous monitoring and adopting suitable measures for environment protection.
4. Implement Environment Management Plans in all our mines /projects/Clusters effectively to mitigate pollution, conservation of natural resources and restoration of ecology & biodiversity.
5. Ensure compliance of all applicable Environmental Clearance& Forestry Clearance conditions and other statutory conditions issued by regulatory agencies.
6. Recycling of wastes on the principle of REDUCE, REUSE and RECYCLE.
7. Put special thrusts on efficient energy utilization / renewable energy as a measure to reduce carbon foot-print.
8. Strive for continual improvement in our environmental performances by setting targets, measuring progress and taking corrective action.
9. Taking measures to render productive post mining land use.
10. Implementation of activities applicable to BCCL arising out of International Conventions.
11. Create environmental awareness among the employees and the local communities through pro-active communication and training

STRATEGIES FOR IMPLEMENTATION OF ENVIRONMENTAL POLICY:

BackGround:

Bharat Coking Coal Limited subscribes to the view of Sustainable Development. Unless theenvironment can sustain all the developmental activities, any pursuit of developmentin isolation can cause irreparable damage to the ecosystem and associatedenvironmental attributes. Keeping this view in mind, Bharat Coking Coal Limited attaches toppriority towards sustainable development and approved its ‘Corporate EnvironmentalPolicy’. Based on CIL Environment Policy2012,incorporating theJharia Master Plan ,CEP of BCCL was approved by 285th BCCL board on 21.04.2012and is complimentary to theNational Environmental Policy, 2006.The Revised BCCL Policy, 2019 is the outcome of the experience gained since2012, keeping in view the modifications / amendments made time to time inenvironmental policies and additional stipulation notified by MoEF&CC (Ministry of Environment, Forest& Climate Change), and other organisations concerning mineclosure, reclamation of degraded land, environmental clearance etc. and also with theobjective of revisiting the corporate policy.The Policy has a vision of Green Mining and mission of 100% compliance of environmental statutes applicable to coal mining industry.This policy is prepared in line with that of CIL’s

policy with incorporation of prevailing local conditions.

STRATEGIES: Bharat Coking Coal Limited adopts the strategies appended below for effective implementation:

1. MINE/ PROJECT PLANNING & DESIGN FOR SUSTAINABLE DEVELOPMENT:

a) Coal being a non-renewal energy source, extraction shall be planned prudently tomeet national requirement in a planned way. The projects shall be designed on theprinciple of Sustainable Development with due consideration to environment, mine closure,safety and aspirations of the stakeholders at the planning& designstage itself with due regard to mine closure plan.

b) While preparing the Mining plan/project reports, the effort shall be to incorporatelatest mining technologies and equipment's with optimal capacity, which are moreenvironment friendly

c) All Mining Plan/ project reports will be provided with detailed provisions for ensuring environmental compliances

2. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) & ENVIRONMENT MANAGEMENT PLAN (EMP)

a. All mine planning and design shall be environmentally acceptable and operationshall be carried out in such a way as to facilitate the compliance of stipulated environmentalstandards.
b. EIA& EMP for all projects/Clusters shall be formulated as per the approved ToR (Termsof Reference) and pubic consultations for obtaining Environmental Clearance (EC) from MoEF&CC. Similarly, in the existing projects needing enhancementof production capacities with or without increase in land, change of technology,renewal of lease and change in land use etc. fresh EC is required to be sought asper norms. The projects shall be operated after obtaining Consent to Establish(CTE)/Consent to Operate (CTO) from State Pollution Control Boards (SPCB).
c. Detailed Mine Closure Plans shall be prepared for all existing and new mines as per the MoC (Ministry of Coal) guidelines.

3. COMPLIANCE OF THE STATUTORY REQUIREMENTS:

The implementation of EMP and fulfilment of all other statutory requirements like conditions of EC, FC and consents to establish & operate, including timely submission of returns to statutory bodies and various agencies, are to be ensured at all levels.

4. MEASURES TO MITIGATE POLLUTION:

a) Air Pollution:

i) Generation of dust is to be controlled at the source to the possible extent with necessary control measures during drilling, blasting, loading, unloading, CHPtransfer points etc
ii)Deployment of eco-friendly mining technologies.
iii) Dust generation is to be minimized along coal / waste transportation routes.
iv)Mechanized transportation of coal to be encouraged.
v) Green belt is to be created around the source of dust

b) Water pollution:

i) The mine water and other effluent shall be treated to ensure the discharge normsas per statute. The treated effluent shall be utilized to the extent possible with aview to achieve

maximum water conservation.
ii) Oil & grease from the effluent shall be removed by Oil & Grease Traps forproper disposal.

c) Noise / ground vibration:

i) All measures to minimize noise pollution will be taken including maintenance of HEMM, equipment and provision of PPE where required.
ii) Suitable blasting techniques shall be followed to reduce ground vibration as well as noise pollution.

d)Land reclamation:

i) Progressive and concurrent reclamation of mined out areas will be carried out as per approved EIA/EMP and Mine Closure Plan (MCP).
ii) Slopes of external dumps are the important area to be suitably graded / terraced for effective reclamation and plantation.
iii) Preservation of top soil is required for future use. Old as well as existing nonactive dumps are to be technically and biologically reclaimed.
iv) Monitoring of reclamation work of all opencast mines will be done through Satellite Surveillance. The outcome shall be put in the websites.

e) Mine closure plans:

Mine Closure Plan (MCP) shall be prepared for each mineon which Mine closure guidelines are applicable. MCP are being delineated in two phases viz. progressive and final mine closure. Appropriate funds are set aside and deposited under a special Escrow fund every year as per MoC guidelines, to be utilized for proper and final mine closure.
For mines closed prior to issuance of MoC guidelines (i.e. 27th August, 2009) suitable action to be taken as per provisions of Mines Act 1952.

f) Mine fire& subsidence

BCCL shall endeavour to reduce occurrence of mine fire and subsidence due to mining activityfor safety and conservation purpose and, shall take steps for prevention and control of coal mine fire. Monthly report shall be submitted to top management of thesubsidiary and CIL and Quarterly to company board. Action Plan for mine fire control shall be implemented. Monitoring will be done through Satellite Surveillance/other suitable technology. Rehabilitation under Master Plan will be expedited to facilitate faster liquidation of fire. During the execution of the Master Plan since 2009, changes have occurred in the fire dealing methodology, the number of affected families and the infrastructure facilities to be provided to them. However, these modifications were executed in cognizance of HPCC committee for JMP.
BCCL is committed for implementation of the GOI approved Master Plan for Dealing with Fire, Subsidence and Rehabilitation in leasehold of BCCL (Jharia Master Plan) which is also required to be dovetailed with the implementation of EC conditions of various clusters of BCCL . Necessary steps shall be taken for implementation of Jharia master plan to deal with the problem of fire and subsidence in JCF along with R&R of affected people.

g) Monitoring:

I. All receptors in and around the mining projects/clusters all be monitored regularly to assess the efficacy of the pollution control / mitigation measures within stipulated standards.
II. Effect of mining on the hydrology of the area will be monitored through measurement of water level and quality of nearby wells and bore holes provided for this purpose. Conservation of water through rainwater harvesting shall be taken up.
III. Area and Unit environmental cells shall have regular interaction with the people in and around the coal mines and other allied units on matters related to environment to take necessary and timely corrective actions.
V. Environmental initiatives and monitoring through self and third party environment audit shall be conducted for generating useful data for taking corrective actions and mitigation measures as per guidelines.

h) Other measures:

I. Special emphasis shall be given to undertake R&D related to various facets of coal mine environmental management in collaboration with Central Mine Planning and Design Institute (CMPDI) and other competent institutions.

II. Besides ensuring statutory compliance, the BCCL desires to set high standards and continual improvement.

III. Mines & establishments shall be ISO 14001certified in phased manner.

IV. CSR and R&R policies of CIL are to be incorporated by BCCL for better planning and implementation of the socio-economic issues of coal mining areas.

V. The coal mining environmental issues are complex and require multidisciplinary approach to address the same. BCCL will endeavour to enter into MoUs with expert agencies of repute to assist in environment issues and also help in capacity building of BCCL executives.

VI. BCCL conduct periodical medical examination (PME) of its work force on routine basis in compliance of the requirement mining rules and regulation,
additional test will be done as and when require.

5. PRESERVATION OF BIO-DIVERSITY:

BCCL has made the ecological restoration a flagship programme for restoration of degraded mined areas and adopting 3- tier plantation consisting of native species grasses, bushes and trees under the technical expertise of Forest research institute, Dehradun, a renowned institute in the field of forests and ecology. Ecological restoration has been widely accepted as one of the most effective means to restore the ecology and biodiversity.

BCCL is committed towards the conservation and restoration of the natural biodiversity of the region on the degraded mined out areas and restore back to forest like areas. BCCL will strive to restore the habitats for the native fauna of the region by restoring the areas through ecological restoration.

BCCL is committed towards the wellbeing and betterment of the living standards for the local community through establishment of the eco-parks in the reclaimed mined areas in the coalfield and promoting the eco-mining tourism in the coalfield areas and exploring the new opportunities to the local communities. This will start from mine planning including technically and biologically reclamation of mined out areas in collaboration with State Forest Departments, Wild Life Divisions, NGOs, FRI Dehradun etc. working in the fields of biodiversity conservation.

6. COAL BENEFICIATION / COALWASHERIES:

a) For beneficiation of Runoff Mines (ROM) coal, washeries are being set up in a phased manner as per requirement and statutes.

b) Slurry Management System (SMS) in all washeries shall be organized to ensure collection of fines, gainful utilization of rejects viz. power generation in Fluidized Bed Combustion (FBC) plants, selling to brick manufacturers or adopting other environmental friendly disposal options as feasible.

c) The reject dumps and tailings shall be suitably handled to avoid any contamination.

d) The effluent from washeries including tailings pond shall be suitably treated and reused to minimize water consumption with zero discharge concept.

7. CONSERVATION AND CLEAN TECHNOLOGY:

a) R&D projects shall be taken up to promote clean coal technology and improve the existing technologies.

b) Energy saved is energy produced. Voluntary energy audit to be done for corrective action to reduce carbon footprint.

c) Clean Development Mechanisms will be explored for reducing emission of Green House Gases by exploration, identification, preparation of projects reports for extraction of methane from Coal Bed, Coal Mine, Abandoned Mine, Ventilation Air, UG Coal Gasification, generation and utilization of renewable energy etc.

8. AWARENESS PROGRAMME:

a) Publicity to generate awareness through exchange & communication of information, newsletters and periodicals on environment, seminars, workshops, celebration of

World Environment Day etc, at BCCL HQ, Areas & units to be undertaken. Regular training programs to be organized at various levels to inculcate awareness among employees.
b) Courses on environmental and forestry laws and Environmental Protection Measures and the Corporate Policy to be organized for project executives for improving knowledge.
c) BCCL will felicitate its workers for best practices in eco-restoration, land reclamation, conservation, compliance of statutes and innovative ways of sustaining environment.

9. WASTE MANAGEMENT:

BCCL will undertake appropriate action for safe handling, storage and disposal of solid waste and hazardous waste generated from its industrial set up and colonies as per relevant rules. The biomedical waste generated from hospitals and dispensaries will be collected and disposed in appropriate facilities created as per statutes. E-waste management and handling of various types of e-waste generatedin its operations will be done as per rule.

10. CORPORATE ENVIRONMENT RESPONSIBILITY:

Corporate Environment Responsibility (CER) is mandatory for issuing environmental clearance for all the Greenfield and Brownfield projects as per directives of MoEFCC with effect from 1st May, 2018 (O.M.No.22-65/2017- IAIII dt. 19.06.2018). Budgetary provisions should be kept for implementation of provisions of CER for all the projects which will be submitted to MoEFCC for grant of environmental clearance.

11. INCORPORATION OF VIEWS OF STAKEHOLDERS:

BCCL will critically examine and incorporate the viewpoints of various stakeholders like PAPs/PAFs, Parliamentary Committees, Standing Sub-Committees, NGOs etc.

12.IMPLEMENTATION OF POLICY:

i) Manpower: BCCL shall have environmental divisions at decision making & operational levels in its structure. The environment department shall be set up and strengthened at:
i)BCCL HQ
ii)Areas / Units / Collieries / Workshops /Washeries

ii) Roles and Responsibilities: The environmental department, set up at company HQs, Areas and Unit levels with appropriate manpower and resources, shall be responsible for implementation of policy, obtaining EC, FC, consent to establish & operate, statutes requirements and undertaking mitigation measures besides preparation of action plan every year and also to intimate the status of implementation to the management regularly.

iii) Annual Environment Budget (Revenue &Capital): The Annual Environment Budget (revenue & capital) shall be prepared based on the action plan including monitoring of various bench marks and the budget utilization. The year wise funds earmarked for environmental protection measures shall be kept in separate accounts with Environmental cost code.

REVIEW OF ENVIRONMENTAL POLICY:

In view of the present fast changing social, economic and environmental scenario, the CIL Policy shall be reviewed every 5 years to incorporate the changes in the legal, technical, environmental, economic and social inputs prevailing at that time.
Whenever, there is change in National Environmental Policy or other National / State relevant policies, Acts etc, the CILCorporate Environmental Policy would be reviewed and suitably revised. It will be followed by revision of this policy accordingly.

Place: Dhanbad **Chairman-cum-Managing Director**
Date:

No.J-11015/380/2010-IA-II(M)
Government of India
Ministry of Environment, Forest and Climate Change
IA Division

Indira ParyavaranBhawan,
Jorbagh Road, N Delhi-3
Dated: 12th June, 2019

To,

The General Manager (E&F)
M/s Bharat Coking Coal Ltd,
Koyala Bhawan,
District **Dhanbad** (Jharkhand) Email: envbccl@gmail.com

Sub: Cluster X Coal Mining Project of capacity 2.289 MTPA and Coal Washery of 2.08 MTPA of M/s Bharat Coking Coal Limited in an area of 2057.47 ha located in District Dhanbad (Jharkhand) - Amendment in Environmental Clearance - reg.

Sir,

This refers to your online proposal No. IA/JH/CMIN/8812/2010 dated 15th September, 2017 and additional information dated 9th February, 2019 on the above mentioned subject.

2. The Ministry of Environment, Forest and Climate Change has considered the proposal for amendment in environmental clearance dated 6th February, 2013 granted by the Ministry in favour of M/s Bharat Coking Coal Ltd for Cluster X Coal Mining Project (comprising six mine lease holds) of total capacity 2.289 MTPA (peak) and coal washery of 2.08 MTPA in a total area of 2057.47 ha in Jharia Coalfields, District Dhanbad (Jharkhand).

3. The amendment in said environmental clearance has been sought due to the proposed restructuring/re-appropriation of individual mines in the Cluster for implementation of the Master Plan dealing with fire and subsidence, with the revised details as under:-

S. No.	Mine	Type of Mine UG/OC	Production Capacity (MTPA)	Lease Area (ha)	Mine Life (Years)	
1	Bhowrah North	UG	0.143	208.83	>20	
	Bhowrah North	OC	0.546		6	
2	Bhowrah South	UG	0.377	571.58	30	
		OC	1.2		43	Fire dealing
3	Amalagamated Sudamdih Patherdih Mine	OC	0.709	498.61	33	Amalgamation of mines for fire dealing
4	Sudamdih Shaft	UG	0.24	391.5	30	
5	Amlabad Closed	UG	0	386.95	NA	
6	Sudamdih Coal Washery (Within lease hold of Sudamdih Shaft Mine)		2.08	18	18	
	TOTAL		**2.289**	**2057.47**		

With the proposed restructuring, combined production capacity of the Cluster would remain at 2.289 MTPA (peak) in the same total area of 2057.47 ha.

Revised Mining Plan for the changed capacities of individual mines/lease holds namely, Amalgamated Sudamdih Patherdih OCP and Bhowrah South OCP has been approved by the Board of M/s Bharat Coking Coal Ltd on 29th January, 2019.

4. The proposal was considered by the sectoral Expert Appraisal Committee in its meeting held on 24-25 April, 2019, wherein the Committee recommended the amendments proposed by the project proponent as stated in para 3 above. Based on recommendations of the EAC, Ministry of Environment, Forest and Climate Change hereby accords approval for amendment in environmental clearance dated 6th February, 2013 to effect changes in production capacities of individual mines/lease holds of Cluster X Coal Mining Project of total capacity 2.289 MTPA (peak) and Coal Washery of 2.08 MTPA in an area of 2057.47 ha.

5. All terms and conditions stipulated in the environmental clearance dated 6th February, 2013 shall remain unchanged.

SKS
12/6/2019

(S. K. Srivastava)
Scientist E

Copy to:

1. The Secretary, Ministry of Coal, Shastri Bhawan, New Delhi
2. The Additional Principal Chief Conservator of Forests, Regional office (ECZ), Ministry of Environment & Forests, Bungalow No. A-2, Shyamali Colony, Ranchi - 834002
3. The Member Secretary, Central Ground Water Authority, Ministry of Water Resources, Curzon Road Barracks, A-2, W-3 Kasturba Gandhi Marg, New Delhi
4. The Secretary, Department of Environment & Forests, Government of Jharkhand, Secretariat, Ranchi
5. The Advisor, Coal India Limited, SCOPE Minar, Core-I, 4th Floor, Vikas Marg, Laxmi Nagar, N Delhi
6. The Member Secretary, Central Pollution Control Board, CBD-cum-Office Complex, East Arjun Nagar, Delhi - 32
7. The Member Secretary, Jharkhand State Pollution Control Board, TA Building, HEC Complex, PO Dhurwa, Ranchi
8. The District Collector, Dhanbad, Government of Jharkhand
9. Monitoring File 10. Guard File 11. Record File 12. Notice Board

Annexure - XVIII

POLLUTION UNDER CONTROL CERTIFICATE

Vehicle Emission Emission Test Certificate

License No: 284/2016

Sl. No:	00000127	Regis Date:	2018	Test Time:	12:14 PM
Vehicle No:	JH01AD 1547	Fuel:	DIESEL	Odometer:	NA
Make:	TATA	Engine No:	20722	Owner Name:	
Model:	TIPPER	Chassis No:	13852	Remark:	
Category:	TIPPER	Test Date:	15-3-2019		

DATE OF : 15-3-2019
JH-01AD 1547
CERTIFICATE CODE : 21

FLUSH CYCLE

	AVERAGE		
	RPM Min	RPM Max	Oil Tmp
	0630	4250	43

DETAIL

RPM Min	RPM Max	Temp	HSU	K value
640	4250	54	20.75	0.54
610	4280	61	27.86	0.76
630	4250	62	24.62	0.66
MEAN			24.42	0.65
RESULT		PASS		

Result: Pass **Valid Up To:** 14-9-2019

This Vehicle Meets the Emission Standards Prescribed By Rule 115 (2) of Central Motor Vehicle Rule 1989.
This Certificate is Valid for Six Months Only.

Seal of Testing Centre **Test Station Code: 284/2016** **Authorized Signatory**

POLLUTION UNDER CONTROL

Lic No. 397/18 See Under Rule 252/01 JH(MVR)

TRANSPORT DEPTT. GOVT. OF JHARKHAND

Veh No.
JH10AG 9659

Type of Vehicle
TIPPER

POLLUTION UNDER CONTROL

DATE OF ISSUE
05/12/2018

VALID UPTO
03/06/2019

प्रपत्र पी.यू.सी.

मोटर वाहन (संशोधन) नियमावली, 2001 के नियम 115 (2) के तहत
प्रदूषण नियंत्रण के प्रमाणित प्रमाण-पत्र

प्रदूषण स्तर प्रमाण-पत्र
जाँच केन्द्र का नाम
बालाजी पथुल स्टेशन, धुर्वा रोड, धनबाद-

अनुज्ञप्ति संख्या : 397 / 13 BC-/14555
मोटर वाहन संख्या : JH10AG 9659 जन संख्या
D.O.Reg. 11/12/2012
मेक : TML निर्गत की तिथि : 05/12/2018
मोडल : 2012 वाहन का प्रकार TIPPER

निरन्तरण स्तर को जाँच एवं मिल पठन धारा ...

पेट्रोल / LPG वाहन

CMVR 1989 के नियम 115 (2) के अन्तर्गत निर्धारित मापदण्ड
CO :- 0.5%-4.5%
HC :- 750-2000

	गैस का नाम	वास्तविक पठन
CO		
HC		

डीजल वाहन

नियम 115 (2)	गैस का नाम	वास्तविक पठन
		19

M.S.U-66
पथुल स्टेशन
धनबाद

AUTH. BY GOVT. OF JHARKHAND

के अन्तर्गत निर्धारित मापदण्ड को पूरा करता है/करते हैं

03/06/2019

ALL INDIA VALID

यह प्रमाण पत्र निर्गत की तिथि से छः माह तक वैध है

koylanchalpuc@gmail.com

KOYLANCHAL VAHAN PRADUSHAN JANCH KENDRA
KARKEND BAZAR, KUSUNDA (DHANBAD)

INDIA GREEN

SOURCE MARK

परिवहन विभाग

Sl. No: 20000127
Vehicle No: JH10R-1438
Make: TML
Model: TIPPER
Category: TIPPER

Regis Date: 2019
Fuel: DIESEL
Engine No: 20732
Chassis No: 12682
Test Date: 15-3-2019

Test Time: 12:14 PM
Odometer: NA
Owner Name:
Remark:

FLUSH CYCLE

AVERAGE		
RPM Min	RPM Max	Oil Temp
0610	4250	43

DETAIL

RPM Min	RPM Max	Temp	HSU	K value
630	4250	59	29.75	0.54
610	4250	61	27.88	0.76
630	4250	62	24.62	0.66
MEAN			27.42	0.65
RESULT		PASS		

Result: Pass Valid Up To: 14-9-2019

This Vehicle Meets the Emission Standards Prescribed By Rule 115 (2) of Central Motor Vehicle Rule 1989.
This Certificate is Valid for Six Months Only.

VAHAN PRADUSHAN JANCH KENDRA
AUTH. BY GOVT. OF JHARKHAND
KAMLEY BAZAR, DHANBAD

Seal of Testing Centre

Test Station Code: 284/2016

Authorized Signatory

POLLUTION UNDER CONTROL CERTIFICATE

COMPUTERIZED EMISSION TEST CERTIFICATE

(Rule 160B(3) of MV Rules 1992)

Transport Department
Govt. Of JHARKHAND

License: 440/2015

PUCC No.	[illegible]	Make	TATA Motors Ltd.	Name	GEC PROJECT LTD
Serial No.	1171	Model	TIPPER	Address	NA
Vehicle No.	JH01AC3505	Fuel	Diesel	Date	01/02/2019
Date of Mfg.	NA	Chasis	12160	Time	02:13:25
Category	GVW	Engine	06158		

Photo of Vehicle

Sl No.	Opacity [1/m]	Opacity [%]	RPM (Max)
1	56	46.13	1209
2	0.58	46.16	1214
3	0.57	46.12	1216
4	0.6	46.14	1212
5	0.56	46.15	1218
--	--	--	--
--	--	--	--
Mean	0.58	46.136	1213.8

Grade PASS Valid Upto 31/07/2019

Certified that the vehicle's smoke emission confirms to the standards prescribed under rule 115(2) of central motors vehicle under 1989

Seal of Testing Centre

Test Station Code: 440/2015

Authorised Signatory


Lic No. 397/18
See Under Rule 252/91 JH(MVR)
TRANSPORT DEPTT. GOVT. OF JHARKHAND
Veh No.
JH22A 1658
Type of Vehicle
TIPPER
TIPPER LPT
POLLUTION
UNDER CONTROL
DATE OF ISSUE
03/12/2018
VALID UPTO
01/06/2019
JH22A 1658
BC-/14513
JH22A 1658
29/07/2007
TML
03/12/2018
2007
TIPPER LPT 2515
21
AUTH. BY GOVT. OF JHARKHAND
01/06/2019
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koylanchalpuc@gmail.com

POLLUTION UNDER CONTROL

Lic No. 397/18 See Under Rule 252/01 JH(MVR)

TRANSPORT DEPTT. GOVT. OF JHARKHAND

Veh No. JH22A 1658

Type of Vehicle TIPPER

TIPPER LPT

POLLUTION UNDER CONTROL

DATE OF ISSUE 03/12/2018

VALID UPTO 01/06/2019

POLLUTION UNDER CONTROL

प्रपत्र पी.यू.सी.

झारखंड मोटर यान नियमावली, 2001 के नियम 252 ट 12 I वेग्रे

प्रदूषण नियंत्रण के अन्तर्गत प्रमाण-पत्र

1658

प्रदूषण स्तर प्रमाण-पत्र

जाँच केन्द्र का नाम

धनबाद

वाहन प्रदूषण जाँच केन्द्र

बालाजी पेट्रोल स्टेशन, मुईफोड़, धनबाद-

अनुज्ञप्ति संख्या : 397/18 BC-/14513

मोटर वाहन संख्या : JH22A 1658 क्रम संख्या

D.O.Reg. 29/07/2007

मेक : TML निर्गत की तिथि : 03/12/2018

मोडल : 2007 वाहन का प्रकार : TIPPER LPT 2515

निरस्तरण स्तर की जाँच एवं निम्न पठन द्वारा –

पेट्रोल / LPG वाहन

CMVR 1989 के नियम 115 (2) के अन्तर्गत निर्धारित मापदण्ड

गैस का नाम

वास्तविक पठन

CO :- 0.5%-4.5%

HC :- 750-2000

CO -

HC -

डीजल वाहन

CMVR 1989 के नियम 115 (2) के अन्तर्गत निर्धारित मापदण्ड

गैस का नाम

वास्तविक पठन

21

M.S.U-65

पूल रोड –

धनबाद

AUTH. BY GOVT. OF JHARKHAND

KOYLANCHAL PRADUSHAN JANCH KENDRA * KARKEND BAZAR *

जाँच केन्द्र की [illegible] के अन्तर्गत निर्धारित निम्नतम मापदण्ड को पूरा करता है/करता है।

01/06/2019

ALL INDIA VALID

प्राधिकृत हस्ताक्षर

यह प्रमाण पत्र निर्गत की तिथि से छः माह तक वैध है।

koylanchalpuc@gmail.com

INDIA GREEN

Study of Occupational diseases and Hearing impairments of Coal Mines workers of BCCL directly involved in active mining operations

CMS/699(L)/11/10/19

11/10/19

GM (Environment)

REGIONAL OCCUPATIONAL HEALTH CENTRE (EASTERN), KOLKATA

&

NATIONAL INSTITUTE OF OCCUPATIONAL HEALTH, AHMEDABAD

(Indian Council of Medical research)

Study of Occupational diseases and Hearing impairments of Coal Mines workers of BCCL directly involved in active mining operations

REGIONAL OCCUPATIONAL HEALTH CENTRE (EASTERN), KOLKATA

&

NATIONAL INSTITUTE OF OCCUPATIONAL HEALTH, AHMEDABAD

(Indian Council of Medical research)

CONTENTS

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Mr. T. K. Dasgupta, Technician B

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BACKGROUND

Although coal remains a major energy resource worldwide, coal mining causes environmental problems, whereas the inhaled coal particles at the work place may lead to the development of coal workers' pneumoconiosis (CWP). Typically, coal workers pneumoconiosis takes many years to develop and to be manifested. Further, once initiated the disease is progressive in nature, often leading to lungfunction impairment, disability. The workers' exposure to coal dust generally occurs during mining operations. Coal mining can also increase the risk of developing asthma and chronic obstructive pulmonary disease (COPD), such as emphysema and chronic bronchitis. It is suggested that coal mining operations may also induce noise induced hearing impairment among the workers.

A request was received from Bharat Coking Coal Limited, Dhanbad to assess the health status of their workers involved in the mining activities in Cluster 11 and 15 areas around Dhanbad. About 10% of the subjects involved in mining activities were to be included in this study. The workers were to be assessed for their health status, presence of any occupational disease and hearing impairments. Under this circumstance, in consultation of the scientists of National Institute of Occupational Health (NIOH) and the concerned officers of Bharat Coking Coal Limited, it was decided that an epidemiological study would be carried out involving workers involved in mining activities.

INTRODUCTION

Coal is an aggregate of heterogeneous substances composed of organic and inorganic materials. The four major coal types ranked in order of increasing heat value are lignite, sub-bituminous, bituminous, and anthracite. The inorganic portion of coal can range from a few percent to >50% (by weight) and is composed of phyllo-silicates (kaolinite, illite, etc.), quartz, carbonates, sulfides, sulfates, and other minerals. In general, aluminum and iron are the main metals in the coals. Arsenic, nickel, zinc, cadmium, cobalt, and copper are trace metals that represent only a very small fraction of the mineral matter[1].

Coal mining in India has a long history of commercial exploitation covering nearly 220 years starting in 1774 in the Raniganj Coalfield along the Western bank of river Damodar. However, for about a century the growth of Indian coal mining remained sluggish for want of demand but the introduction of steam locomotives in 1853 gave a fillip to it. As on 2011, India had 285 billion tonnes of resource. The production of coal was 532.69 million tonnes in 2010-11. The production of lignite was 37.73 million tonnes in 2010-11. As on 2011, India ranked 3rd in world coal production.[2]

Coal remains a major energy resource worldwide. In the United States, > 50% of electricity is generated in coal-fired power plants. However, coal mining causes environmental problems such as acid mine drainage, whereas the inhaled coal particles at the work place may lead to the development of coal workers' pneumoconiosis (CWP).[3,4]Typically, coal workers pneumoconiosis takes many years to develop and be manifested requiring a surveillance for a longer duration. Further once initiated the disease is progressive in nature often leading to lung function impairment, disability, and premature death.

Coal mining can also increase the risk of developing asthma and chronic obstructive pulmonary disease (COPD), such as emphysema and chronic bronchitis.[5-7]It is suggested that coal dust stimulates the recruitment of neutrophils to the lungs and both these neutrophils and resident alveolar macrophages show evidence of activation, secreting free radicals and proteolytic enzymes, plausible mediators of tissue injury in emphysema[8-10].

Considering the environmental – occupational hazards involved, regular and periodic monitoring of environmental conditions and the health status of the workers is always advised and recommended. A request was received from Bharat Coking Coal Limited, Dhanbad to assess the health status of their workers involved in the mining activities in Cluster 11 and 15 areas around Dhanbad. The workers were to be assessed for their health status, presence of any occupational disease and hearing impairments. Under this background the present project is developed with the aim of studying the coal mining as well as coal dust related health effects in the mining workers.

AIM AND OBJECTIVES

AIMS

To study the coal mining as well as coal dust related health effects in the coal mining workers.

OBJECTIVES

1. To understand health status of workers through questionnaire survey, health examination.
2. To study respiratory health in coal field mining workers.
3. To assess ventilatory functions of coal field mining workers.
4. To analyze hearing ability through audiometric evaluation.

METHODOLOGY

An occupational health study was conducted involving different mines of Cluster 11 and 15 of Bharat coking Coal Limited, Dhanbad. This study was undertaken among the exposed workers mainly from active mining activity. Representative sample from workers working in such occupations is included in this study. Initially the aim of the study was explained to the workers, informed consent was obtained after which they were enrolled for this study. Every individual subject was interviewed with a pre-designed questionnaire to collect information in relation to personal, occupational and morbidity details of the workers. The participants of this study were subjected to following interview/examination/investigations:

- Detailed personal, occupational and medical history.
- Clinical examination with special emphasis on examination of respiratory system.
- Haematological examination.
- Lung function test.
- Audiometry.
- Ophthalmological assessment.

Study design: Cross sectional study

Study subjects: This study covered 351 subjects from Kustore sector and 140 subjects from Bagmara sector of BCCL Collieries. Among the subjects of Kustore sector 49 were from Kachi Balihari mines, 51 from Bhagabandh mines, 40 from Gopali Chawk mines and 100 from Munidi mines. PB project mines contributed 111 subjects. Similarly among the subjects of Bagmara sector, Kharkharee mines and Phularitand mines contributed 75 subjects and 65 subjects respectively. Workers actively involved in mining actively were mainly included in this study. However, few subjects of this study were enrolled from supervisory staffs in order to have a complete and comprehensive understanding of the occupational health condition. These workers were randomly selected from the total workforce in the selected clusters and mines.

Data collection: The information regarding demographic, occupational and clinical history was collected on a pre-designed and pre-tested proforma through interview of subject. This was followed by complete clinical examination, spirometry, audiometry and chest radiography of each subject. The audiometer and spirometer were brought by NIOH team while for chest radiography the facilities at BCCL hospitals were used. The processing of exposed films was done by the technicians at BCCL hospital. The ophthalmological examination and haematological – biochemical estimations were also done using facilities and expertise at BCCL hospitals.

Data analysis: Data entry and analysis were done in standard statistical software. The statistical analysis included calculation of differences, proportions and application of tests of significance etc, to ascertain health effects especially respiratory health conditions.

Lung function test was carried out in all subjects. Forced vital capacity (FVC), and Peak Expiratory Flow Rate (PEFR) were recorded by Spirovit-sp-10 (Schiller Health Care Ltd, Switzerland). Three successive recording of FVC and PEFR were made in standing posture and the nose clip was used. The best of the three performances was considered for calculation purpose. The different flow volumes like FEV_1, FEV_1% was calculated from the same tracings. All volumes

obtained were expressed in body temperature on atmospheric pressure of air saturated with water vapour (BTPS). Body height and body weight were measured in bare feet on a standard scale. Pulmonary function test values were predicted from the standard prediction equation. The instrument was calibrated every day before starting the experiment.

Blood was collected from each worker by venipuncture taking all aseptic precautions. Hematological and biochemical analysis was carried out using standard procedure.

Audiometric Evaluation of Hearing:

The following criteria were maintained for non- inclusion of workers as subjects in audiometry:

- Whose present hearing level was not amenable to quantitative description, who had served in the armed forces, or had been exposed to gunfire, or whose past noise exposure was different from that of their present occupation.
- Who were known to have existing or previous ear disease or abnormality.
- Head injury with history of unconsciousness or skull fracture.

Criteria for acceptance (inclusion criteria) as test subjects:

The following criteria were applied for categorizing ears as acceptable for the test

- Tympanic membrane intact
- No history of congenital or acquired conditions associated with sensory neural hearing loss e.g. congenital deafness, meningitis, unconsciousness, treatment with ototoxic drugs, vertigo, etc.

Criteria for normal hearing:

Hearing impairment is considered to occur when the average of the hearing threshold levels at audiometric frequencies of both ears exceed 25 dBA. Pure tone air conduction hearing threshold

was obtained in a quiet room. Threshold of hearing is defined as the minimum decibel level (dB) at which the subjects respond at least two times on ascending trial. The data for each subject was obtained. Pure tone threshold were obtained using descending- ascending threshold crossing technique. The data was analyzed for each ear of the subjects for all test frequencies. Hearing threshold at test frequencies was averaged for all subjects to assess hearing sensitivity.

Measurement of hearing:

Pure tone audiometry was carried out for the present investigation. In the individual experiment, subjects were briefed about the nature and purpose of the study. He was then seated in a chair, the earphones were fitted on his ears, and the door of the room was closed. They were instructed to respond by raising their fingers when they could just hear the tone lasting for 2 sec. The pulsing of the tone was set at 0.5/ sec. The intensity of the tone was raised by 5 dB until the threshold of hearing was determined at each test frequency viz 125Hz, 250Hz, 500Hz, 1KHz, 1.5KHz, 2KHz, 3KHz, 4KHz, 6KHz.and 8KHz. The actual measurement was started following a brief practice trial session. The better ear followed by the other ear was tested. The right ear was tested first in cases where both the ears were reported to be nearly equal in hearing sensitivity. It was ensured that the subject would fully cooperate. Care was taken to ensure reliable reporting of the subjects' 'just audible sound'. Misses (error of omission) and false alarms (error of commission) were avoided.

Equipment (Audiometer):

An audiometer was used as the source of pure tone audiometry. It has all the facilities of mask attenuation, frequency setting (125-8000 Hz.), decibel setting of pure tone and pulse setting. It has also a pair of earphone attachment. The audiometer is calibrated periodically as per the specification of International Standards Organization.

Questionnaire survey

Medical Examination

Pulmonary Function Test

Information- Communication

Audiometry

Haematology & Radiology Examination

RESULT

&

DISCUSSION

(Total subjects)

This study covered 351 subjects from Kustore sector and 140 subjects from Baghmara sector of BCCL Collieries. Among the subjects of Kustore sector 49 were from Kachi Balihari mines, 51 from Bhagabandh mines, 40 from Gopali Chawk mines and 100 from Munidi mines. PB project mines contributed 111 subjects (Table 1). Similarly among the subjects of Baghmara sector, Kharkharee mines and Phularitand mines contributed 75 subjects and 65 subjects respectively. Workers actively involved in mining activity were mainly included in this study. However, about 10% subjects of this study were enrolled from supervisory staffs in order to have a complete and comprehensive understanding of the occupational health condition.

Table 1: Distribution of Supervisory workers and coal miners according to the name of the mine

Sector	Mine Name	Supervisory workers	Coal Miners	Total
		N (%)	N (%)	N (%)
Kustore	10/12 KACHI BALIHARI PITS	8 (2)	41 (12)	49 (14)
	BHAGABANDH COLLIARY	10 (3)	41 (12)	51 (15)
	GOPALI CHAWK COLLIARY	7 (2)	33 (9)	40 (11)
	MUNIDI COLLIARY	17 (5)	83 (24)	100 (29)
	P.B.PROJECT COLLIARY	5 (1)	106 (30)	111 (31)
Total		47 (13)	304 (87)	351
Baghmara	KHARKHAREE COLLIARY	5 (4)	70 (50)	75 (54)
	PHULARITAND COLLIARY	1 (1)	64 (45)	65 (46)
Total		6 (5)	134 (95)	140
Grand Total		**53 (10)**	**438 (90)**	**491 (100)**

Mean age of the workers was 45.9 ± 8.36 years. Most of the workers were between 35-54 years age group. Mean age of supervisory staffs was slightly higher than that of miners. About 98% workers were married. As far as education is concerned majority (56%) had middle school education. Only 4% subjects had graduate level education or higher (Table 2).

Table 2: Demographic characteristics of the study subjects

Demographic characteristics	Supervisory workers	Coal Miners	Total
Age group (in years)	**N (%)**	**N (%)**	**N (%)**
<25	0(0)	4(1)	4(1)
25 - 34	5(1)	34(7)	39(8)
35 - 44	9(2)	148(30)	157(32)
45 - 54	18(4)	175(36)	193(40)
≥55	16(3)	77(16)	93(19)
Mean age (in years)	**48.31 ± 9.47**	**45.55 ± 8.189**	**45.9 ± 8.36**
Marital status			
Single	2(0.5)	6(1.5)	8(2)
Married	46(8.5)	432(89.5)	478(98)
Education status			
Illiterate	0(0)	102(21)	102(21)
Primary schooling	1(0)	15(3)	16(3)
Middle schooling	18(4)	256(53)	274(56)
Secondary schooling	19(4)	56(12)	75(15)
Graduate and above	10(2)	9(2)	19(4)

So far as personal habits are concerned, 86% of subjects were non-smokers, 10% were smokers and 3% were ex-smokers. Tobacco chewing habit was present in 61% subjects and occasional alcohol intake history was found in 39% workers (Table 3).

Table 3: Personal habits of the study subjects

Demographic characteristics	Supervisory workers	Coal Miners	Total
Smoking habits	N (%)	N (%)	N (%)
Non-smoker	38(8)	382(79)	420(86)
Smoker	9(2)	40(8)	49(10)
Ex-smoker	1(0)	16(3)	17(3)
Tobacco chewer			
No	27(6)	160(33)	187(39)
Yes	21(4)	283(57)	304(61)
Alcohol drinking habit			
No	34(7)	264(54)	298(61)
Yes	14(3)	174(36)	188(39)

Mean job experience was 11.72 ± 8.49 years. About 83% workers had job experience of up to 20 years, 3% workers had experience more than 30 years (Table 4). Mean experience was a little higher in supervisory employee group than miners group.

Table 4: Occupational characteristics of Supervisory workers & Coal miners

Demographic characteristics	Supervisory workers	Coal Miners	Total
Duration of job (in years)	N (%)	N (%)	N (%)
<10	23(5)	241(49)	264(54)
10 - 20	12(2)	129(26)	141(29)
21 - 30	13(3)	60(12)	73(15)
>30	0(0)	13(3)	13(3)
Mean duration of job (years)	**12.65 ± 9.31**	**11.61 ± 8.39**	**11.72 ± 8.49**

Most common symptoms complained by study subjects were musculoskeletal pain (34%) (Table 5). Other complaints were Cough, difficulty in breathing, chest pain, loose teeth, and soreness of mouth and colicky pain in abdomen. Headache, sleep disturbance, weakness, tremor in fingers was also experienced by some subjects.

Table 5: Distribution of symptoms among study subjects

Symptoms	Supervisory workers	Coal Miners	Total
	N (%)	N (%)	N (%)
Cough	1 (0.5)	23 (4.5)	24 (5)
Cough with Phlegm	0 (0)	7 (1)	7 (1)
Difficulty in Breathing	2 (0.5)	27 (5.5)	29 (6)
Chest Pain	2 (0.5)	23 (4.5)	25 (5)
Colicky pain	1 (0.5)	14 (2.5)	15 (3)
Loose Teeth	5 (1)	36 (7)	41 (8)
Soreness of mouth/throat	3 (1)	21 (4)	24 (5)
Urinary problems	1 (0.25)	5 (0.75)	6 (1)
Musculoskeletal pain	21 (4)	146 (30)	167 (34)
Headache/sleep difficulty /weakness/dizziness/tremor	6 (2)	46 (9)	52 (11)

Table 8: Pulmonary function impairments among study subjects

Pulmonary function category	Supervisory workers	Coal Miners	Total
	N (%)	N (%)	N (%)
FVC/PFVC			
<80%	0 (0.0)	15 (3.0)	15 (3.0)
≥80%	53 (11.0)	423 (86.0)	476 (97.0)
$FEV_{1\%}$			
< 70 %	2 (0.5)	29 (6.0)	31 (6.5)
70- 79.99 %	21 (4.5)	158 (32.0)	179 (36.5)
≥ 80 %	30 (6.0)	251 (51.0)	281 (57.0)
FVC/PFVC <80% + $FEV_{1\%}$ <70%	0 (0.0)	3 (0.6)	3 (0.6)

FVC – Forced Vital Capacity; PFVC – Predicted Forced Vital Capacity; FEV_1 – Forced Expiratory Volume in first second

Table 9: Forced Vital Capacity according to study variables among study subjects

Study variables	Forced Vital Capacity [Mean ± SD (litres)]		
	Supervisory workers	Coal Miners	Total
Age group (in years)	**Mean ± SD (litres)**	**Mean ± SD (litres)**	**Mean ± SD (litres)**
< 45	3.85 ± 0.585	3.71 ± 0.646	3.72 ± 0.641
≥ 45	3.53 ± 0.576	3.36 ± 0.64	3.38 ± 0.634
	t = 3.120;df =1;p=0.083	t=30.586;df=1;p=0.00	t=32.016;df=1;p=0.00
Duration of exposure (yrs)			
< 20	3.64 ± 0.562	3.52 ± 0.65	3.53 ± 0.643
≥ 20	3.55 ± 0.672	3.47 ± 0.71	3.48 ± 0.702
	t=0.264;df=1;p=0.610	t=0.430;df=1;p=0.512	t=0.519;df=1;p=0.472
Smoking habit			
Never smoker	3.6 ± 0.587	3.5 ± 0.655	3.51 ± 0.649
Ever smoker	3.76 ± 0.613	3.49 ± 0.616	3.54 ± 0.619
	t=0.210;df=1;p=0.649	t=0.115;df=1;p=0.735	t=0.317;df=1;p=0.574

Similar trend was observed in case of FEV1 values also (Table 10). Significant difference was observed between subject of less than 45 years and rest of the workers. This difference was more prominent in miners than supervisory staffs. No such remarkable difference was observed when compared in relation to job experience and smoking habit.

Table 10: Forced Expiratory Volume in first second according to study variables among study subjects

Study variables	Forced Expiratory Volume in first second [Mean ± SD (litres)]		
	Supervisory workers	Coal Miners	Total
Age group (in years)	**Mean ± SD (litres)**	**Mean ± SD (litres)**	**Mean ± SD (litres)**
< 45	3.073 ± 0.3887	3.028 ± 0.5229	3.031 ± 0.5139
≥ 45	2.837 ± 0.4553	2.685 ± 0.5597	2.705 ± 0.5486
	t=2.95;df=1;p=0.092	t=42.02;df=1;p=0.001	t=43.53;df=1;p=0.001
Duration of exposure (yrs)			
< 20	2.945 ± 0.4025	2.844 ± 0.5556	2.854 ± 0.5427
≥ 20	2.791 ± 0.5426	2.769 ± 0.6072	2.772 ± 0.5962
	t=1.259;df=1;p=0.267	t=1.319;df=1;p=0.25	t=1.872;df=1;p=0.172
Smoking habit			
Never smoker	2.886 ± 0.4428	2.836 ± 0.5617	2.841 ± 0.5509
Ever smoker	2.972 ± 0.5042	2.763 ± 0.5127	2.805 ± 0.5129
	t=0.208;df=1;p=0.650	t=0.131;df=1;p=0.72	t=0.018;df=1;p=0.895

Same pattern could be found in case of Peak Expiratory Flow Rate also (Table 11). Significant difference was present in relation to age (more so in miners than supervisor), however, smoking and duration of exposure wise classification did not show any significant difference.

Table 11: Peak Expiratory Flow Rate according to study variables among study subjects

Study variables	Peak Expiratory Flow Rate [Mean ± SD (litres/minute)]		
	Supervisory workers	Coal Miners	Total
Age group (in years)	Mean±SD (litres/minute)	Mean±SD (litres/minute)	Mean ± SD (litres/minute)
< 45	465 ± 63.579	473.23 ± 65.358	472.65 ± 65.113
≥ 45	479.47 ± 60.402	444.83 ± 85.172	449.4 ± 83.078
	t=0.571;df=1;p=0.458	t=14.37;df=1;p=0.00	t=10.97;df=1;p=0.001
Duration of exposure (yrs)			
< 20	474.86 ± 59.704	458.15 ± 75.028	459.79 ± 73.769
≥ 20	477.33 ± 66.167	450.2 ± 89.349	453.97 ± 86.752
	t=0.01;df=1;p=0.896	t=0.785;df=1;p=0.376	t=0.506;df=1;p=0.477
Smoking habit			
Never smoker	475.37 ± 61.851	456.31 ± 78.316	458.17 ± 77.012
Ever smoker	475 ± 63.64	461.75 ± 76.691	464.4 ± 73.849
	t=0.002;df=1;p=0.962	t=0.193;df=1;p=0.661	t=0.301;df=1;p=0.583

So far as chest radiographic findings are concerned, 93% subjects (Table 12) had findings within normal limits. 3% subjects showed findings suggestive of opacities in lung and almost 1.5% had other features on chest X-ray (mostly suggestive of Koch's infection of lung).

Table 12: Chest radiographic findings among the study subjects

Chest X ray findings	Supervisory workers	Coal Miners	Total
	N (%)	N (%)	N (%)
Within normal limit	50 (10)	408 (83)	458 (93)
Pulmonary Opacities	1 (0.5)	12 (2.5)	13 (3)
Koch's infection	0 (0)	7 (1.5)	7 (1.5)
Not Done	2 (0.5)	11(2.0)	13(2.5)
Total	**53 (11)**	**438 (89)**	**491 (100)**

Haematological and biochemical findings of the subjects were mostly within normal limits. Almost 11% workers had random blood sugar level >140. Mean Hemoglobin level in 13.1±0.8 gm%. Mean ESR was 7.0±2.1 unit. Random Blood sugar, blood urea and creatinine was 114.7±36.4 unit, 22.7±3.6 unit and 0.8±0.1unit respectively (Table 13).

Table 13: Haematological & Biochemical findings of study subjects

Parameter	Minimum	Maximum	Mean ± SD
Haemoglobin (g/dL)	10	15	13.15 ± 0.845
Erythrocyte Sedimentation Rate (mm/h)	3	20	7.046 ± 2.144
Total Leucocyte Count (mcL)	5500	12600	9064.61 ± 1167.13
Neutrophil	46	89	61.77 ± 5.826
Lymphocyte	20	62	31.97 ± 6.013
Eosinophil	2	13	5.62 ± 1.77
Monocyte	0	8	0.80 ± 0.905
Besophil	0	0	0.00
Random Blood Sugar (mg/dL)	55	300	114.74 ± 36.46
Blood Urea (mg/dL)	14	38	22.75 ± 3.63
Serum Creatinine (mg/dL)	.30	7.00	0.83 ± 0.32

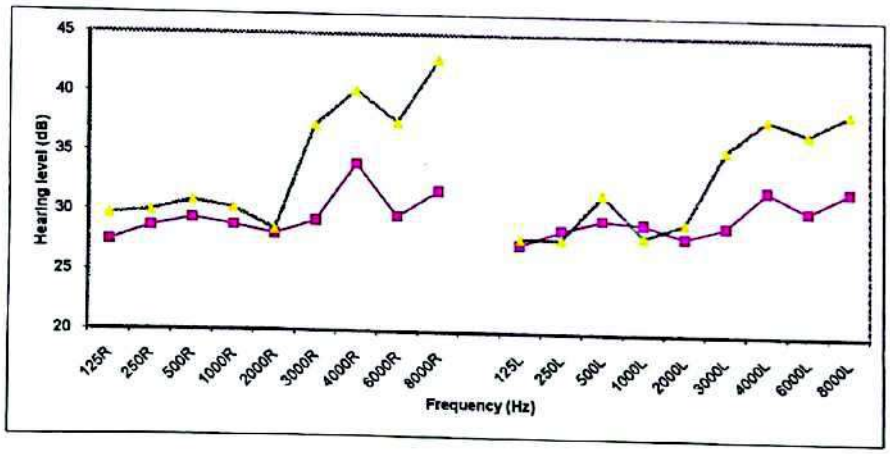
As far as ophthalmological findings are concerned, 5% subjects had uncorrected vision (although using spectacles) and 9% subjects had Cataract in eyes. Colour blindness was also observed in few subjects (Table 14).

Table 14: Ophthalmological findings of study subjects

	Supervisory workers	Coal Miners	Total
	N (%)	N (%)	N (%)
People having uncorrected vision after correction	1 (0.5)	24 (4.5)	25 (5)
Colour Blindness	0	6 (1)	6 (1)
Cataract	4 (1)	29 (8)	33 (9)
Glaucoma	0 (0)	2 (1)	2 (1)
Muscular Pathology	0	1	1
Pterygium	0	1	1

Figure 1 describes hearing ability of workers examined by audiometry. Two curves depict the median hearing ability of subjects with <10 years (lower curve), and ≥ 10 years (higher curve) of job experience. On preliminary observation, decreased hearing ability at high frequency was observed in some workers. Difference of hearing ability with increasing duration of exposure was also observed at higher frequency; however, this observation also is subject to adjustment for age and other probable factors that can affect hearing ability. Moreover, hearing assessment was done in field condition where despite best efforts ideal experimental chamber condition could not be achieved, which may also be a contributing factor.

Figure 1: Distribution of hearing ability according to job experience



CONCLUSION

- This study covered 351 subjects from Kustore sector and 140 subjects from Baghmara sector of BCCL Collieries. Mean age of the workers was 45.9 ± 8.36 years. Most of the workers were between 35-54 years age. Mean job experience was 11.72 ± 8.49 years.

- Most common symptoms complained by study subjects were musculoskeletal pain (34%). Other complaints were Cough, difficulty in breathing, chest pain, soreness of mouth etc. Headache, sleep disturbance, weakness, tremor in fingers was also experienced by some subjects.

- About 20% subjects had systolic blood pressure >140 as well as diastolic blood pressure > 90 mm of Mercury. 9% workers had only higher systolic blood pressure and 11% had only higher diastolic blood pressure.

- As far as pulmonary functional status of study subjects in concerned, about 3% subjects had restrictive type of abnormality (FVC/PFVC < 80%) and 0.6 % subjects had combined type of abnormality (FVC/PFVC <80 % and FEV1% <70%). A good number of subjects (36.5%) had FEV1% values between 70% and 80%. Mean FVC values were significantly lower among the subjects of age 45 years or above.

- So far as chest radiographic findings are concerned, 93% subjects had findings within normal limits. 3% subjects showed findings suggestive of opacities in lung and almost 1.5% had other features on chest X-ray (mostly suggestive of Koch's infection of lung). Such findings may be due to pneumoconiotic changes in lung, hence these subjects should be properly followed up and necessary medical, ethical, legal, administrative actions may be initiated as necessary.

- Haematological and biochemical findings of the subjects were mostly within normal limits. Almost 11% workers had random blood sugar level more than 140 units. As far as ophthalmological findings are concerned, 5% subjects had uncorrected vision and 9% subjects had Cataract in eyes.

- Decline in hearing ability with increasing duration of exposure was observed more at higher frequency; however, this observation is subject to adjustment for age and other probable factors.

- The subjects for this study are selected from workplaces identified by BCCL, Govt. of India, as required for the purpose of this study. The findings of this study may thus be restricted to the concerned workplaces and may not be generalisable.

RECOMMENDATION

- Prevalence of musculoskeletal pain during work in a good number of workers reflects that manual work of the work processes might be causing some discomfort for the workers. Training on proper method of manual material handling may prove useful of these workers. On the other hand regular proper exercise should be promoted among workers especially supervisory employees to get rid of ill effects of sedentary activities.

- Special emphasis should be given to protection of respiratory health, hearing ability. Periodic relevant examination (lung function test, audiometry) at regular interval is recommended.

- Industrial hygiene survey (periodic monitoring of dust and other environmental hazards) at regular interval should be undertaken including noise level monitoring in different operations.

- Some prevalent symptoms observed may be representation of nervous system effect due to exposures to toxicants. In order to exclude the possibility of exposure from occupational environment, environmental study should include assessment of exposure to metals.

- Measures like using protective appliances (e.g. PPEs), pre-placement- and periodic medical examination, for the control and prevention of relevant health hazards, are to be implemented and maintained by all the mining areas to protect the health of the workers.

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2. "Coal & Lignite - Indian Minerals year book - 2011". Indian Bureau of Mines, Government of India. October 2012. Retrieved 26 December 2013
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EXPENDITURE MADE UNDER VARIOUS HEADS OF ENVIRONMENTAL MANAGEMENT PLAN

Major Environmental measures cost for the year 2013-14

Sl. No.	Activity (2013-14)	Cost Incurred (In Lakhs)
1	Environmental Monitoring (through HQ)	4.80
2	Gabion Plantation through DFO	20.41
3	Biological reclamation	93.98
4	EMP Preparation cost	80.00
Total Cost Incurred (Manpower cost and Diesel cost is included)		199.19

Major Environmental measures cost for the year 2014-15

Sl. No.	Activity (2014-15)	Cost Incurred (In Lakhs)
1	Environmental Monitoring (through HQ)	4.80
2	Gabion Plantation through DFO	15.11
3	Ecological Restoration	279.86
4	FRI Dehradun Monitoring Cost	0.85
5	Environment Statutory Fee	2.25
Total Cost Incurred (Manpower cost and Diesel cost is included)		302.87

Major Environmental measures cost for the year 2015-16

Sl. No.	Activity (2015-16)	Cost Incurred (In Lakhs)
1	Environmental Monitoring (through HQ)	4.80
2	Gabion Plantation through DFO	11.40
3	Ecological Restoration	308.81
4	Statutory Fee including CTO/CTE	11.25
5	FRI Dehradun Monitoring Cost	2.138
Total Cost Incurred(Manpower cost and Diesel cost is included)		338.40

Major Environmental measures cost for the year 2016-17

Sl. No.	Major Environment Activity (2016-17)	Cost Incurred (In Lakhs)
1	Environmental Monitoring (through HQ)	4.46
2	Gabion Plantation through DFO	11.16
3	FRI Dehradun Monitoring Cost	0.89
4	Ecological Restoration / Block Plantation	214.43
5	Water Sprinkling	46.20
6	Scientific study for delineation of fire (through HQ)	18.10
Total Cost Incurred (Manpower cost and Diesel cost is included)		295.24

Major Environmental Measure cost for the year 2017-18

Sl. No.	Major Environment Activity (2017-18)	Cost Incurred (In Lakhs)
1	Environmental Monitoring (through HQ)	20.55
2	Source Apportionment Study (through HQ)	141.60
3	Ecological Restoration / Block Plantation	221.53
4	FRI Dehradun Monitoring Cost	0.89
5	Water Sprinkling	34.66
Total Cost Incurred (Manpower cost and Diesel cost is included)		419.23

Major Environmental measures cost for the year 2018-19

Sl. No.	Major Environment Activity (2017-18)	Cost Incurred (In Lakhs)
1	Routine Environmental Monitoring	32.57
2	Water Quarterly Monitoring Report	3.60
3	FRI Dehradun Monitoring Cost	0.89
4	Ecological Restoration/Block Plantation	38.31
5	Water Sprinkling	31.51
6	Construction of water curtain sprinkler	1.50
7	Statutory Fee including CTO/CTE	3.80
8	Ground water Monitoring	CMPDIL (through HQ)
Total Cost Incurred (Manpower cost and Diesel cost is included)		112.18

Major Environmental measures cost for the year 2019-20

Sl. No.	Major Environment Activity (2019-20)	Cost Incurred (In Lakhs)
1	Routine Environmental Monitoring	17.99
2	Water Quarterly Monitoring Report	1.69
3	FRI Dehradun Monitoring Cost	0.85
4	Ecological Restoration/Block Plantation	45.50
5	Water Sprinkling	31.51
6	Statutory Fee including CTO/CTE	3.80
7	Mist water sprinkler (indent) through HQ	45.66
8	Ground water Monitoring	CMPDIL (through HQ)
9	Online PM10 Analyser installation (through HQ)	42.30
Total Cost Incurred (Manpower cost and Diesel cost is included)		189.30

Mine Closure Cost: Amount deposited in Escrow account for implementation of progressive mine closure Activity in the mines under cluster X is 32.12 Crores from FY 2013-14 to FY 2019-20.

Annexure - XXI

Bharat coking coal limited

(A Subsidiary of Coal India Ltd)
Office of the Project Officer, Bhowra (N), Eastern Jharia Area,
P.O. Bhowra, Dist: Dhanbad (Jharkhand),PIN- 828302

Ref. No:- BCCL/EJA/BH(N)/2020/ 4414 Date:- 19/06/2020

To,
The Member Secretary,
Jharkhand State Pollution Control Board
T. A. Division Building (Ground Floor)
H. E. C. Dhurva.
Ranchi – 834004

Sub:- Submission of Environmental Statement in From – V

Dear Sir,

Environmental Statement is Form – V is being submitted to you for financial year 2019-20 in respect of Bhowra (N) U/G Mines.

Enclosures:- As above.

Yours Faithfully

Project Officer
Bhowra (N) U/G Mines

Distribution:-
1.The Regional Office, JSPCB Office, HIG Dhanbad
2. The General Manager (Env.), BCCL, Koyla Bhawan.
3. The Area Manager (Env.), E. J. Area, Bhowra.
4. Office File.

(Form – V)

(See rule 14)

Environmental Statement for the financial year ending the 31st March 2020

PART – A

(i) Name and address of the owner/occupier of the industry operation or process : Chanchal Goswami, O.T. (P&P) BCCL, Koyla Nagar, Dhanbad

(ii) Industry category : Coal Mining Industry

(iii) Production capacity : U/G - 0.143 MTY
OCP – 0.546 MTY
(EC no:- J-11015/380/2010-14-II(M), dt: 06/02/13)

(iv) Year of establishment : Colliery operating since pre nationalization period and vested in BCCL through Coal Mine Nationalisation Act 1972-73

(v) Date of last environmental Statement submitted : 24.06.2019, (Ref. No: BCCL/EJA/BH(N)/2020/285)

PART - B

Water and River Material Consumption

Water Consumption	
Process (Dust separation)	20 M^3/day
Cooling	Nil
Domestic	120 M^3/day

Name of Products	Process water consumption per unit of product output	
	During the previous financial year	During the current financial year
COAL	6.540 KL/T	6.577 KL/T

Raw Material Consumption

Name of materials	Name of products	Consumption of raw material per Unit of output	
		During the previous financial year (2018-19)	During the current financial year (2019-20)
Diesel	Coal	0.1712 L/Te	0.146 L/Te
Explosive	Coal	0.3151Kg/ Te	0.247 Kg/ Te
Timber	Coal	S- 0.1641 nos./Te; P- 0.0549 nos./Te *	S- 0.0932 nos./Te; P- 0.0189 nos./Te *

*S – wooden sleepers, P- wooden props.

PART- C

Pollution discharged to environment/unit of output (parameter as specified in the consent issued)

Pollutants	Quantity of pollutants discharge	Concentrations of pollutants in discharge(mass/volume)	Percentage of variation from prescribed standards with reasons
Water	--	*(MW- 10 , 19.03.20)* TSS - 46 PH - 8.31 Oil & Grease - <2.0 COD - 40	Within Limit
Air	--	*(as on 18.03.20)* PM 10 - 82 PM 2.5 - 46 SO_2 - 10 NO_x - 22	Within Limit

PART – D

Hazardous Wastes

(as specified under Hazardous waste management and handling rules, 1989)

Hazardous Waste	Total Quantity (Kg.)	
	During the previous financial year (2018-19)	During the current financial year (2019-20)
From process	Burnt oil - 295Litre	Burnt oil - 165Litre
From pollution control facilities	N/A	N/A

PART – E

Solid Wastes

Solid Wastes		Total Quantity	
		During the previous financial year	During the current financial year
(a) Process		Nil	Nil
(b) Pollution control facility		Nil	Nil
(c)	1.Quantity recycled or re-utilized within the unit	Nil	Nil
	2. Sold	Nil	Nil
	3. Disposed	Nil	Nil

PART – F

Please specify the characterizations (in terms of composition of quantum) of hazardous as well as solid waste and indicate disposal practice adopted for both these categories of wastes.

(i)	Type of Rocks	:-	N/A
(ii)	Type of soil	:-	N/A
(iii)	Chemical properties of soil: -		N/A
(iv)	Disposal process for Solid Waste (backfilling practice): -		N/A

PART – G

Impact of pollution abatement measures taken on conservation of nature resources and on the cost of production

(i)	No. of plants planted	: Nil
(ii)	Cost of plants	: Nil
(iii)	Plantation cost incurred	: Nil
(iv)	Backfilling cost	: Nil

PART – H

Additional measures/investment proposal for environmental protection including abatement of pollution, prevention of pollution

(i) Water sprinkling is done in transporting road, coal stock yard, working faces, etc. to reduce dust emission.

(ii) Proper and timely maintenance of tipper, SDL machine, fan, pumps etc. is being done to control noise pollution.

(iii) Monitoring of air quality and water quality is being done periodically.

(iv) Covered coal transportation is being done.

(v) Pucca road prepared for coal transportation from 23/8 ind.

(vi) Maintenance of plants provided on both side of roads at 23/8 ind. is being maintained.

PART – I

Any other particulars for improving the quality of the environment

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Project officer
Bhowra (N) U/G Mines

Bharat coking coal limited

(A Subsidiary of Coal India Ltd)
Office of the Project Officer, Bhowra (S), Eastern Jharia Area,
P.O. Bhowra, Dist: Dhanbad (Jharkhand),PIN- 828302

Ref. No:- BCCL/EJA/BH(S)//2020/997 Date:- 11/09/2020
14

To,
The Member Secretary,
Jharkhand State Pollution Control Board
T. A. Division Building (Ground Floor)
H. E. C. Dhurva
Ranchi – 834004

Sub:- Submission of Environmental Statement in From – V

Dear Sir,

Environmental Statement is Form – V is being submitted to you for financial year 2019-20 in respect of Bhowra (S) Colliery.

Enclosures:- As above.

Yours Faithfully

14/9/2020

Project Officer
Bhowra (S)) Colliery

Distribution:-
1.The Regional Office, JSPCB Office, HIG Dhanbad
2. The General Manager (Env.), BCCL, Koyla Bhawan.
3. The Area Manager (Env.), E. J. Area, Bhowra.
4. Office File.

[FORM V]

Environmental Statement for the financial year ending on 31st March 2020

PART A

(i) Name and address of the owner/occupier of the industry operation or process.
Chanchal Goswami, D.T. (P&P), BCCL, Koyla Nagar, Dhanbad

(ii) Industry category Primary-(STC Code) Secondary-(STC Code).

Primary (Coal Mining)

(iii) Production capacity-

Peak EC Capacity- 2.289MTPA
(EC Order No.- J-11015/380/2010-IA.II(M) dated 06.02.2013 & EC amended Vide letter no.- J-11015/380/2010-IA.II(M) dated 12.06.2019)

(iv) Year of establishment-
Pre-nationalization (Pre-1973)

(v) Date of the last environmental statement submitted.- 18.05.2019. (Ref no. BCCL/EJA/BH(S)/PO/472)

PART B

Water and Raw material consumption:

1. **Water consumption-** 375 KL/Day

Process (Dust suppression)-1165 KL/Day

Cooling/spraying- Nil

Domestic- 985 KL/Day

2. **Raw material consumption**

Name of raw material	Name of products	Consumption of raw material per unit of output	
		During the previous financial year (2018-2019)	During the current financial year (2019-2020)
1.Diesel	coal	0.012 ltr/Te	0.0049 ltr/Te
2.Explosive	coal	4.38 kg/Te	4.78 kg/Te

Name of products	Process water consumption per unit of product output	
	During previous FY	During current FY
Coal	0.0831 KL/T	0.073 KL/T

PART-C

Pollution discharged to environment/unit of output (parameter as specified in the consent issued)

Pollution	Quantity of pollutants Discharged (mass/day)	Concentration of pollutants in discharges (mass/ volume)	Percentage of variation from prescribed standards
Water	Analysis report enclosed	Analysis report enclosed for cluster -X	The analysis report reveals that most of the parameters are below permissible limit.
Air	Analysis report enclosed	Analysis report enclosed for cluster -X	The analysis report reveals that most of the parameters are below permissible limit.

PART D

Hazardous Wastes

(as specified under Hazardous Wastes (Management and Handling) Rules, 1989)

Hazardous waste	Total Quantity(kg)	
	During the previous financial year (2019-2020)	During the current financial year (2020-2021)
From process	1470 L Burnt oil	238 L Burnt oil
From pollution control facilities	Nil	Nil

PART E

Solid Wastes

Solid Wastes	Total quantity (Kg)	
	During the previous financial year (2019-2020)	During the current financial year (2020-2021)
From process	Nil	Nil
From pollution control facilities	Nil	Nil
Quantity recycled or re-utilizes within the unit	Nil	Nil

PART -F

Please specify the characterization (in terms of composition and quantity) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes.

1. Types of rocks : NA
2. Type of soil : NA
3. Chemical properties of soil : NA
4. Disposal process of solid waste (backfilling practice) : NA

PART -G

Impact of the pollution abatement measures taken on conservation of natural resources and on cost of production.

1. No. of plants planted : 28,617 (From 2014-15 to 20.9.20)
2. Cost of plants : NA
3. Plantation cost incurred : NA
4. Backfilling cost : NA

PART -H

Additional measures/investment proposal for environmental protection including abatement of pollution, prevention of pollution:

1. Water sprinkling is done in transportation road, coal stock yard, working faces etc to reduce dust emission.
2. Monitoring of air quality and water is being done periodically.
3. Covered coal transportation is being done.

PART-I

Any other particulars for improving the quality of the environment

1. Mobile water sprinkling in dust prone areas.
2. Plantation in mine area, schools and office complexes.
3. Distribution of plant saplings among locals.
4. Ecological restoration of 9.28 Ha of Overburden dump.

Project Officer
Bhurkunda South Colliery

भारत कोकिंग कोल लिमिटेड
(कोल इंडिया लिमिटेड का एक अंग)
BHARAT COKING COAL LIMITED
A Mini Ratna Company)
(A Subsidiary of Coal India Limited)
Office of the Project Officer, ASP Colliery

A.S-P Colliery
P.O.- Sudamdih
Dist.–Dhanbad
Jharkhand 828126

Ref No– BCCL/EJA/ASP/20/2104

Dated: 30/9/2020

To,
The Member Secretary,
Jharkhand State Pollution Control Board,
TA. Division Building
HEC, Dhurwa.
RANCHI – 834004.

Sub. :-**Submission of Environmental Statement (From –V) for the year 2019-20.**

Dear Sir,

Please find herewith the Environmental Statement duly filled in the financial year 2019-20 in respect of Amal. S – P. Colliery.

This is for your kind information, Sir.

Encl. - As Above

Yours faithfully

30/9/2020

Project Officer
Amal. S – P. Colliery

Copy to:
1. Regional Officer, J.S.P.C.B, Dhanbad
2. Area Manager (Env.)E.J. Area.
3. Colliery Manager / Safety Officer, A.S – P. Colliery.
4. Office file.

"FORM – V"
(See rule 14)

Environmental statement for the financial year ending 31st March'2020

PART – A

Name and address of the owner / Occupier of the industry operation or process	: Sri Chanchal Goswami, D.T, Koyla Bhawan, Koyla Nagar, BCCL, Dhanbad.
Industry category primary (STD Code)	: Coal Mining Industry (A.S-P. Colliery)
Production capacity	: 0.709 MTPA.
Year of establishment	: 1962
Date of last environmental statement submitted.	: Dt. 23.09.2019 (Ref. No. EJA/ASP/SMD/18/1792)

PART – B

Water and Raw Material consumption:

Water Consumption.	
1. Process (Dust suppression)	93 KL/ Day
2. Cooling	Nil
3. Domestic	272 KL/ Day

Name of products	Process water consumption per unit of product point	
	During the previous Financial year 2018-19	During the current Financial year 2019-20
N/A	N/A	N/A

2. Raw material consumption:

Name of Raw Material	Name of products	Consumption of Raw Materials per unit of product output	
		During the previous Financial year 2018-19	During the current Financial year 2019-20
Diesel	Coal	2.46 Ltrs./Ton.	4.04 Ltrs./Ton.
Explosive	Coal	0.318 KG/Ton	1.893 KG/Ton

Industry may two codes if disclosing details of raw material would violate contractual Obligations otherwise all industries have to name the materials used.

PART – C

Pollution discharged to Environment / unit of output (Parameter as specified in the consent issued).

Pollution	Quantity of pollutants discharged (mass/day)	Concentrations of Pollution in discharges (mass / volume)	Percentage of variation from prescribed stack with reason.
a) Water	—	Total suspended solid – 46 pH – 8.31 Oil & Grease - <2.0 COD - 40	Within the limit Within the limit Within the limit Within the limit
b) Air	—	PM10 – 80 PM 2.5 – 42 SO_2 - 10 NOx - 21	Within the limit Within the limit Within the limit Within the limit

PART – D

Hazardous wastes (As specified under Hazardous wastes Management and Handling rules 1989.

Hazardous waste	Total Quantity	
	During the previous Financial year 2018-19	During the current Financial year 2019-20
a) From process	Quantity of Burnt Oil – 200 Ltrs. Cotton waste – Nil Oil soaked filters – 12 Nos.	Quantity of Burnt Oil – 461 Ltrs. Cotton waste – 5.100Kg. Oil soaked filters – 17 Nos.
b) From pollution control facilities	N/A	N/A

PART – E

Solid wastes

Solid wastes		Total Quantity	
		During the previous Financial year 2018-19	During the current Financial year 2019-20
a) From process		Quantity of Overburden generated –1313800 M^3	Quantity of Overburden generated – 346282.91 M^3
b) From Pollution control facilities		Oil & Grease trap's bottom sludge – N/A	Oil & Grease trap's bottom sludge – N/A
c)	Quantity of O/B used for back filling -1313800 M^3	Quantity of O/B used for back filling -1313800 M^3	Quantity of O/B used for back filling - 346282.91 M^3
	Nil	Nil	Nil
	Nil	Nil	Nil

PART – F

Please specify the characterization (in terms of composition of quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both these categories of wastes

Type of rock : Sedimentary

Type of soil : There is no soil. All soil has been removed earlier.

Chemical properties of soil – N/A

Disposal process for solid waste (Back filling practice) – By dumper for back filling of the excavated area.

PART – G

Impact of the pollution abatement measures taken on conservation of natural resources and on the cost of production.

Ecological restoration work is going on.

PART – H

Additional measures / investment proposal for environmental protection including abatement of pollution, prevention of pollution.

(i) There are two water tankers of 20 KL Capacity, which sprinkle 04 trips water daily (except rainy season).
(ii) Fencing of ecological restoration site is being done.
(iii) There is no pressure filters.
(iv) Black toping of roads has not been done.
(v) Monitoring of air quality, water quality and noise levels are being done periodically.
(vi) Coal is being transported by covered trucks.

PART – I

Any other particulars for improving the quality of the environment.

Carbon sequestration studies done at H.Q. Level /source appointment study and reduction in pollution load by reducing road transport study being done at H.Q. level.