ENVIRONMENTAL CLEARANCE COMPLIANCE OF CLUSTER-XIII (GRANTED VIDE LETTER NO.J-11015/11/2010-IA.II (M) DATED 06.06.2013

(OCTOBER'18 – MARCH'19)

Sl. No.	A. Specific Conditions by MOEF:	Compliance
i.	**No mining shall be undertaken in/under the forestland until prior forestry clearance has been obtained under the provisions of FC Act 1980.**	Stage-I forest clearance of 6.41 ha of forest land of proposed Murulidih O/C mine has been issued by MOEF vide letter no.5-JHC188/2010-BHU dated 05.03.13. All the conditions of the above letters are compiled including the total online payment of Rs 8155592.17/- was done to MoEF through RTGS/NEFT. Awaited for Stage-II forest clearance for the same.
ii	**The EC is granted to Murulidih 20/21 Pits U/G of 0.18 MTPA and a peak production of 2.34 MTPA in an ML area of 571. 32 ha.**	Coal production from cluster XIII group of mines is **Nil.** Production from Murulidih 20/21 Pits U/G is **suspended from December 2015.**
iii.	**The maximum production in the cluster shall not exceed beyond that for which environmental clearance has been granted for the cluster XIII as per given below:**	. Being Complied. (Presently there is not any producing mine under cluster XIII) **Annexure I**
iv.	**The measure identified in the environmental plan for cluster – XIII group of mine and the condition given in this environmental clearance letter shall be dovetailed to the implementation of Jharia Action Plan.**	Being Complied.
v.	**As there is no fire in cluster XIII but the measure should be adopted proponent to control spread of neighboring fire to this cluster XIII. The proponent shall prepare time series maps of Jharia Coal field through NRSA to monitor & prevent fire problems in this Jharia Coalfield by Isothermal mapping / imaging and monitoring temperatures of the coal seam (whether they are closed 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 fire in other areas including in mines of cluster – XIV shall be undertaken.**	It has been complied. NRSC was engaged for preparation of time series maps to monitor and prevent fire problems of Jharia Coalfield by Isothermal mapping/imaging and monitoring temperatures of the coal seams and NRSC has submitted their final report in January 2018 in which the area of fire has been reduced from 9.00 Km2 to 3.28 km2. NRSC report is enclosed as Annexure II.
Vi.	**Underground mining should be taken up after completion of reclamation of O/C mine area after two years.**	Agreed. Presently there is no running O/C mine in cluster XIII.

vii.	**No mining shall be undertaken where underground fires continue. Measure shall be taken to prevent/check such fire including in old OB dump.**	It is being complied.
Viii	**There shall be no external OB dumps. 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.**	Being complied.
ix.	**A detailed calendar plan of production with plan for OB dumping and back filling (for open cast mines) and reclamation and final mine closure plan for each mine of cluster XIII shall be drawn up & implemented.**	Being implemented. Mine closure plan is approved.
x.	**The void in 5 ha. Area shall be converted in to a water reservoir of maximum depth of 15-20 mtr in post mining stage and shall be gently sloped and upper benches of the reservoir shall be stabilized with plantation and periphery of the reservoir fenced . The abandoned pits and voids should be backfilled with OB & biologically reclaimed with plantation and or may used for pisciculture.**	Will be Complied.
xi.	**Mining shall be carried out as per statutette 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 60m width shall be maintained along the nalas/water bodies. The small water bodies in OC shall be protected to the extend feasible and the embankment proposed along water body shall be strengthened with stone pitching.**	Complied and will be complied as per statute.
xii.	**Active OB dumps near water body and rivers should be rehandled for back filling abandoned mine voids. However, those which have been biologically reclaimed need not be disturbed.**	There is no opencast project running in cluster XIII at present.

xiii.	**Thick green belt shall be developed along undisturbed areas, mine boundary and in mine reclamation. During post mining stage, a total of 91.75 ha would be reclaimed and afforested by planting native species in consultation with local DFO/Agriculture deptt. /Institutions with the relevant discipline. The density of the trees should be around 2500 plants per ha.**	It is being complied. Four Eco-restoration Sites of total area 8.4 Ha. (Site-A= 4.2 Ha. Site-B =1.5 Ha, Site-C =1.8 Ha and Site-D= 0.9 Ha) reclaimed area are developed and maintained at Murulidih (about 2500 plants per ha).
Ha	**The roads should be provided with avenue plantation on both sides as trees act as sink of carbon and other pollutant.**	Agreed. Being complied.
xv.	**Specific mitigative measures identified for the Jharia Coalfields in the Environmental Action Plan prepared for Dhanbad as a critically polluted are and relevant for Cluster XIII shall be implemented.**	Being Implemented.
xvi.	**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.**	**It is being complied.** Establishment of ambient environment quality monitoring stations has been finalized with the consultation of Jharkhand State Pollution Control Board. NEERI Nagpur was approached for conducting Source Apportionment Study BCCL for compliance of EC conditions. The proposal regarding Conducting the Source Apportionment Study has been submitted by NEERI. Work Order had already been issued to NEERI Nagpur on 12.05.2018. And work has been started in September 2018. Field data collection is scheduled in Summer 2019.
xvii.	**No ground water shall be used for mining activities. Additional water required, if any, shall be met from mine water or by recycling/ reused of the water from the existing activities and from rain water harvesting measures. The project authority shall meet water requirement of nearby village (s) in case the village wells go dry to dewatering of mine.**	Agreed. Being implemented.
xviii.	**Regular monitoring of groundwater level and quality of the study area shall be carried out by establishing a network of existing wells and**	It is being complied. CMPDI RI-II has prepared a report for Location and design of Piezometers. Ground water monitoring has been done.

	construction of new piezometers. The monitoring for quantity shall be dome 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.	
xix.	**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.**	Agreed. Being implemented. CMPDIL, Dhanbad is monitoring the same. **Annexure- III**
xx.	**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 effluent discharge into natural water course. However there is arrangement for treatment of effluent discharge to prescribed standards. There is neither Open Cast mine running nor CHP nor such workshop from where effluent discharge is found.
xxi.	**Regular monitoring of subsidence movement on the surface over and around the working area and impact natural drainage pattern, water bodies, vegetation, structure, roads and surroundings shall be continued till movement ceases completely. In case observation of any high rate of subsidence movement, appropriate effective corrective measure shall be taken to avoid loss of life and material. Cracks shall be effectively plugged with ballast and clayey soil /suitable material.**	Being implemented. Subsidence study is being conducted by ISM Dhanbad before the start of panel. Extraction done in Non-Effective Width Method so that there is no subsidence on the surface.
xxii.	**Sufficient coal pillars shall be left un extracted around the air shaft (within subsidence influence area) to protect from any damage from subsidence, if any.**	Being complied.
xxiii.	**High root density tree species shall be selected and planted over areas likely to be affected by subsidence.**	Plantation in BCCL is being done on 3-tier basis, in which both, Monocotyledonae (Monocots) such as grasses, bamboo etc and Dicotyledonae (Dicots) such as sheesham, mango etc are being planted for developing an extensive root system. The Monocots having fibrous root system helps in developing the root density at the topsoil level while, Dicots having the tap root system have a distributed root density in

		topsoil, subsoil and regolith layer of soil. These two root system together forms the high root density system.
Xxiv.	**Depression due to subsidence resulting in water accumulating within low lying areas shall be filled up or drained out by cutting drains.**	Complied.
Xxv.	**Solid barriers shall be left below the roads falling within the blocks to avoid any damage to the road.**	Already complied as per statute.
xxvi.	**No depillaring operation shall be carried out below the township/colony.**	Depillaring operation are being carried out after getting written permission from DGMS which is statutory binding.
xxvii.	**The transportation plan for conveyor – cum – rail for cluster XIII 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 transportation of coal during phase I should be by mechanically covered trucks.**	Will be Complied. Presently there is no producing mine under cluster-XIII.
xxviii.	**A study should be initiated to analyze extent of reduction in pollution load every year by reducing road transport.**	Pollution load study report for has been submitted by CMPDI. Presently there is no producing mine under cluster-XIII.
.xxix.	**R & R of 2187 nos. of PAF's involved. They should be rehabilitated at cost of Rs. 11199.89 lakhs as per the approved Jharia Action Plan.**	PAF's /PAP's involved is being rehabilitated as per cost specified as per Jharia Action Plan.

Xxx.	**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.**	Being Complied. Will be submitted.
.Xxxi.	**A detailed CSR action plan shall be prepared for cluster XIII 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 area within**	

	the cluster XIII ML that would be existing 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 communities . Third party evaluation shall be got carried out regularly for the proper implementation of activities under taken in the project area under CSR. Issue raised in the public hearing should 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 the 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.	Agreed. Being implemented.
xxxii.	**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.**	Time series map of vegetation cover in the Jharia Coal field has been carried out through CMPDI in the year 2014 and 2017 **(which is enclosed as Annexure- IV)**
xxxiii.	**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.**	Agreed .Eco-restoration sites (4 no. of total area 8.4 ha) using native species are maintained. Mine closer plan is approved for Murulidih 20/21 Pits Colliery.
xxxiv.	**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 Company for implementing environment policy and socio – economic issues and the capacity building required in this regard.**	A full-fledged Environment Department, headed by a HOD (Environment) along with a suitable qualified multidisciplinary team of executives which includes Environment, Mining & Excavation, has been established in Headquarters. They are also trained in ecological restoration, sustainable development, rainwater Harvesting methods etc. At the project level, one Executive in each area has also been nominated as Project Nodal Officer (Environment) and is 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 Headquarters 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. 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.
xxxv.	**Implementation of final mine closure plan for cluster XIII, subject to obtaining prior approval of the DGMS in regard to Mines Safety issues.**	Will be implemented.
Xxxvi.	**Corporate Environment Responsibility:**	Annexure- V
a)	**The Company shall have a well laid down Environment Policy approved by the Board of Directors.**	Agreed.
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.**	Already prescribed.
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.**	Already complied.
d)	**To have proper checks and balances, the company shall have a well laid down 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.**	Being followed.
Sl. No	**B. General Conditions Conditions by MOEF:**	**Compliance**
i.	**No change in mining technology and scope of working shall be made without prior approval of the Ministry of Environment and Forests.**	Being complied.
ii.	**No change in the calendar plan of production for quantum of mineral coal shall be made.**	Being Followed.

iii.	**Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for PM10, PM 2.5, SO 2 and NOx monitoring. Location of the stations shall be decided based on the meteorological data, topographical features 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.**	The locations of monitoring stations in the Jharia Coalfields has finalized in consultation with the Jharkhand State Pollution Control Board. The work of monitoring of ambient environment is being done through Central Mine Planning and Design Institute (CMPDI) having laboratory recognized under the EP Rules. Records for the same are maintained.
iv.	**Data on ambient air quality (PM 10, PM 2.5, SO 2 and NO x) 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.**	Being complied. Monitoring done by CMPDIL. **Enclosed as Annexure- III**
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.**	Being Complied.
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 work of monitoring of ambient environment done through Central Mine Planning and Design Institute RI-II (CMPDI), Dhanbad which is having laboratory recognized under the EP Rules. There is no effluent discharge from workshop no coal production from any mines of Cluster-XIII. However there is arrangement for treatment of effluent discharge to prescribed standards. There is neither Open Cast mine running nor CHP nor such workshop from where effluent discharge is found. Very small quantity of burnt oil is generated which is used to lubricate the machines.
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.**	Already Complied.
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,**	It is being complied. Monitoring is done by CMPDIL.

	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.	
ix.	**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.**	Being Complied. Vocational training Centers under Separate Human Resource Development Deptt. is Conducting regular training programme on these issues.
x.	**Occupational health surveillance program me 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 to outsourcing and the health and safety issues of the outsourced manpower should be addressed by the company while outsourcing**.	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) `s guideline.
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.**	A full-fledged Environment Department, headed by a HOD (Environment) along with a suitable qualified multidisciplinary team of executives which includes Environment, Mining, Excavation, have been established in Headquarters. They are also trained in ecological restoration, sustainable development, rainwater Harvesting methods etc. At the project level, one Executive in each area has also been nominated as Project Nodal Officer (Environment) and is 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 quarters 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. 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.
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.**	It is being initiated to comply the same. Agreed to report the same.

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 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.**	It has been complied.
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.**	Complied.
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, SO 2 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.

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 Office s of CPCB and the SPCB.**	Being complied.
xviii.	**The Regional Office of this 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.**	Agreed. Being and shall be complied.
xix.	**The Environmental statement for each financial year ending 31 March in For –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.**	Being complied. Agreed.
7	**The Ministry or any other competent authority may stipulate any further condition(s) for environmental protection.**	Agreed
8	**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

9	**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 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.**	Agreed
10	**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

30.05.2019

Project officer,
Lohapatti colliery / 20/21 pits Murulidih colliery

Project Officer
Mohuda Group Office
B.C C.L

ANNEXURE- I

A. Production from Oct'18 to March'19 of Cluster XIII mines

Total Month		Oct '18	Nov'18	Dec'18	Jan'19	Feb'19	March'19	(Million ton)
Cluster XIII	Murulidih 20/21 pits	0	0	0	0	0	0	0
	Bhurungiya colliery	Nil						Nil
	Muchraidih colliery							
	Hantoodih Colliery							
	Padugora colliery							
	Murulidih colliery							
	Bhatdee colliery							
	Total (in Million ton)							0
	Remarks: - Murulidih 20/21 pits colliery temporarily closed for production from December-2015.							

ANNEXURE- II

भारत कोकिंग कोल लिमिटेड
एक मिनीरत्न कंपनी
(कोल इंडिया लिमिटेड का एक अंग)
पंजीक्रत कार्यालय कोयला भवन ,कोयला नगर ,
(धनबाद)झारखंड826005(
CIN:U10101JH1972GOI000918
Tele: 0326 2230174 FAX: 0326 2230176
ईमेल :cgmsafety@bccl.gov.in

Bharat Coking Coal Limited
A Miniratna Company
(A subsidiary of Coal India Ltd)
Office of GM I/C(S&R)
Koyla Bhawan, Koyla Nagar,
Dhanbad, Jharkhand-826005
CIN:U10101JH1972GOI000918
Tele: 0326 2230174 FAX: 0326 2230176 Email: cgmsafety@bccl.gov.in

पत्र संख्या भाकोकोलि/उप महाप्रबंधक(एस&आर)I/C/संचिका-MP/17 323 दिनांक-:07.04.2017

To,
Dr, Vinod Kumar,
Group Head, Geosciences group
National Remote Sensing Center
India Space Research Organization
Dept of Space, Govt of India,
Balanagar, Hyderabad - 500037

Sub:- Work –Order for " Delineation of Surface Coal Fire and associated Land Subsidence in Jharia Coalfield, Jharkhand using satellite based remote – sensing techniques"

Dear Sir,

Consequent upon competent approval of proposal on aforesaid subject and subsequent signing o MOU between BCCL and NRSC, the aforesaid work is awarded to NRSC for Rs.18,10500/- (Eighteen lac ten thousand five hundred) only, against 100% payment in advance subject to terms and conditions listed in MOU. As per agreed payment terms and Demand Note No. 07/2016-17,

You are therefore requested to initiate all necessary activities for commencing the subject work as early as possible.

Thanking you,

Yours faithfully,

7/4/17

General Manager I/C (S & R)

Cc to :
1. Director (T) P&P, BCCL- for kind information.
2. TS to CMD, BCCL – for kind information.
3. Sri Mithilesh Kumar, Sr.Mgr.(M),Safety.Deptt., KoylaBhawan

ANNEXURE - III

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

(FOR THE MONTH OCTOBER, 2018)

E. C. no. J-11015/11/2010-IA.II (M) dated 06.06.2013.

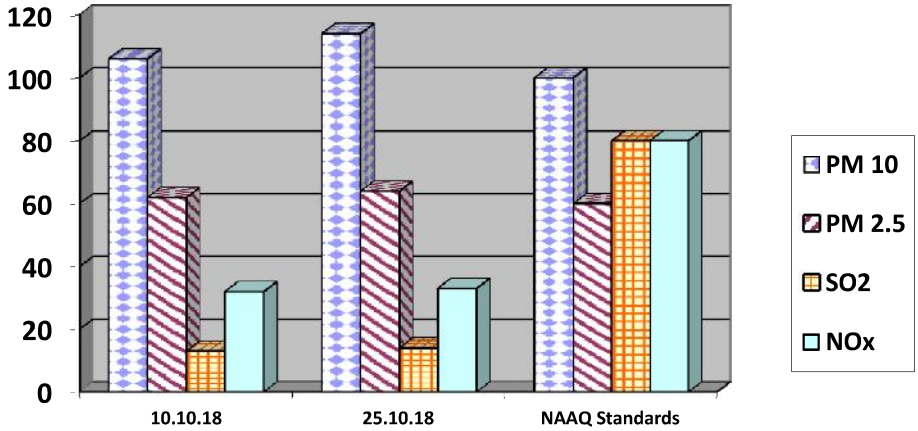
CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

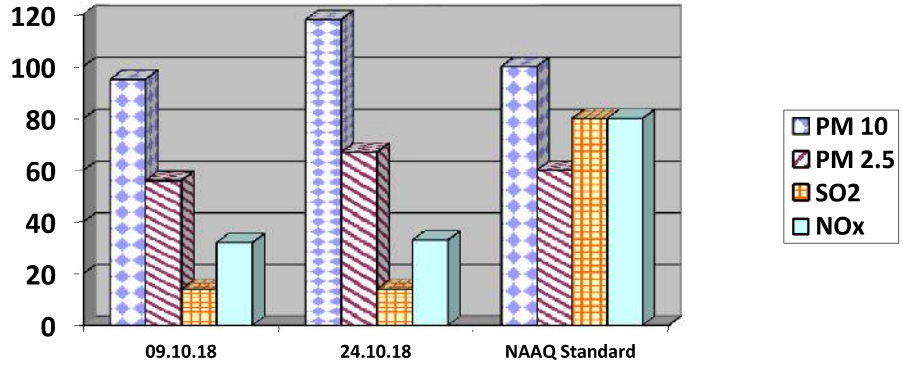
AMBIENT AIR QUALITY DATA

Cluster –XIII,Bharat Coking Coal limited Month: **OCT ,2018** Year : **2018-19.**

Station Name: A19 – Murlidih 20/21		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	10.10.18	106	62	13	32
2	25.10.18	114	64	14	33
	NAAQ Standards	100	60	80	80



Station Name: A20, Lohapatti		Zone: Buffer		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO_2**	**NO_x**
1	09.10.18	95	56	14	32
2	24.10.18	118	67	14	33
	NAAQ Standard	100	60	80	80

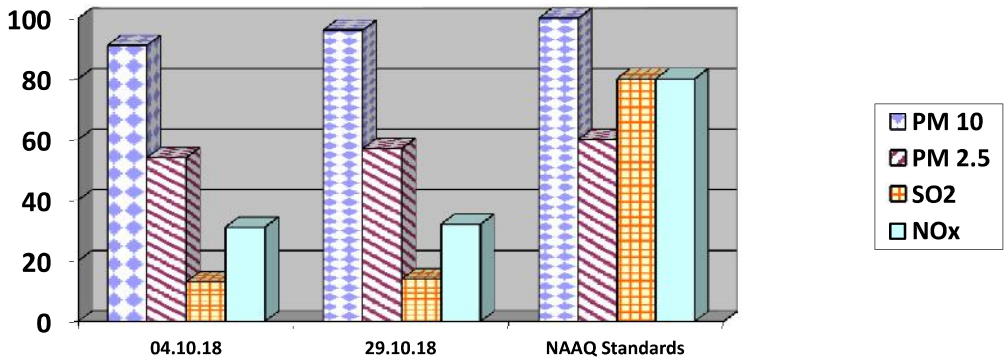


Analysed By
JSA/SA/SSA

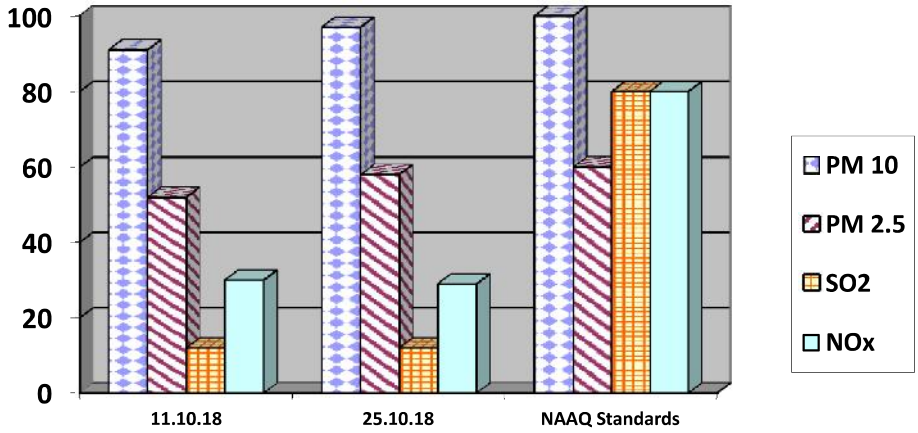
Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

Station Name: A21 Kharkharee		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	04.10.18	91	54	13	31
2	29.10.18	96	57	14	32
	NAAQ Standards	100	60	80	80



Station Name: A31 Dumarda		Zone: Buffer		Category: Residential	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	11.10.18	91	52	12	30
2	25.10.18	97	58	12	29
	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(Mining/Environment)
RI-2, CMPDI, Dhanbad

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) **Mine Discharge of Murlidih 20/21 (MW13)**

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

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 -XIII**		Month: **OCT, 2018**	Name of the Station: **Mine Discharge of Murlidih 20/21**	
Sl. No.	**Parameters**	**MW13** First Fortnight	**MW13** Second Fortnight	**As per MOEF General Standards for schedule VI**
		10-10-2018	26-10-2018	
1	Total Suspended Solids	26	28	*100 (Max)*
2	pH	8.01	8.03	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	44	56	*250 (Max)*

All values are expressed in mg/lit unless specified.

Analysed By
JSA/SA/SSA

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

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

i) **Murlidih (N19)**
ii) **Lohapatti (N20)**
iii) **Kharkharee CISF Office (N21)**
iv) **Dumarda (N31)**

4.2 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).

4.3 Results & Interpretations

Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEFCC. 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 -XIII**			Month: **OCT, 2018**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Murlidih 20/21 (N 19)**	**Industrial area**	10.10.18	58.4	*75*
2	**Murlidih 20/21**	**Industrial area**	25.10.18	59.3	*75*
3	**Lohapatti (N20)**	**Industrial area**	09.10.18	59.1	*75*
4	**Lohapatti**	**Industrial area**	24.10.18	57.3	*75*
5	**Kharkharee (N21)**	**Industrial area**	04.10.18	51.6	*75*
6	**Kharkharee**	**Industrial area**	29.10.18	52.4	*75*
7	**Dumarda (N31)**	**Residential area**	11.10.18	49.2	*55*
8	**Dumarda**	**Residential area**	25.10.18	50.8	*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(Mining/Environment)
RI-2, CMPDI, Dhanbad

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

(FOR THE MONTH NOVEMBER, 2018)

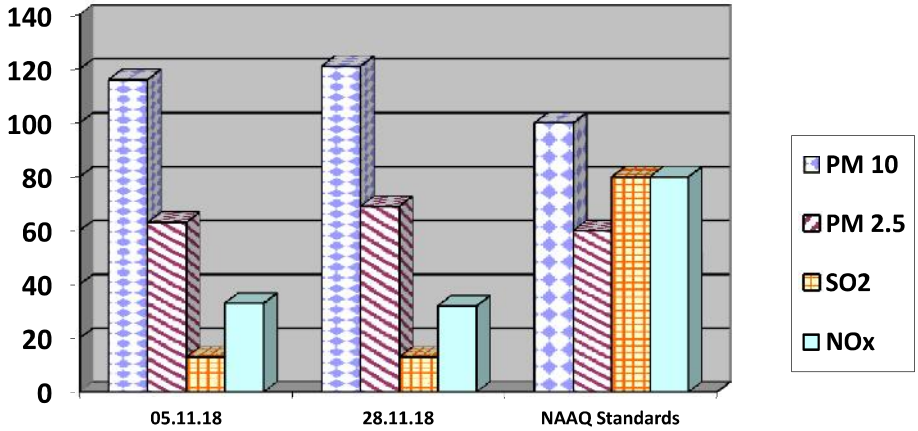
E. C. no. J-11015/11/2010-IA.II (M) dated 06.06.2013.

CMPDI
ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

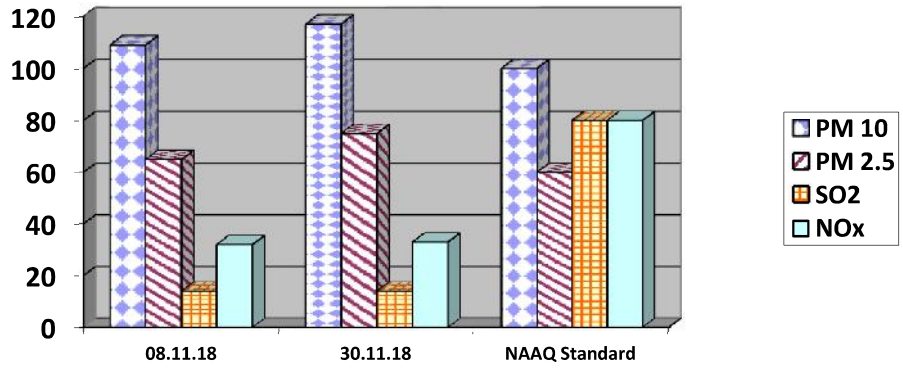
AMBIENT AIR QUALITY DATA

Cluster –XIII,Bharat Coking Coal limited Month: **NOV ,2018** Year : **2018-19.**

Station Name: A19 – Murlidih 20/21		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	05.11.18	116	63	13	33
2	28.11.18	121	69	13	32
	NAAQ Standards	100	60	80	80



Station Name: A20, Lohapatti		Zone: Buffer		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO_2**	**NO_x**
1	08.11.18	109	65	14	32
2	30.11.18	117	75	14	33
	NAAQ Standard	100	60	80	80

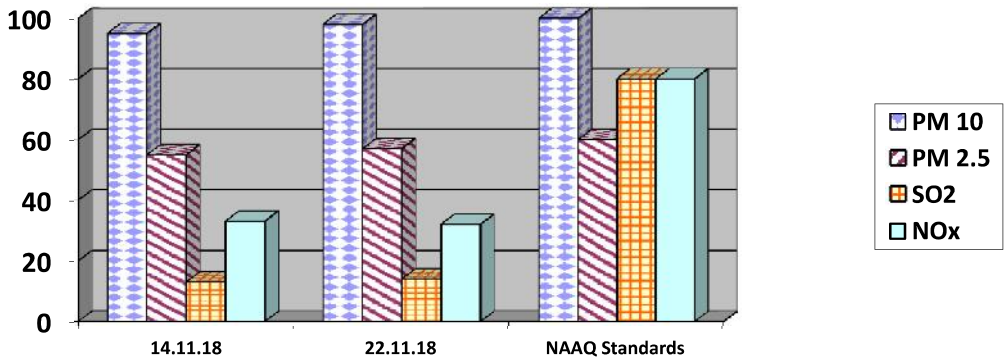


Analysed By
JSA/SA/SSA

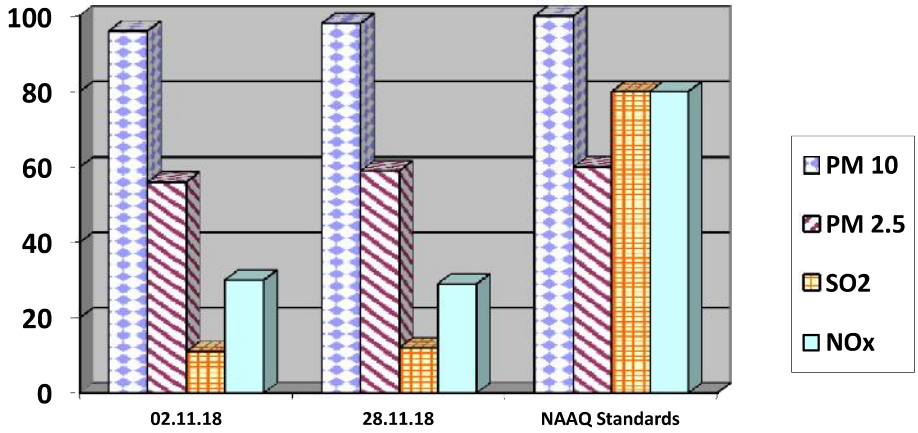
Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

Station Name: A21 Kharkharee		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	14.11.18	95	55	13	33
2	22.11.18	98	57	14	32
	NAAQ Standards	100	60	80	80



Station Name: A31 Dumarda		Zone: Buffer		Category: Residential	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	02.11.18	96	56	11	30
2	28.11.18	98	59	12	29
	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(Mining/Environment)
RI-2, CMPDI, Dhanbad

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) **Mine Discharge of Murlidih 20/21 (MW13)**

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

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 -XIII**		Month: **NOV, 2018**	Name of the Station: **Mine Discharge of Murlidih 20/21**	
Sl. No.	**Parameters**	**MW13** First Fortnight	**MW13** Second Fortnight	**As per MOEF General Standards for schedule VI**
		06/11/2018	28/11/2018	
1	Total Suspended Solids	20	26	*100 (Max)*
2	pH	8.55	7.5	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	48	52	*250 (Max)*

All values are expressed in mg/lit unless specified.

Analysed By
JSA/SA/SSA

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

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

i) **Murlidih (N19)**
ii) **Lohapatti (N20)**
iii) **Kharkharee CISF Office (N21)**
iv) **Dumarda (N31)**

4.2 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).

4.3 Results & Interpretations

Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEFCC. 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 -XIII**			Month: **NOV, 2018**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Murlidih 20/21 (N 19)**	**Industrial area**	05.11.18	52.3	*75*
2	**Murlidih 20/21**	**Industrial area**	28.11.18	57.9	*75*
3	**Lohapatti (N20)**	**Industrial area**	08.11.18	60.2	*75*
4	**Lohapatti**	**Industrial area**	30.11.18	59.1	*75*
5	**Kharkharee (N21)**	**Industrial area**	14.11.18	50.7	*75*
6	**Kharkharee**	**Industrial area**	22.11.18	51.5	*75*
7	**Dumarda (N31)**	**Residential area**	02.11.18	50.8	*55*
8	**Dumarda**	**Residential area**	28.11.18	48.8	*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(Mining/Environment)
RI-2, CMPDI, Dhanbad

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

(FOR THE MONTH DECEMBER, 2018)

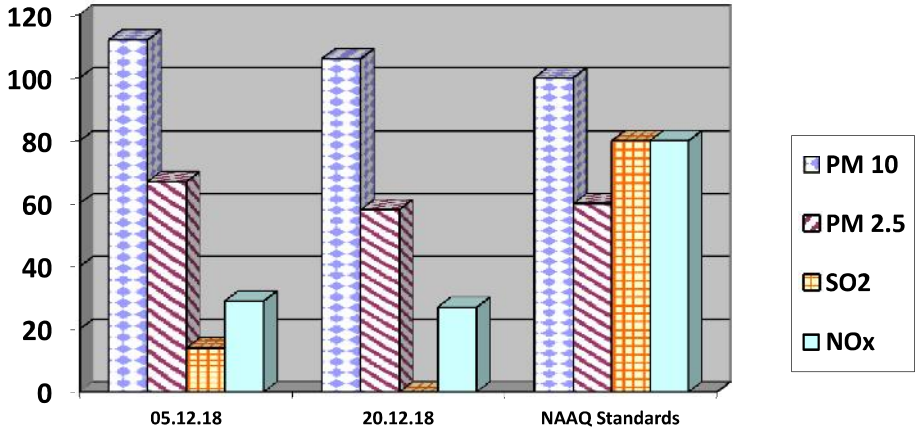
E. C. no. J-11015/11/2010-IA.II (M) dated 06.06.2013.

CMPDI
ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

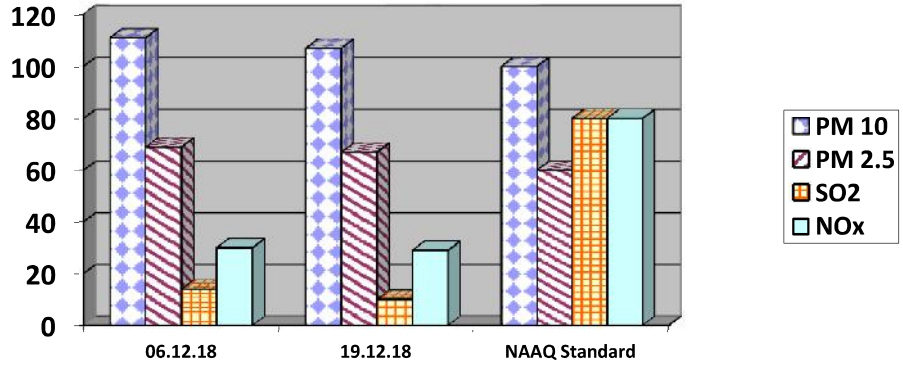
AMBIENT AIR QUALITY DATA

Cluster –XIII,Bharat Coking Coal limited Month: **DEC ,2018** Year : **2018-19.**

Station Name: A19 – Murlidih 20/21		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	05.12.18	112	67	14	29
2	20.12.18	106	58	<10	27
	NAAQ Standards	100	60	80	80



Station Name: A20, Lohapatti		Zone: Buffer		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO_2**	**NO_x**
1	06.12.18	111	69	14	30
2	19.12.18	107	67	10	29
	NAAQ Standard	100	60	80	80

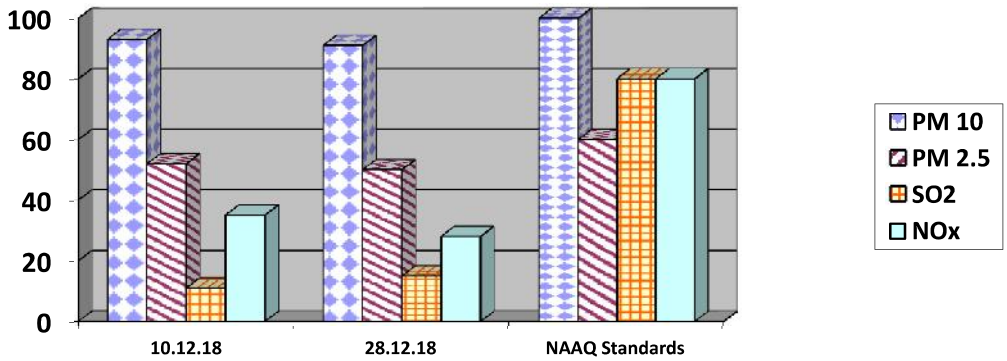


Analysed By
JSA/SA/SSA

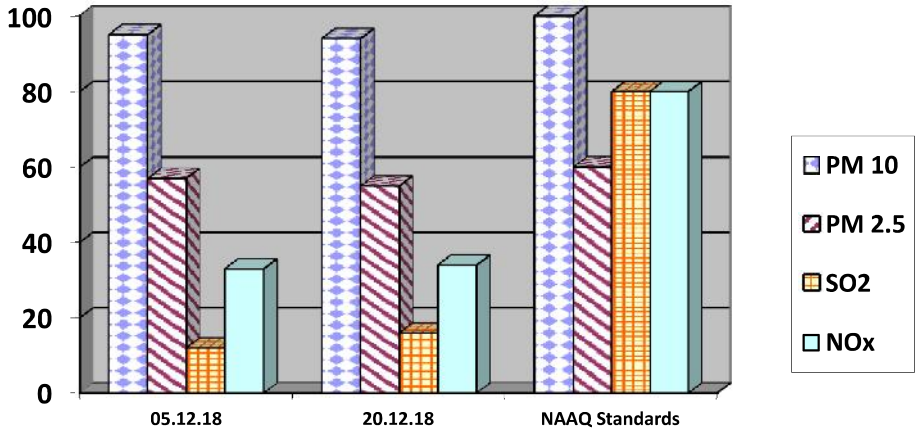
Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

Station Name: A21 Kharkharee		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	10.12.18	93	52	11	35
2	28.12.18	91	50	15	28
	NAAQ Standards	100	60	80	80



Station Name: A31 Dumarda		Zone: Buffer		Category: Residential	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	05.12.18	95	57	12	33
2	20.12.18	94	55	16	34
	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(Mining/Environment)
RI-2, CMPDI, Dhanbad

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) **Mine Discharge of Murlidih 20/21 (MW13)**

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

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 -XIII**		Month: **DEC, 2018**	Name of the Station: **Mine Discharge of Murlidih 20/21**	
Sl. No.	**Parameters**	**MW13** First Fortnight	**MW13** Second Fortnight	**As per MOEF General Standards for schedule VI**
		06.12.18	21.12.18	
1	Total Suspended Solids	26	22	*100 (Max)*
2	pH	8.41	7.48	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	44	48	*250 (Max)*

All values are expressed in mg/lit unless specified.

Analysed By
JSA/SA/SSA

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

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

i) **Murlidih (N19)**
ii) **Lohapatti (N20)**
iii) **Kharkharee CISF Office (N21)**
iv) **Dumarda (N31)**

4.2 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).

4.3 Results & Interpretations

Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEFCC. 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 -XIII**			Month: **DEC, 2018**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Murlidih 20/21 (N 19)**	**Industrial area**	05.12.18	54.3	*75*
2	**Murlidih 20/21**	**Industrial area**	20.12.18	56.2	*75*
3	**Lohapatti (N20)**	**Industrial area**	06.12.18	59.2	*75*
4	**Lohapatti**	**Industrial area**	19.12.18	61.7	*75*
5	**Kharkharee (N21)**	**Industrial area**	10.12.18	51.7	*75*
6	**Kharkharee**	**Industrial area**	28.12.18	53.1	*75*
7	**Dumarda (N31)**	**Residential area**	05.12.18	51.82	*55*
8	**Dumarda**	**Residential area**	20.12.18	49.7	*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(Mining/Environment)
RI-2, CMPDI, Dhanbad

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

(FOR THE MONTH JANUARY, 2019)

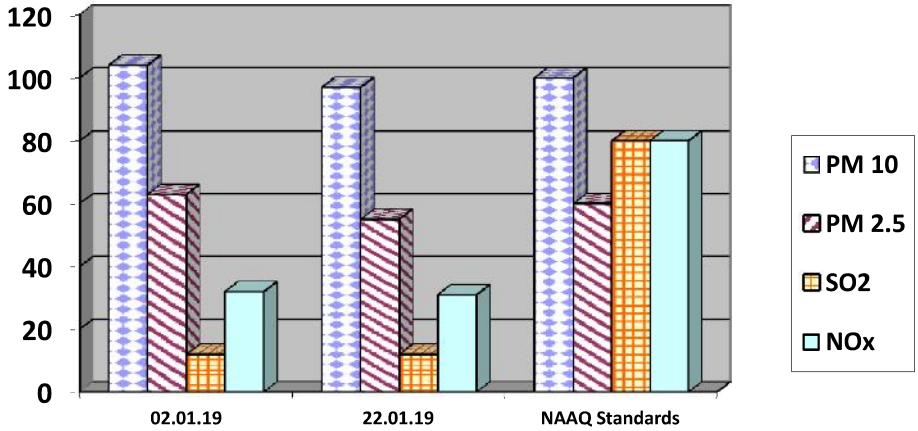
E. C. no. J-11015/11/2010-IA.II (M) dated 06.06.2013.

CMPDI
ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

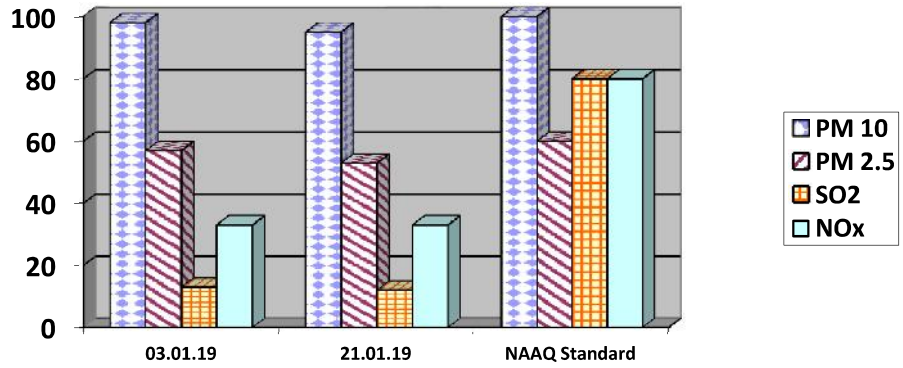
AMBIENT AIR QUALITY DATA

Cluster –XIII,Bharat Coking Coal limited Month: **JAN,2019** Year : **2018-19.**

Station Name: A19 – Murlidih 20/21		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	02.01.19	104	63	12	32
2	22.01.19	97	55	12	31
	NAAQ Standards	100	60	80	80



Station Name: A20, Lohapatti		Zone: Buffer		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO_2**	**NO_x**
1	03.01.19	98	57	13	33
2	21.01.19	95	53	12	33
	NAAQ Standard	100	60	80	80

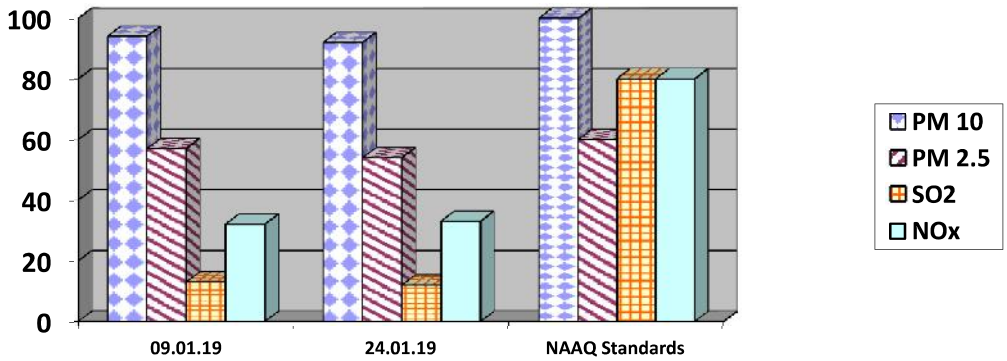


Analysed By
JSA/SA/SSA

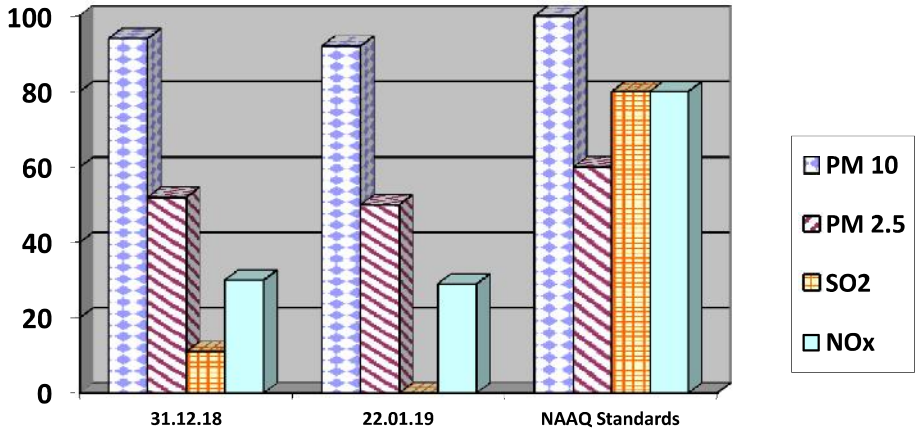
Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

Station Name: A21 Kharkharee		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	09.01.19	94	57	13	32
2	24.01.19	92	54	12	33
	NAAQ Standards	100	60	80	80



Station Name: A31 Dumarda		Zone: Buffer		Category: Residential	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	31.12.18	94	52	11	30
2	22.01.19	92	50	<10	29
	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(Mining/Environment)
RI-2, CMPDI, Dhanbad

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) **Mine Discharge of Murlidih 20/21 (MW13)**

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

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 -XIII**		Month: **JAN, 2019**	Name of the Station: **Mine Discharge of Murlidih 20/21**	
Sl. No.	**Parameters**	**MW13** First Fortnight	**MW13** Second Fortnight	**As per MOEF General Standards for schedule VI**
		02.01.19	23.01.19	
1	Total Suspended Solids	26	20	*100 (Max)*
2	pH	7.94	7.99	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	40	36	*250 (Max)*

All values are expressed in mg/lit unless specified.

Analysed By
JSA/SA/SSA

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

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

i) **Murlidih (N19)**
ii) **Lohapatti (N20)**
iii) **Kharkharee CISF Office (N21)**
iv) **Dumarda (N31)**

4.2 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).

4.3 Results & Interpretations

Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEFCC. 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 -XIII**			Month: **JAN, 2019**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	**Murlidih 20/21 (N 19)**	**Industrial area**	02.01.19	54.9	*75*
2	**Murlidih 20/21**	**Industrial area**	22.01.19	58.2	*75*
3	**Lohapatti (N20)**	**Industrial area**	03.01.19	60.1	*75*
4	**Lohapatti**	**Industrial area**	21.01.19	62.3	*75*
5	**Kharkharee (N21)**	**Industrial area**	09.01.19	59.7	*75*
6	**Kharkharee**	**Industrial area**	24.01.19	51.8	*75*
7	**Dumarda (N31)**	**Residential area**	31.12.18	54.6	*55*
8	**Dumarda**	**Residential area**	22.01.19	50.7	*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(Mining/Environment)
RI-2, CMPDI, Dhanbad

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

(FOR THE MONTH FEBRUARY, 2019)

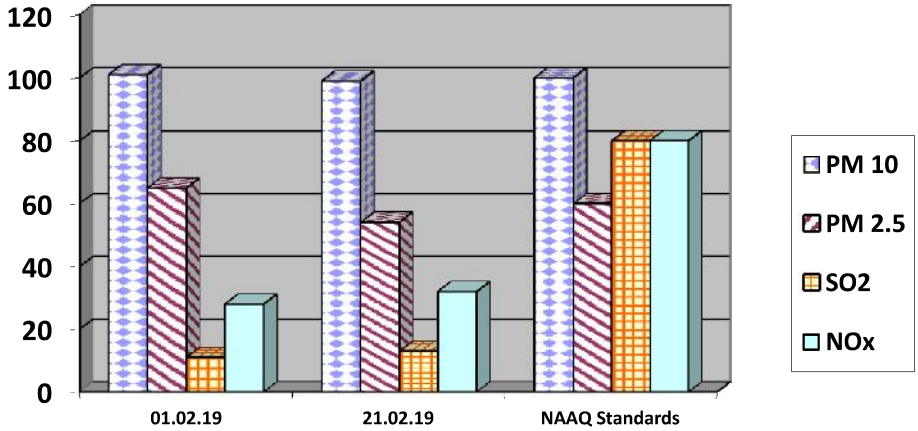
E. C. no. J-11015/11/2010-IA.II (M) dated 06.06.2013.

CMPDI
ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

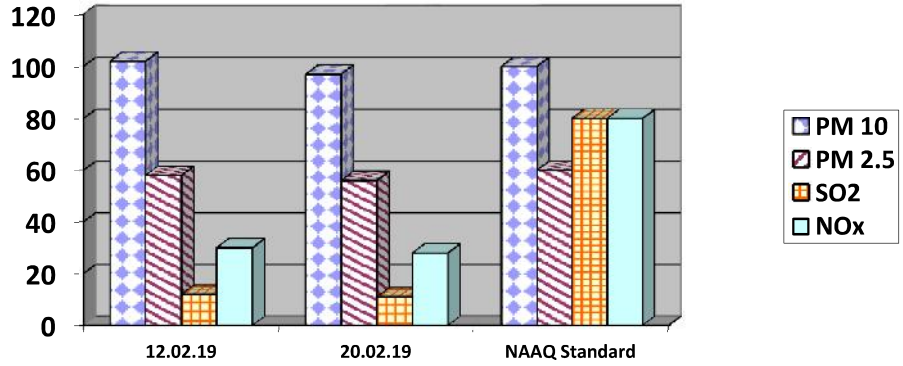
AMBIENT AIR QUALITY DATA

Cluster –XIII,Bharat Coking Coal limited Month: **FEB,2019** Year : **2018-19.**

Station Name: A19 – Murlidih 20/21		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	01.02.19	101	65	11	28
2	21.02.19	99	54	13	32
	NAAQ Standards	100	60	80	80



Station Name: A20, Lohapatti		Zone: Buffer		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO_2**	**NO_x**
1	12.02.19	102	58	12	30
2	20.02.19	97	56	11	28
	NAAQ Standard	100	60	80	80

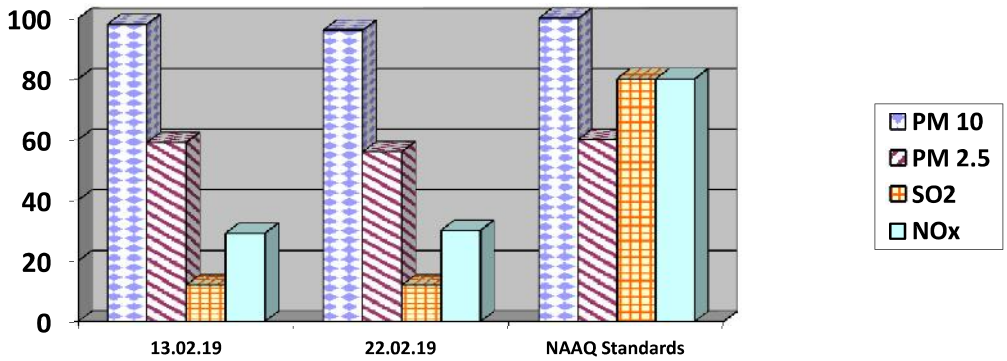


Analysed By
JSA/SA/SSA

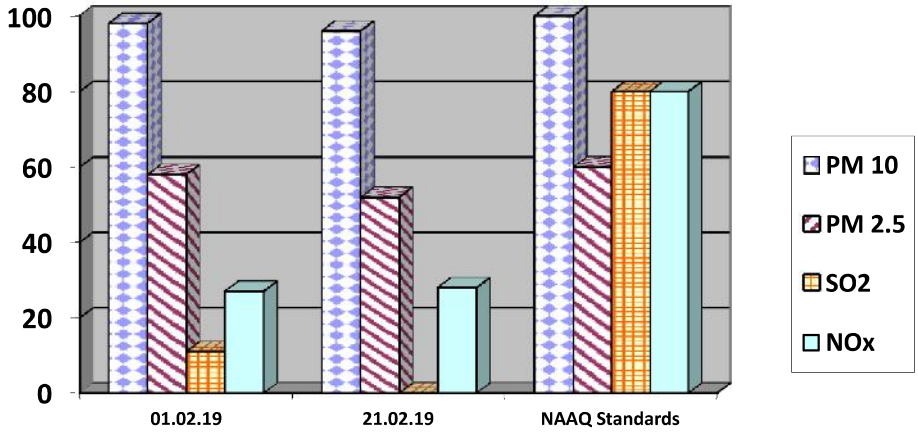
Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

Station Name: A21 Kharkharee		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	13.02.19	98	59	12	29
2	22.02.19	96	56	12	30
	NAAQ Standards	100	60	80	80



Station Name: A31 Dumarda		Zone: Buffer		Category: Residential	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	01.02.19	98	58	11	27
2	21.02.19	96	52	<10	28
	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(Mining/Environment)
RI-2, CMPDI, Dhanbad

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) **Mine Discharge of Murlidih 20/21 (MW13)**

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

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 -XIII**		Month: **FEB, 2019**	Name of the Station: **Mine Discharge of Murlidih 20/21**	
Sl. No.	**Parameters**	**MW13** First Fortnight	**MW13** Second Fortnight	**As per MOEF General Standards for schedule VI**
		1ST	**2ND**	
1	Total Suspended Solids	**02-02-2019**	**22-02-2019**	*100 (Max)*
2	pH	34	28	*5.5 - 9.0*
3	Oil & Grease	7.84	8.03	*10 (Max)*
4	COD	<2.0	<2.0	*250 (Max)*

All values are expressed in mg/lit unless specified.

Analysed By
JSA/SA/SSA

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

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

i) **Murlidih (N19)**
ii) **Lohapatti (N20)**
iii) **Kharkharee CISF Office (N21)**
iv) **Dumarda (N31)**

4.2 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).

4.3 Results & Interpretations

Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEFCC. 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 -XIII**			Month: **FEB, 2019**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	Murlidih 20/21 (N 19)	Industrial area	01.02.19	56.2	*75*
2	Murlidih 20/21	Industrial area	21.02.19	56.7	*75*
3	Lohapatti (N20)	Industrial area	12.02.19	63.2	*75*
4	Lohapatti	Industrial area	20.02.19	61.9	*75*
5	Kharkharee (N21)	Industrial area	13.02.19	50.2	*75*
6	Kharkharee	Industrial area	22.02.19	53.2	*75*
7	Dumarda (N31)	Residential area	01.02.19	49.2	*55*
8	Dumarda	Residential area	21.02.19	48.4	*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(Mining/Environment)
RI-2, CMPDI, Dhanbad

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

(FOR THE MONTH MARCH, 2019)

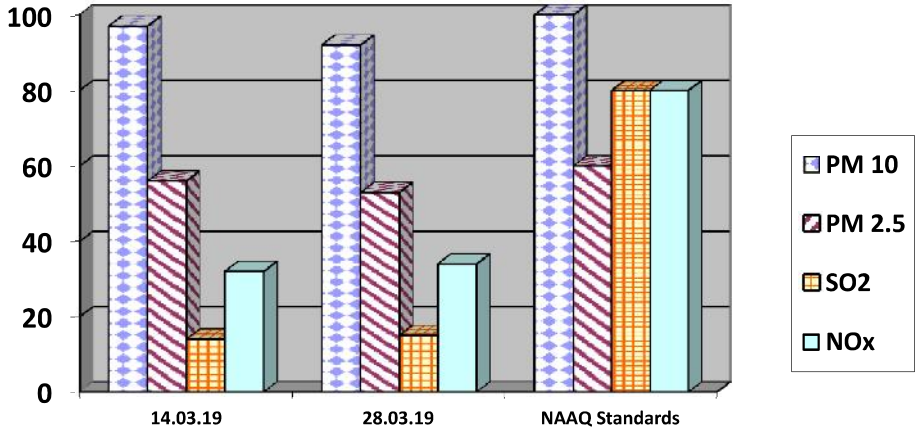
E. C. no. J-11015/11/2010-IA.II (M) dated 06.06.2013.

CMPDI
ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

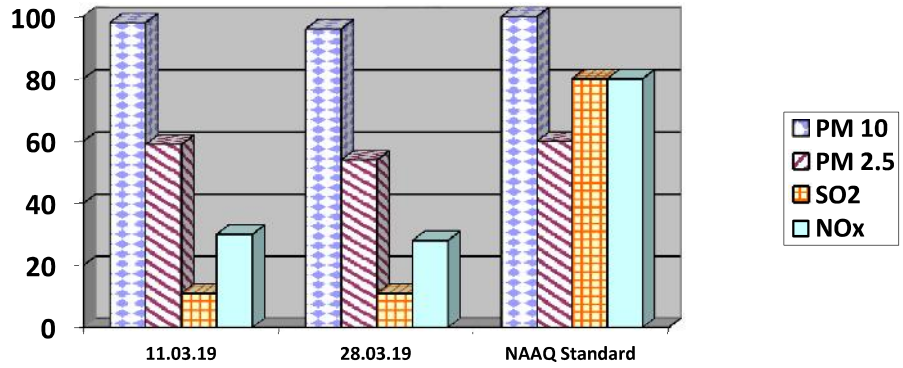
AMBIENT AIR QUALITY DATA

Cluster –XIII,Bharat Coking Coal limited Month: **MARCH ,2019** Year : **2018-19.**

Station Name: A19 – Murlidih 20/21		Zone: Core		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO2**	**NOx**
1	14.03.19	97	56	14	32
2	28.03.19	92	53	15	34
	NAAQ Standards	100	60	80	80



Station Name: A20, Lohapatti		Zone: Buffer		Category: Industrial	
Sl. No.	**Dates of sampling**	**PM 10**	**PM 2.5**	**SO_2**	**NO_x**
1	11.03.19	98	59	11	30
2	28.03.19	96	54	11	28
	NAAQ Standard	100	60	80	80

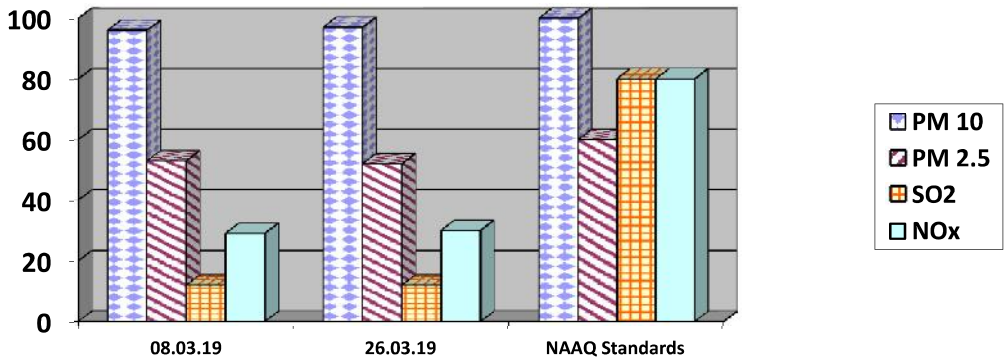


Analysed By
JSA/SA/SSA

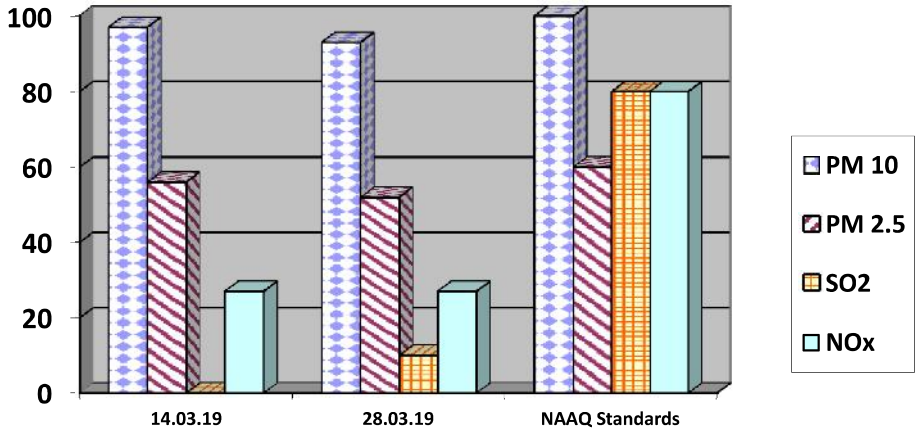
Checked By
Lab In Charge
RI-2, CMPDI, Dhanbad

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

Station Name: A21 Kharkharee		Zone: Buffer		Category: Industrial	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	08.03.19	96	53	12	29
2	26.03.19	97	52	12	30
	NAAQ Standards	100	60	80	80



Station Name: A31 Dumarda		Zone: Buffer		Category: Residential	
Sl. No.	Dates of sampling	PM 10	PM 2.5	SO2	NOx
1	14.03.19	97	56	<10	27
2	28.03.19	93	52	10	27
	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(Mining/Environment)
RI-2, CMPDI, Dhanbad

WATER QUALITY MONITORING

3.1 Location of sampling sites

(Refer **Plate No. – II**)

i) **Mine Discharge of Murlidih 20/21 (MW13)**

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

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 -XIII**		Month: **MARCH, 2019**	Name of the Station: **Mine Discharge of Murlidih 20/21**	
Sl. No.	**Parameters**	**MW13** First Fortnight	**MW13** Second Fortnight	**As per MOEF General Standards for schedule VI**
		13.03.19	**27.03.19**	
1	Total Suspended Solids	24	34	*100 (Max)*
2	pH	8.07	8.18	*5.5 - 9.0*
3	Oil & Grease	<2.0	<2.0	*10 (Max)*
4	COD	28	20	*250 (Max)*

All values are expressed in mg/lit unless specified.

Analysed By
JSA/SA/SSA

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

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

NOISE LEVEL QUALITY MONITORING

4.1 Location of sampling sites

i) **Murlidih (N19)**
ii) **Lohapatti (N20)**
iii) **Kharkharee CISF Office (N21)**
iv) **Dumarda (N31)**

4.2 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).

4.3 Results & Interpretations

Ambient noise levels were recorded during day time and the observed values were compared with standards prescribed by MoEFCC. 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 -XIII**			Month: **MARCH , 2019**		
Sl. No.	**Station Name/Code**	**Category of area**	**Date**	**Noise level dB(A)LEQ**	***Permissible Limit of Noise level in dB(A)***
1	Murlidih 20/21 (N 19)	Industrial area	14.03.19	52.4	*75*
2	Murlidih 20/21	Industrial area	28.03.19	58.3	*75*
3	Lohapatti (N20)	Industrial area	11.03.19	60.1	*75*
4	Lohapatti	Industrial area	28.03.19	63.7	*75*
5	Kharkharee (N21)	Industrial area	08.03.19	53.4	*75*
6	Kharkharee	Industrial area	26.03.19	55.6	*75*
7	Dumarda (N31)	Residential area	14.03.19	50.5	*55*
8	Dumarda	Residential area	28.03.19	46.9	*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,**

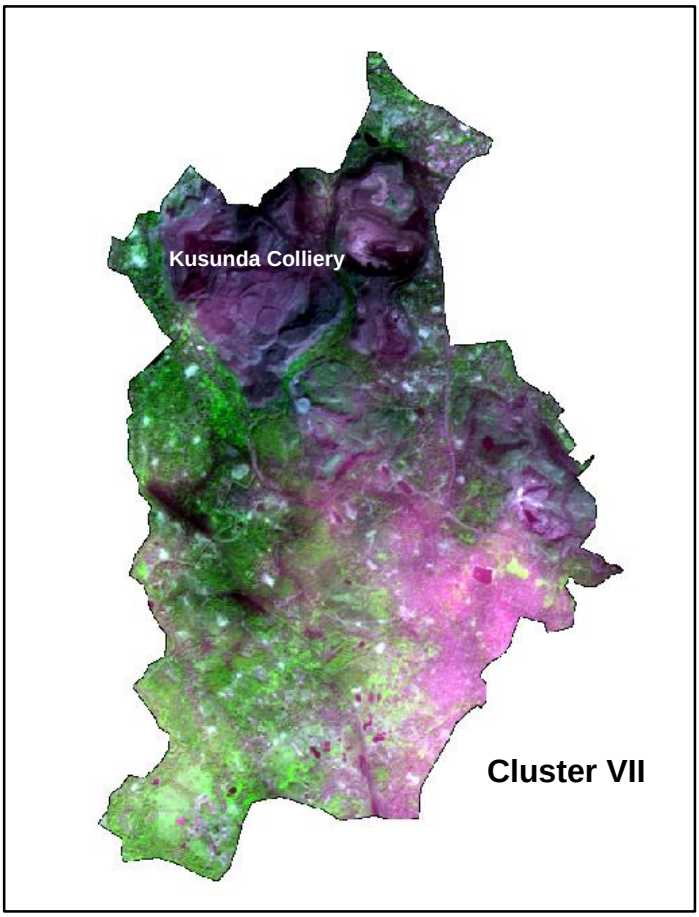
Analysed By
JSA/SA/SSA

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

Approved By
HOD(Mining/Environment)
RI-2, CMPDI, Dhanbad

ANNEXURE - IV

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

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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””.

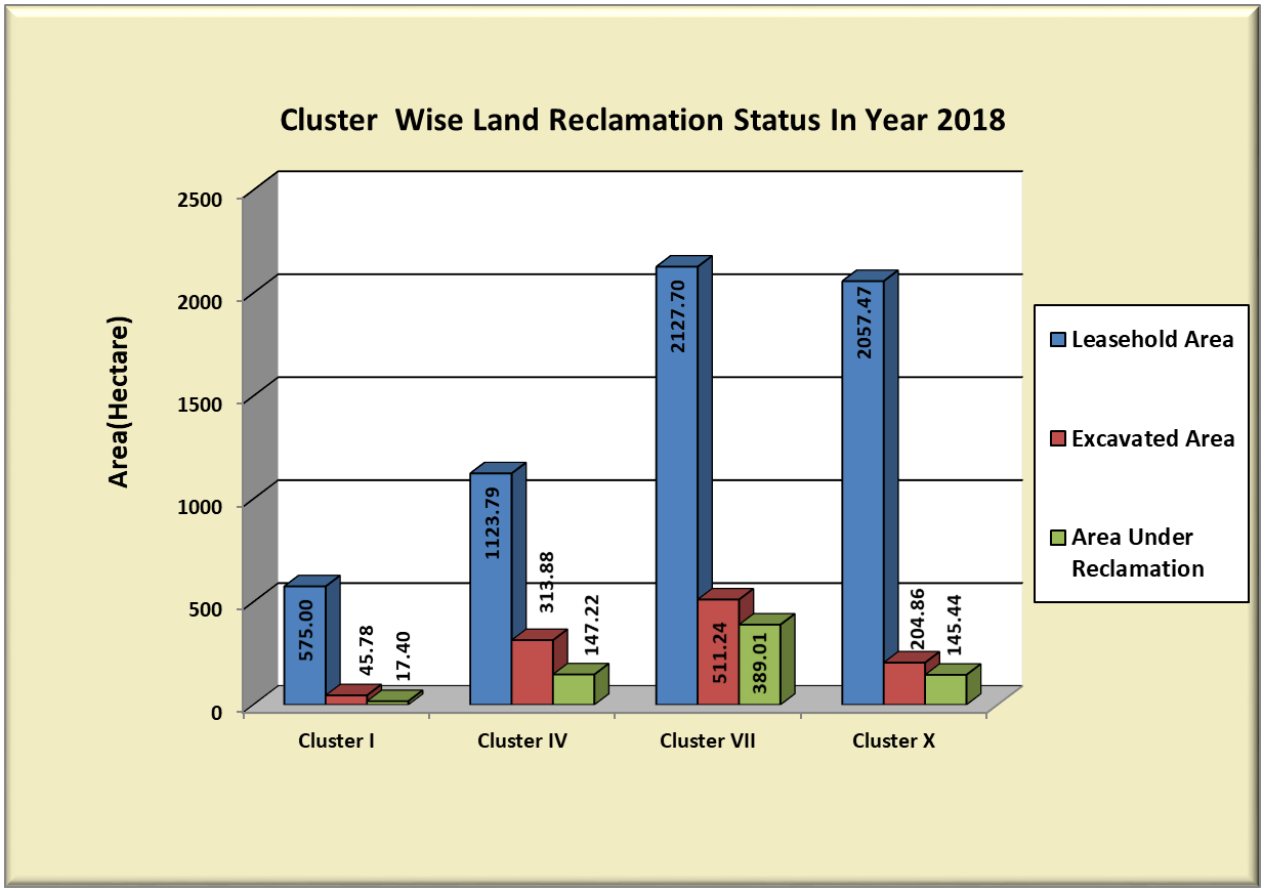


Fig. 1: Cluster wise Land Reclamation Status-2018 (BCCL)

1. Background

1.1 Land is the most important natural resource which embodies soil, water, flora, fauna and total ecosystem. All human activities are based on the land which is the scarcest natural resource in our country. Mining is a site specific industry and it could not be shifted anywhere else from the location where mineral occurs. It is a fact that surface mining activities do affect the land environment due to ground breaking. Therefore, there is an urgent need to reclaim and restore the mined out land for its productive use for sustainable development of mining. This will not only mitigate environmental degradation, but would also help in creating a more congenial environment for land acquisition by coal companies in future.

1.2 Keeping above in view, Coal India Ltd. (CIL) issued a work order vide letter no. CIL/WBP/ENV/2017/DP/8391 dated 22.06.2017 to Central Mine Planning & Design Institute (CMPDI), Ranchi, for monitoring of clusters with coal mines (both underground and open cast projects) having less than 5 million m^3 per annum capacity (Coal +OB) at an interval of three years based on remote sensing satellite data for sustainable development of mining. Earlier, CMPDI used to carry out land reclamation monitoring for individual projects of less than 5 million capacity, but from 2018 the same will be carried out cluster wise for mines of ECL & BCCL. For operational reasons and convenience, underground and opencast mines (often with multiple overlapping seams), have now been clustered together. The result of land reclamation status of all such mines are hosted on the website of CIL, (www.coalindia.in), CMPDI (www.cmpdi.co.in) and the concerned coal companies in public domain. Detailed report is submitted to Coal India and respective subsidiaries.

1.3 Land reclamation monitoring of all cluster coal mining projects would also comply the statutory requirements of Ministry of Environment & Forest (MoEF). Such monitoring would not only facilitate in taking timely mitigation measures against environmental degradation, but would also enable coal companies to utilize the reclaimed land for larger socio-economic benefits in a planned way.

1.4 Present report is embodying the finding of the study based on satellite data of the year 2018 carried out for four clusters of mines comprising both underground and OC projects for Bharat Coking Coal Ltd.

2. Objective

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

3. Methodology

There are number of steps involved between raw satellite data procurement and preparation of final map. National Remote Sensing Centre (NRSC) Hyderabad, being the nodal agency for satellite data supply in India, provides only raw digital satellite data, which needs further digital image processing for extracting the information and map preparation before uploading the same in the website. Methodology for land reclamation monitoring is given in fig 2. Following steps are involved in land reclamation /restoration monitoring:

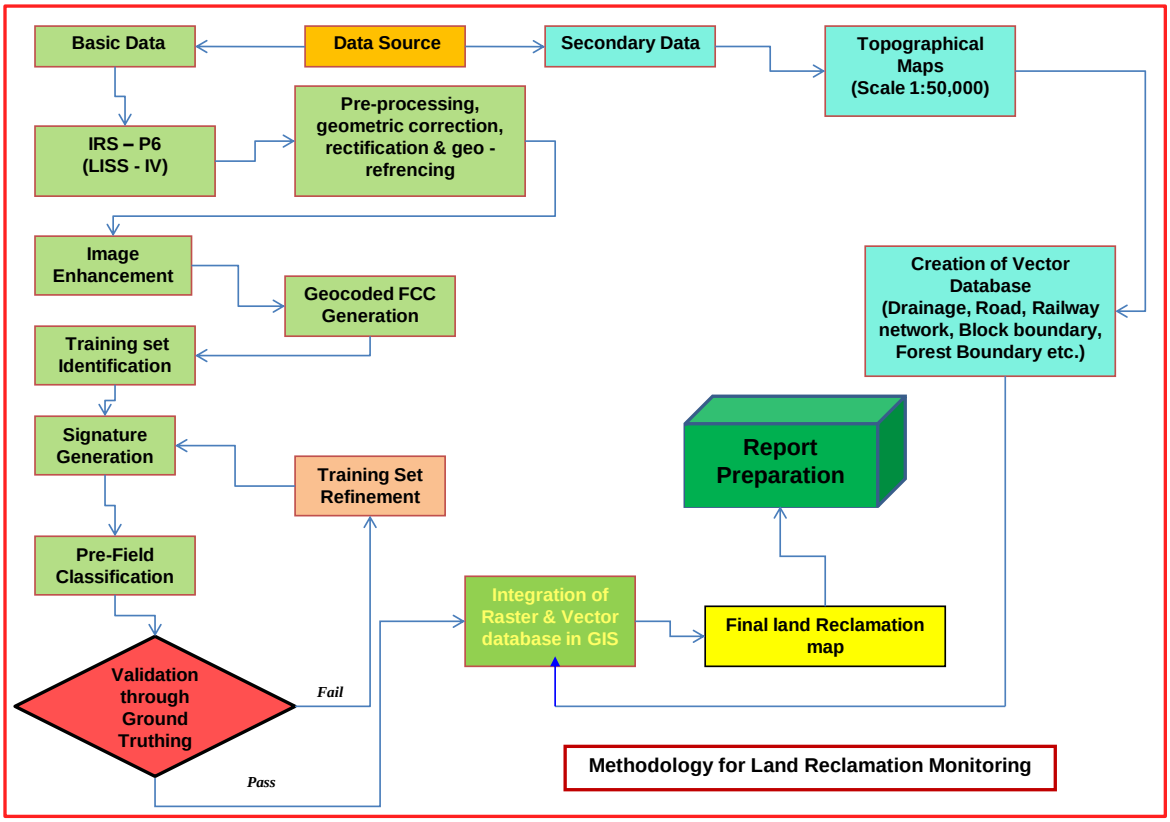


Fig. 2: Methodology of Land Reclamation Monitoring

3.1 **Data Procurement:** After browsing the data quality and date of pass on internet, supply order for data is placed to NRSC. Secondary data like leasehold boundary, toposheet are procured for creation of vector database.

3.2 **Satellite Data Processing:** Satellite data are processed using ERDAS IMAGINE digital image processing s/w. Methodology involves the following major steps:

- **Rectification & Geo-referencing:** Inaccuracies in digital imagery may occur due to 'systematic errors' attributed to earth curvature and rotation as well as 'non-systematic errors' attributed to satellite receiving station itself. Raw digital images contain geometric distortions, which make them

unusable as maps. Therefore, geo-referencing is required for correction of image data using ground control points (GCP) to make it compatible to SoI toposheet.

- **Image enhancement:**

  To improve the interpretability of the raw data, image enhancement is necessary. Local operations modify the value of each pixel based on brightness value of neighbouring pixels using ERDAS IMAGINE 14.0 s/w. and enhance the image quality for interpretation.

- **Training set selection**

  Training set requires to be selected, so that software can classify the image data accurately. The image data are analysed based on the interpretation keys. These keys are evolved from certain fundamental image-elements such as tone/colour, size, shape, texture, pattern, location, association and shadow. Based on the image-elements and other geo-technical elements like land form, drainage pattern and physiography; training sets were selected/identified for each land use/cover class. Field survey was carried out by taking selective traverses in order to collect the ground information (or reference data) so that training sets are selected accurately in the image. This was intended to serve as an aid for classification.

- **Classification and Accuracy assessment**

  Image classification is carried out using the maximum likelihood algorithm. The classification proceeds through the following steps: (a) calculation of statistics [i.e. signature generation] for the identified training areas, and (b) the decision boundary of maximum probability based on the mean vector, variance, covariance and correlation matrix of the pixels. After evaluating the statistical parameters of the training sets, reliability test of training sets is conducted by measuring the statistical separation between

the classes that resulted from computing divergence matrix. The overall accuracy of the classification was finally assessed with reference to ground truth data.

- **Area calculation**

  The area of each land use class in the leasehold is determined using ERDAS IMAGINE v. 14.0 s/w.

- **Overlay of Vector data base**

  Vector data base is created based on secondary data. Vector layer like drainage, railway line, leasehold boundary, forest boundary etc. are superimposed on the image as vector layer in the Arc GIS database.

- **Pre-field map preparation**

  Pre-field map is prepared for validation of the classification result

3.3 Ground Truthing:

Selective ground verification of the land use classes are carried out in the field and necessary corrections if required, are incorporated before map finalization.

3.4 Land reclamation database on GIS:

Land reclamation database is created on GIS platform to identify the temporal changes identified from satellite data of different cut - of dates.

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.

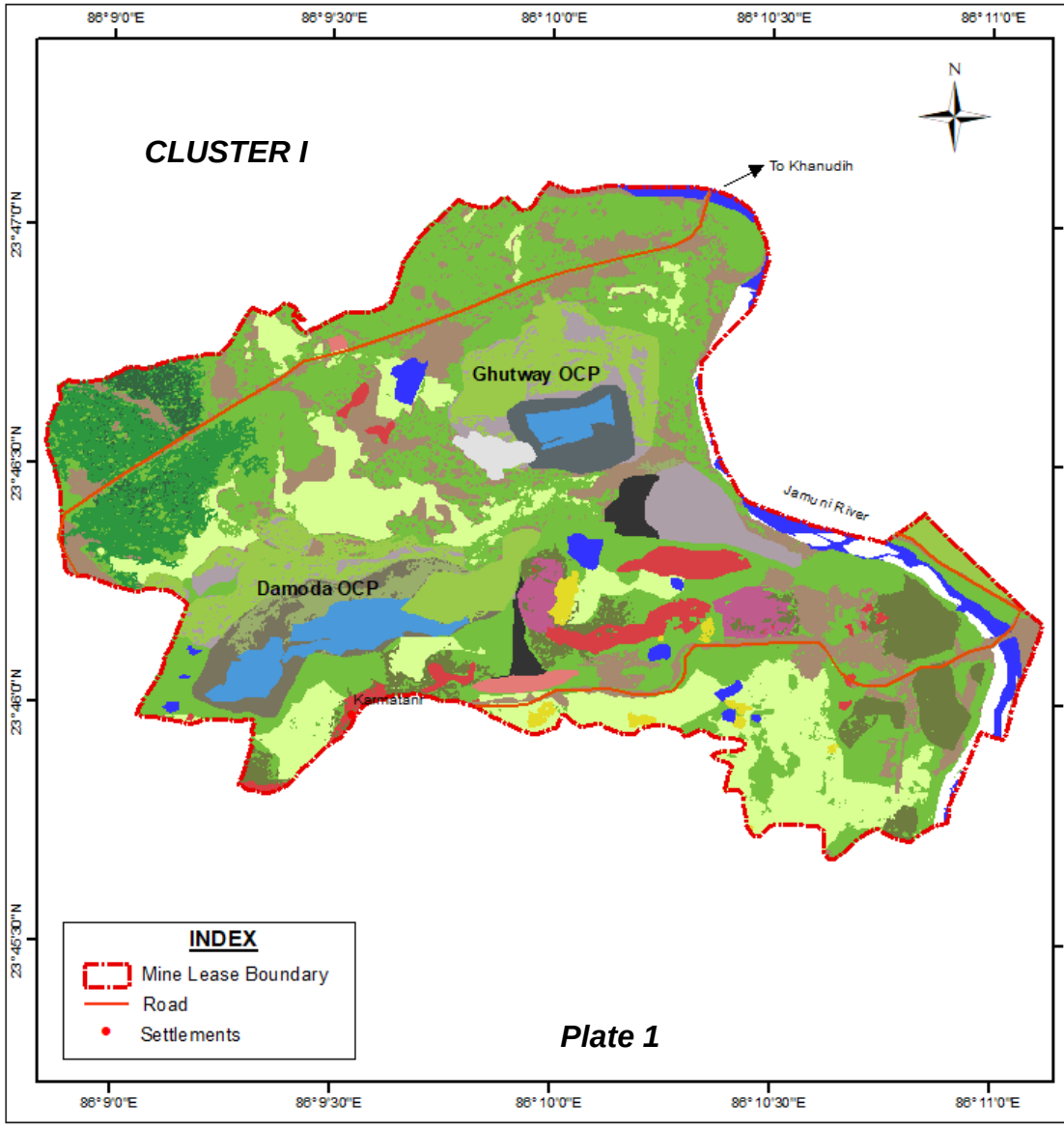
4.4 Study reveals that majority of the mines under the clusters considered for monitoring are of opencast type. 35.02% of excavated area is under active mining in the opencast mines. 58.11% of the excavated area have come under technical reclamation till 2018

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
ACTIVE MINING	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-I (2018)				
Classes		Colour	Core Zone	
Level-I	Level-II		Area (Ha)	% of Total
Forests	Dense Forest		5.36	0.93
	Open Forest		29.81	5.18
	Total Forest (A)		**35.17**	**6.12**
	Scrubs (B)		**194.77**	**33.87**
Plantation Area	Social Forestry		25.53	4.44
	Plantation on OB		47.99	8.35
	Plantation on Backfill		7.29	1.27
	Total Plantation (C)		**80.80**	**14.05**
	Total Vegetation (A+B+C)		**310.75**	**54.04**
Agriculture Land	Crop land		3.52	0.61
	Fallow Land		79.43	13.81
	Total Agriculture Land		**82.95**	**14.43**
Waste Land	Waste Land		69.03	12.00
	Sand Body		9.94	1.73
	Total Waste Land		**78.97**	**13.73**
Mining Area	Advance Quarry area		3.24	0.56
	Coal Quarry		8.79	1.53
	Barren OB Dump		20.58	3.58
	Back Fill		10.11	1.76
	Coal Dump		5.26	0.91
	Water Filled Qry		16.36	2.84
	Total Mining Area		**64.33**	**11.19**
Settlements	Urban Settlements		7.17	1.25
	Rural Settlements		13.83	2.41
	Industrial Settlements		2.58	0.45
	Total Settlement Area		**23.58**	**4.10**
Water Body	**River/ Ponds**		**14.43**	**2.51**
	Total Area		**575.00**	**100.00**

Customer	Bharat Coking Coal Limited				
Title	Land Reclamation Monitoring of Cluster Mines				Job No. 561410027
Subject: Land Reclamation Status of Cluster-I 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)		
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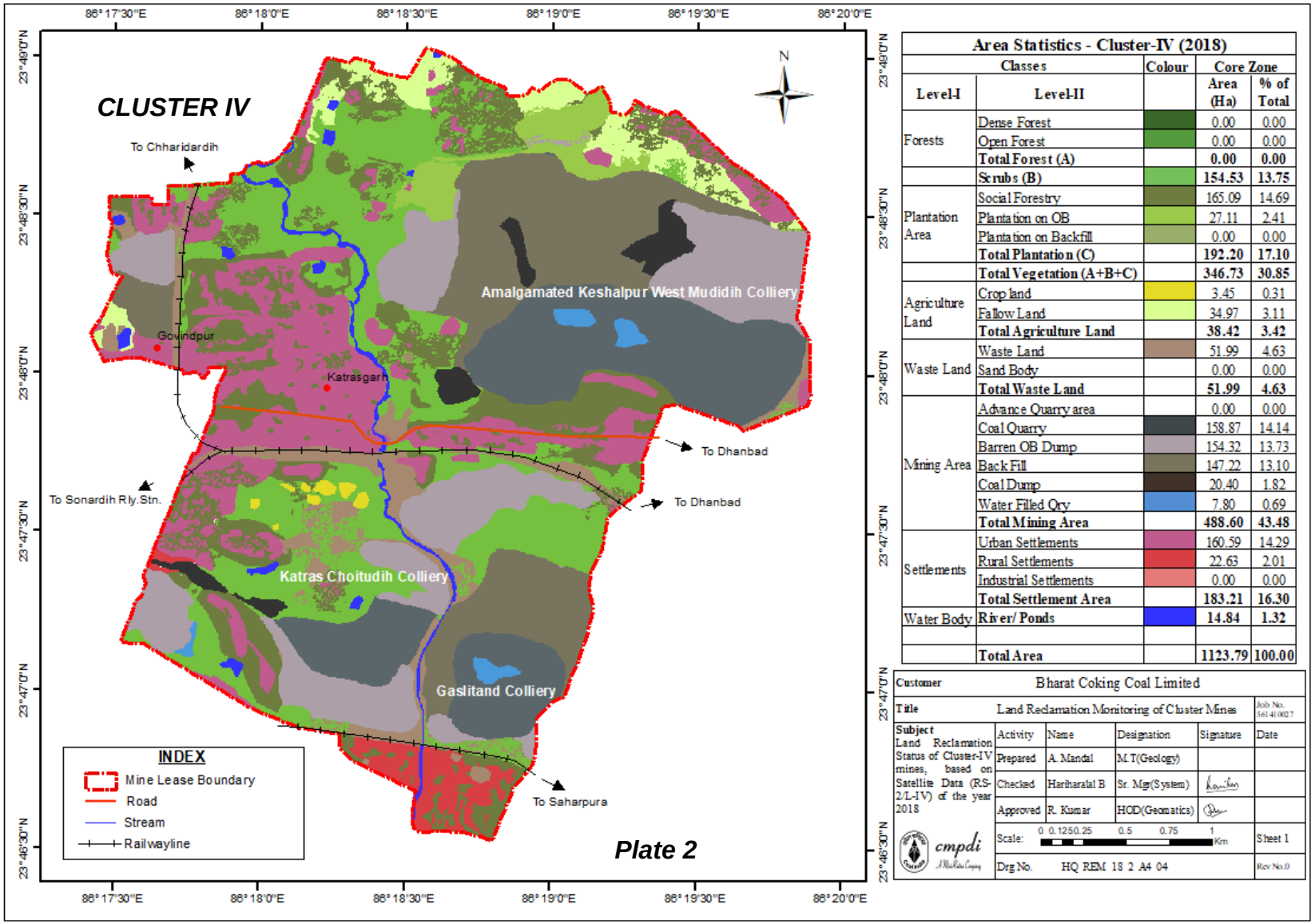

Area Statistics - Cluster-IV (2018)

Classes		Colour	Core Zone	
Level-I	Level-II		Area (Ha)	% of Total
Forests	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest (A)		**0.00**	**0.00**
	Scrubs (B)		**154.53**	**13.75**
Plantation Area	Social Forestry		165.09	14.69
	Plantation on OB		27.11	2.41
	Plantation on Backfill		0.00	0.00
	Total Plantation (C)		**192.20**	**17.10**
	Total Vegetation (A+B+C)		**346.73**	**30.85**
Agriculture Land	Crop land		3.45	0.31
	Fallow Land		34.97	3.11
	Total Agriculture Land		**38.42**	**3.42**
Waste Land	Waste Land		51.99	4.63
	Sand Body		0.00	0.00
	Total Waste Land		**51.99**	**4.63**
Mining Area	Advance Quarry area		0.00	0.00
	Coal Quarry		158.87	14.14
	Barren OB Dump		154.32	13.73
	Back Fill		147.22	13.10
	Coal Dump		20.40	1.82
	Water Filled Qry		7.80	0.69
	Total Mining Area		**488.60**	**43.48**
Settlements	Urban Settlements		160.59	14.29
	Rural Settlements		22.63	2.01
	Industrial Settlements		0.00	0.00
	Total Settlement Area		**183.21**	**16.30**
Water Body	**River/ Ponds**		**14.84**	**1.32**
	Total Area		**1123.79**	**100.00**

Customer	Bharat Coking Coal Limited				
Title	Land Reclamation Monitoring of Cluster Mines				Job No. 561410027
Subject: Land Reclamation Status of Cluster-IV 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)		
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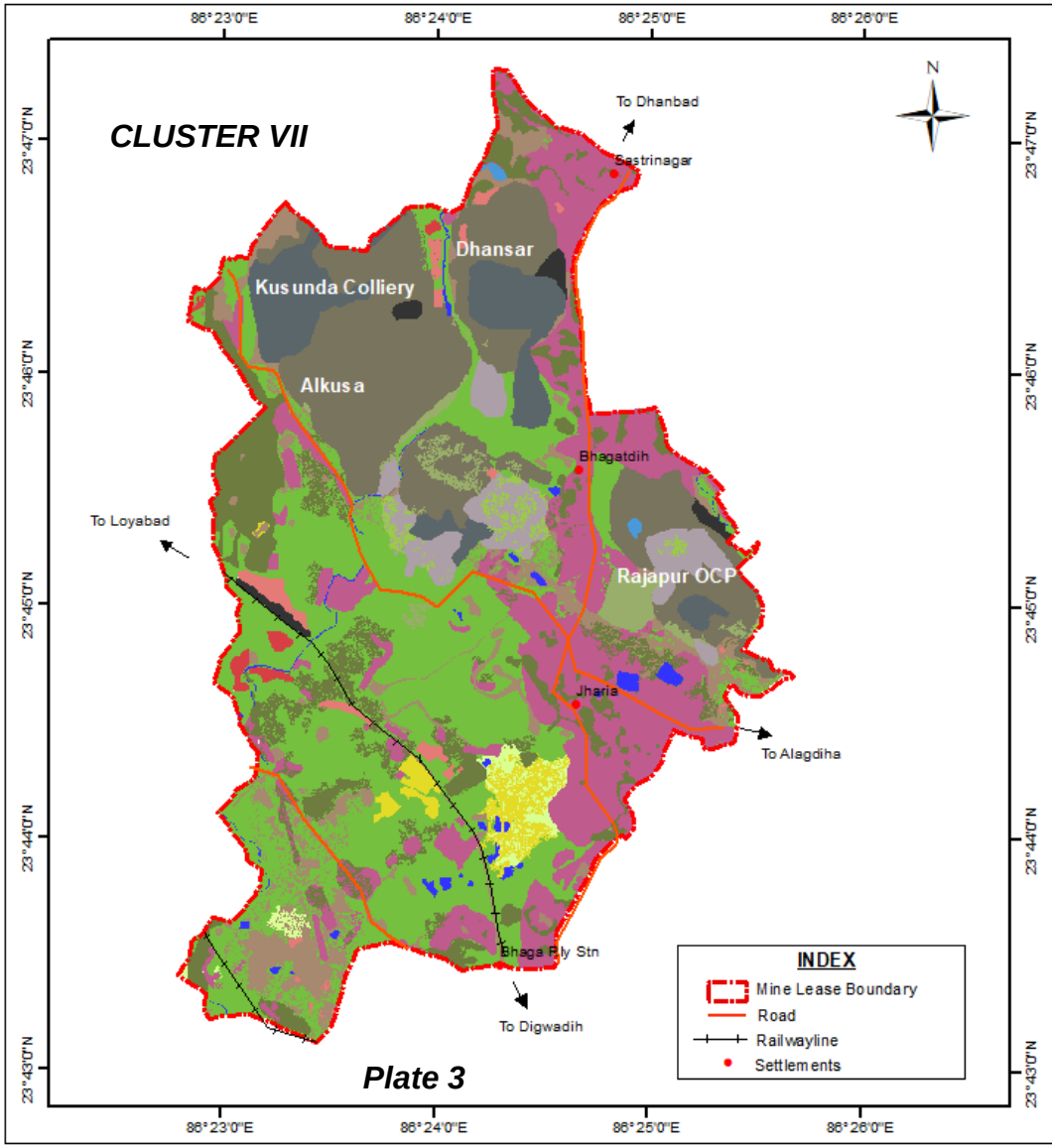

Area Statistics - Cluster-VII (2018)

Classes		Colour	Core Zone	
Level-I	Level-II		Area (Ha)	% of Total
Forests	Dense Forest		0.00	0.00
	Open Forest		0.00	0.00
	Total Forest (A)		**0.00**	**0.00**
	Scrubs (B)		**618.49**	**29.07**
Plantation Area	Social Forestry		238.67	11.22
	Plantation on OB		15.52	0.73
	Plantation on Backfill		37.47	1.76
	Total Plantation Area (C)		**291.67**	**13.71**
	Total Vegetation (A+B+C)		**910.15**	**42.78**
Agriculture Land	Crop land		37.65	1.77
	Fallow Land		20.73	0.97
	Total Agriculture Land		**58.37**	**2.74**
Waste Land	Waste Land		162.76	7.65
	Sand Body		0.00	0.00
	Total Waste Land		**162.76**	**7.65**
Mining Area	Advance Quarry area		0.00	0.00
	Coal Quarry		119.18	5.60
	Barren OB Dump		75.79	3.56
	Back Fill		351.54	16.52
	Coal Dump		16.03	0.75
	Water Filled Qry		3.05	0.14
	Total Mining Area		**565.59**	**26.58**
Settlements	Urban Settlements		380.73	17.89
	Rural Settlements		9.93	0.47
	Industrial Settlements		21.79	1.02
	Total Settlement Area		**412.45**	**19.38**
Water Body	**River/ Ponds**		**18.39**	**0.86**
	Total Area		**2127.70**	**100.00**

Customer	Bharat Coking Coal Limited				
Title	Land Reclamation Monitoring of Cluster Mines				Job No. 561410027
Subject: Land Reclamation Status of Cluster-VII 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)		
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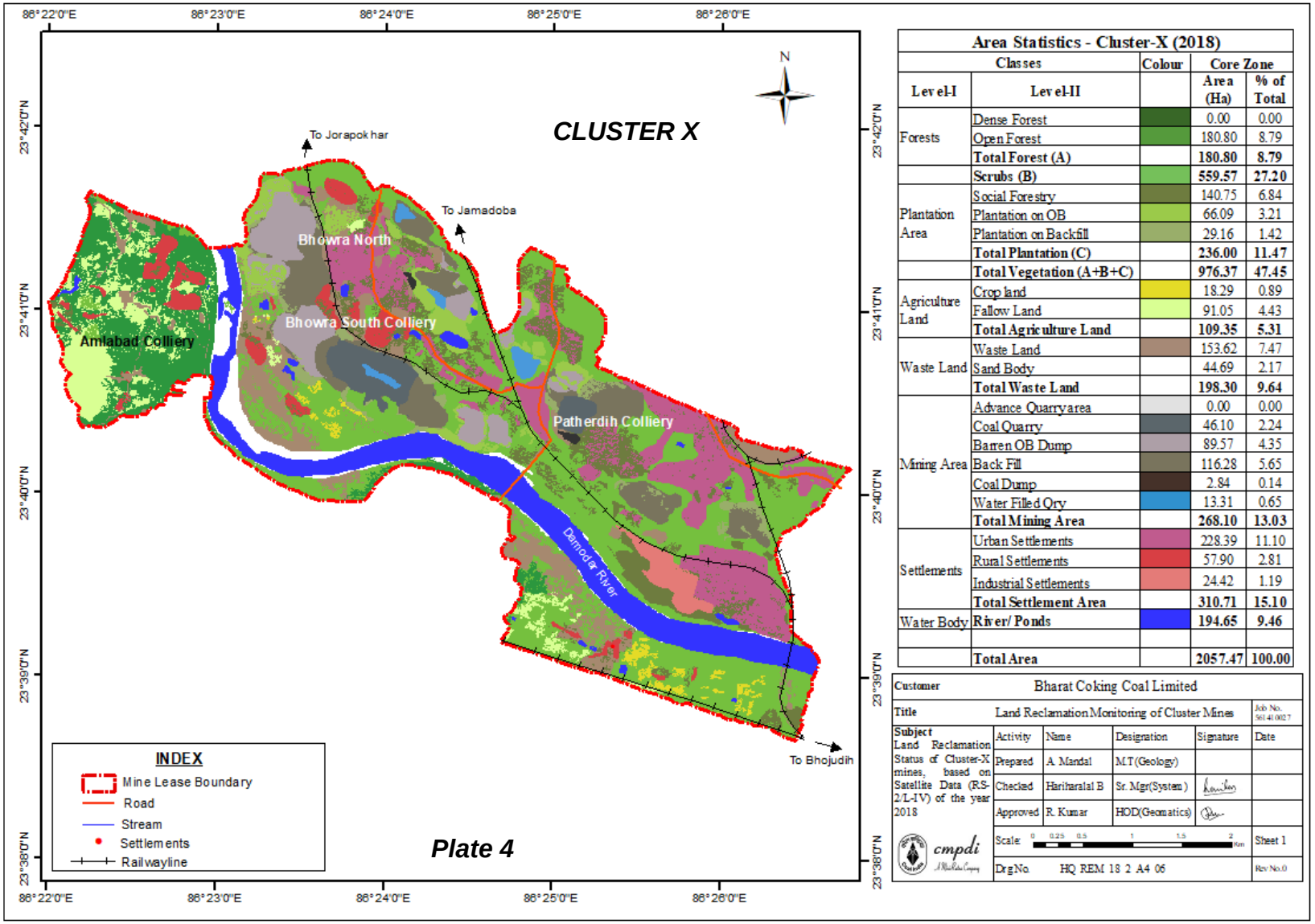
	Drg No. HQ REM 18 2 A4 05				Rev No 0



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)		
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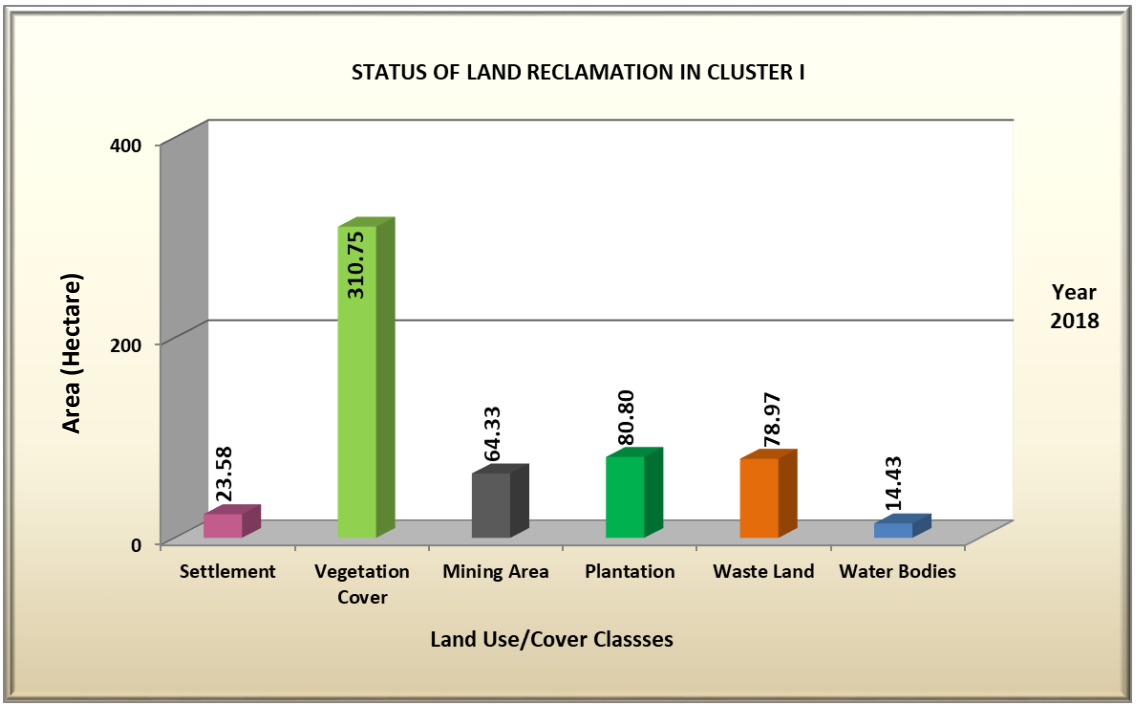

Fig. 3: Land Reclamation status of Cluster I

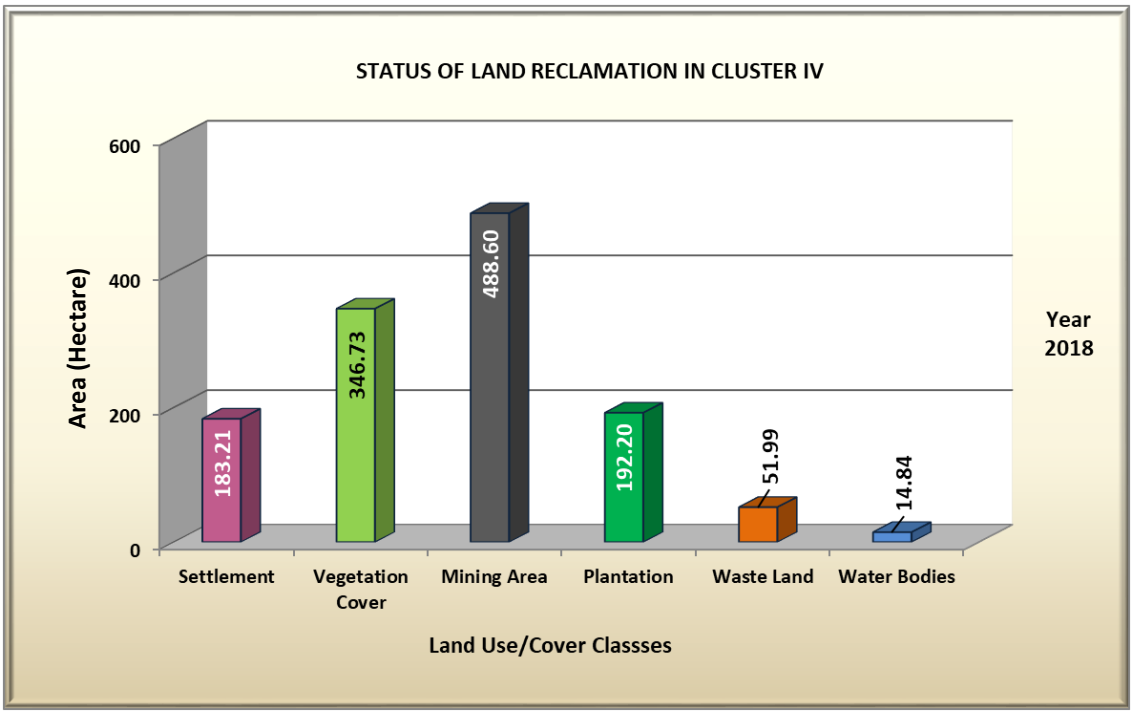

Fig. 4: Land Reclamation status of Cluster IV

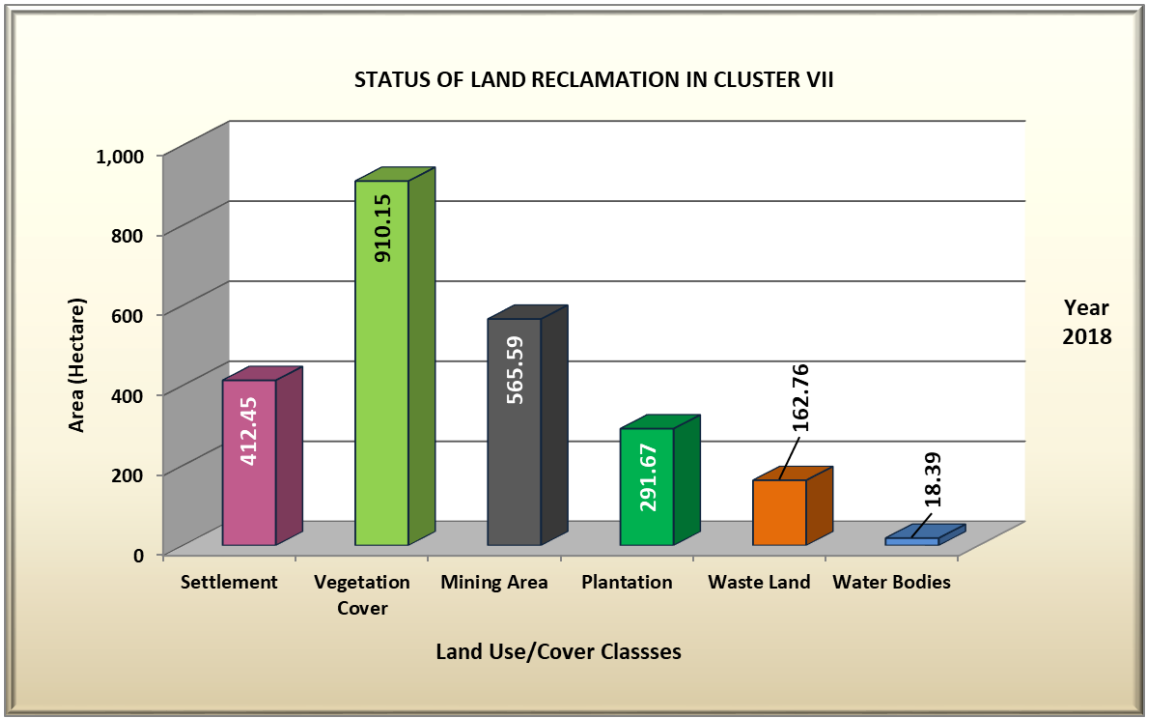

Fig. 5: Land Reclamation status of Cluster VII

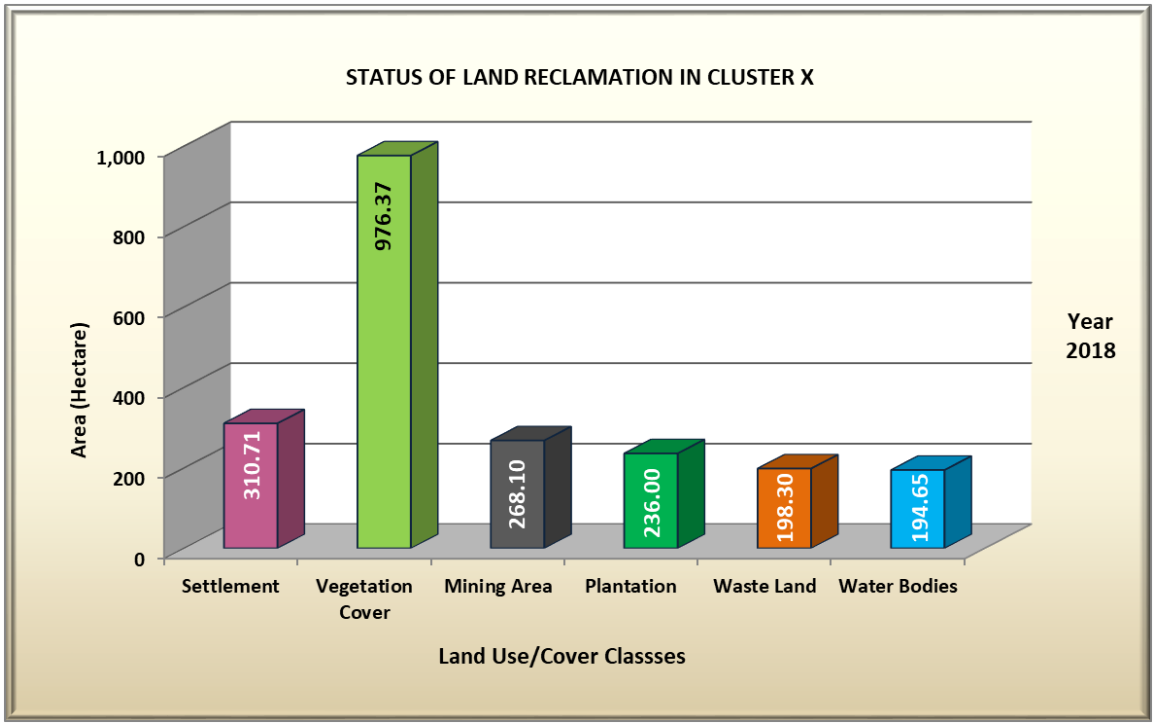

Fig. 6: Land Reclamation status of Cluster X

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

Central Mine Planning & Design Institute Ltd.
(A Subsidiary of Coal India Ltd.)
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Phone : (+91) 651 2230001, 2230002, 2230483, FAX (+91) 651 2231447, 2231851
Website : www.cmpdi.co.in, Email : cmpdihq@cmpdi.co.in

ANNEXURE-V

BHARAT COKING COAL LIMITED

(A Subsidiary of Coal India Limited – A Maharatna Company)

CORPORATE ENVIRONMENTAL POLICY

Bharat Coking Coal Limited (BCCL), a subsidiary of Coal India Limited, is a Public Sector Undertaking engaged in mining of coal and allied activities. It is the only producer of Prime Coking Coal in India. BCCL was incorporated in 1972 to operate coking coal mines operating in the Jharia and Raniganj Coalfields. Currently, the Company operates 66 coal mines and 8 Coal Washeries.

Our mission is to produce the planned quantity of coal efficiently and economically with due regard to safety, conservation and quality. BCCL affirms its commitment for environment friendly mining with right mitigation of pollution, reclamation of the degraded land, preservation of biodiversity and proper disposal of waste following the best environmental practices including judicious use of the non-renewable energy on the path of continual improvement. Towards this commitment, BCCL shall endeavor to:

- Conduct mining and associated operations in an environmentally responsible manner to comply with applicable laws and other requirements related to environmental aspects.
- Design projects with due consideration of Sustainable Development by integrating sound environmental management practices in all our activities.
- Prevent pollution of surrounding habitation by continuous monitoring and adopting suitable measures for environment protection.
- Ensure compliance of all applicable Environmental and Forest Clearance conditions and other statutory conditions issued by regulatory agencies.
- Implement the Environmental Management Plans in all our mines effectively to mitigate pollutions on air, water and noise; proper disposal of wastes and reclamation and ecological restoration of degraded land; and by also dovetailing the Jharia action/ Master Plan for dealing with Fires, Subsidence and Rehabilitation of affected people with the Environmental Management Plans under the Cluster Concept.
- Strive to conserve Bio-Diversity through Ecological restoration methods.
- Conserve natural resources through recycling of wastes on the principle of Reduce, Recycle and Reuse. Put special thrusts on efficient energy utilization as a measure to reduce carbon foot-print.
- Strive for continual improvement in our environmental performances by setting targets, measuring progress and taking corrective action.
- Create environmental awareness among the employees and the local communities through pro-active communication and training and encourage our business associates to adopt similar approach for environmental protection.

Place: Dhanbad
Date: 25.5.12

Chairman-cum-Managing Director

Chairman-cum-Mg. Director
BHARAT COKING COAL LIMITED
Koyla Bhawan, Dhanbad-826 005