

भारत कोकिंग कोल लिमिटेड

एक मिनी रत्न कम्पनी

(महाराष्ट्र कम्पनी कोल इंडिया का एक उपक्रम)

पंजीकृत कार्यालय : कोयला भवन, कोयला नगर,

धनबाद-826005

सीआइएन : U10101JH1972GO1000918

परियोजना पदाधिकारी का कार्यालय
महुदा ग्रुप

पोस्ट / थाना: महुदा, जिला: धनबाद (झारखण्ड)-828305

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Bharat Coking Coal Limited

A Mini Ratna Company

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

Regd. Off. : Koyla Bhawan, Koyla Nagar

Dhanbad - 826005

CIN : U10101JH1972GO1000918

**OFFICE OF THE PROJECT OFFICER
MAHUDA GROUP**

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"For uploading online on the 'Parivesh Portal' of MoEF&CC and sending by email"

Ref:- BCCL/WJA/ENV/2024/ 265 (C)

Date:- 22/11/2024

To,
The Regional Director
Ministry of Environment & Forest and Climate Change
Regional Office (ECZ), Bunglow No. A-2,
Shyamali Colony, Ranchi – 834002.

Sub: - Submission of six-monthly reports on compliance of Environment Clearance for the period from April 2024 to March'2024 with respect to Cluster-XIII group of mines of M/s Bharat Coking Coal Limited.

Ref: EC Order No. – J-11015/11/2010-IA.II (M), Dated: - 06.06.2013.

Respected Sir,

Please find enclosed herewith the six-monthly reports on compliance of Environment Clearances for the period from April 2024 to Sept '2024 in respect of Cluster XIII group of mines of M/s Bharat Coking Coal Limited. We hope you will find in order.

Thanking you,

Encl: - As Above

Yours faithfully,



Project officer
Mahuda Group of Mines
(Cluster-XIII, BCCL)

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

(April 2024 to Sept '24)

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.	Currently, there is no mining activity in any of the mines within Cluster-XIII.
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 only working mine i.e. 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) <u>Annexure-I</u>
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 temperature of the coal seams and NRSC has submitted their final report in January 2021. NRSC report is enclosed as <u>Annexure II.</u>
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.	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. There is no producing mine in Cluster XIII.
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 as per status. No running OC mine in Cluster-XIII.
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.	Being Complied. There is no producing mine in Cluster XIII.
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 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 depts. /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 (More than 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	Being Implemented.

	Plan prepared for Dhanbad as a critically polluted area and relevant for Cluster XIII shall be 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.	Location of monitoring stations was already finalized with the consultation of Jharkhand State Pollution Control Board. Source Apportionment Study: - Report of Source Apportionment Study has been submitted by NEERI, Nagpur. Report sent by NEERI is attached as <u>Annexure III</u>.
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 construction of new piezometers. The monitoring for quantity shall be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality including Arsenic and Fluoride during the month of May. Data thus collected shall be submitted to the Ministry of Environment & Forest and to the Central Pollution Control Board/SPCB quarterly within one month of monitoring. Rainwater harvesting measures shall be undertaken in case monitoring of water table indicates a declining trend.	Complied. CMPDI RI-II has prepared a report for Location and design of Piezometers. Groundwater monitoring data has been enclosed as <u>Annexure IV</u>.
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-V.

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.	Presently there is no producing mine in Cluster-XIII. There is no effluent discharge into natural water course. 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. Subsidence monitoring is being done.
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.	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.	Presently there is no coal production from mines under Cluster-XIII.
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	Will be Complied. Presently there is no coal production from mines under cluster-XIII.

	should be dovetailed with Jharia Action Plan. The road transportation of coal during phase I should be by mechanically covered trucks.	
xxviii.	A study should be initiated to analyze extent of reduction in pollution load every year by reducing road transport.	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.
.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.
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 and implemented 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 (12 nos.) which includes Environment, Mining, Excavation, Civil, Survey ,Electrical & mechanical, Forestry disciplines executives and technicians (4 nos.) 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- VI
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. 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. 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.	Already complied. Already complied. 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. Annexure - VI
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-VII.

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 presently no coal production from any mines of Cluster – XIII.
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, 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.	It is being complied. Monitoring is done by CMPDIL. Having 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	A full-fledged Environment Department, headed by a HOD (Environment) along with a suitable qualified multidisciplinary team of executives (12 nos.) which includes Environment, Mining, Excavation, Civil,

	company.	Survey,Electrical & mechanical, Forestry disciplines executives And technicians (4 nos.) 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 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.
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
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 Project officer
 Mahuda Group of Mines
 (Cluster-XIII, BCCL)

Project Officer
 Mahuda Group of Mines
 W. J Area (BCCL)

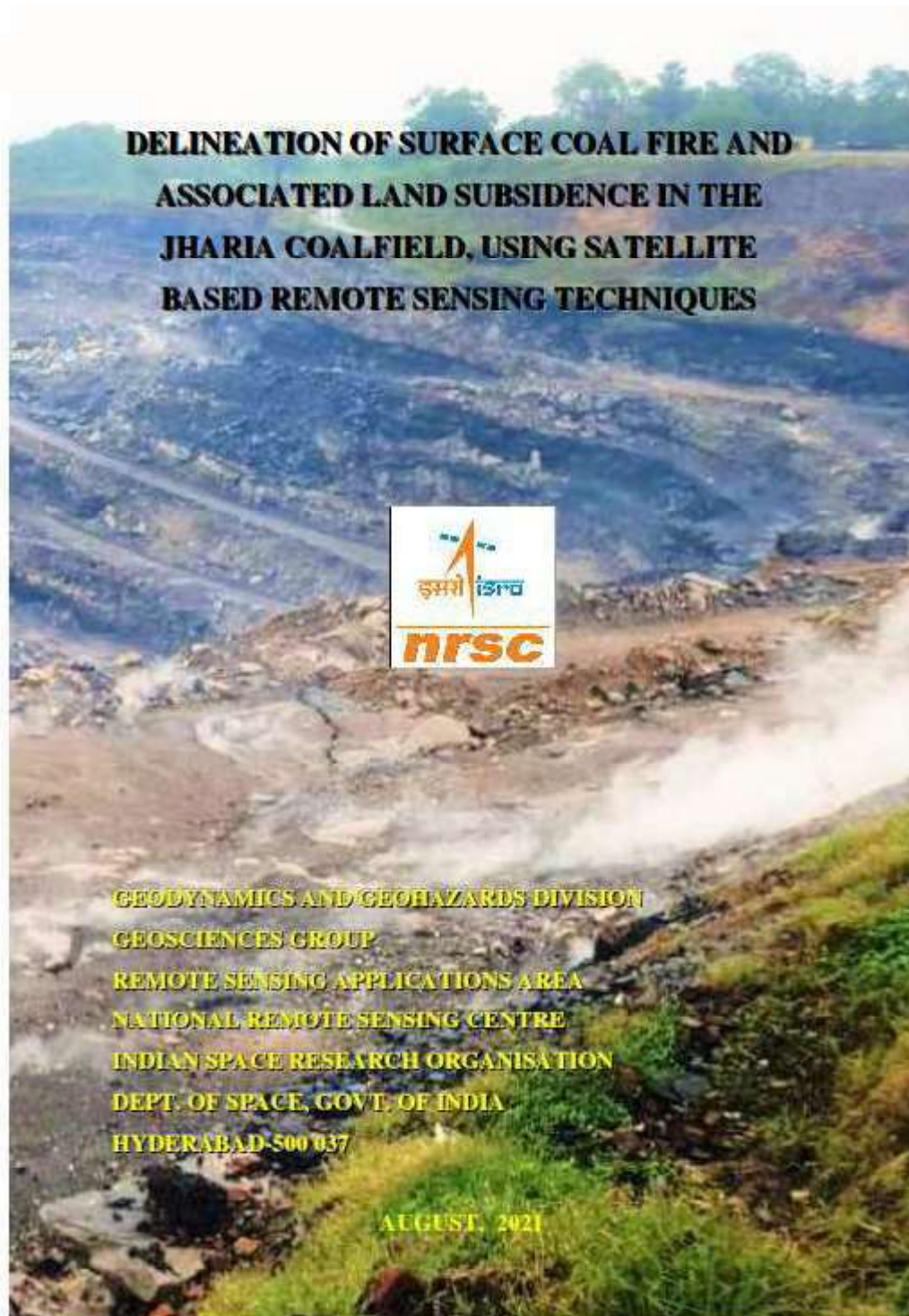
ANNEXURE-I

Production from April 2024 to Sept 2024

Month		April 2024	May 2024	June 2024	July2024	August 2024	Sept 2024	(Million ton)
Cluster-XIII	Murlidih 20/21 pits	0	0	0	0	0	0	
	Bhurangia colliery	NIL						NIL
	Mucharaidih colliery							
	Hantoodih colliery							
	Padugora colliery							
	Murulidih colliery							
	Bhatdih colliery							
	Total (in MT)							0
	Remarks- Murulidih 20/21 pits colliery temporarily closed for production from December 2015							



As per specific condition no xiii. The proponent shall prepare time -series maps of the Jharia Coalfields through NRSA to monitor and prevent fire problems in the Jharia Coalfields by Isothermal mapping /imaging and monitoring temperatures of the coal seams.



**DELINEATION OF SURFACE COAL FIRE AND
ASSOCIATED LAND SUBSIDENCE IN THE
JHARIA COALFIELD, USING SATELLITE
BASED REMOTE SENSING TECHNIQUES**



**GEODYNAMICS AND GEOHAZARDS DIVISION
GEOSCIENCES GROUP
REMOTE SENSING APPLICATIONS AREA
NATIONAL REMOTE SENSING CENTRE
INDIAN SPACE RESEARCH ORGANISATION
DEPT. OF SPACE, GOVT. OF INDIA
HYDERABAD-500 037**

AUGUST, 2021

DELINEATION OF SURFACE COAL FIRE AND ASSOCIATED LAND SUBSIDENCE IN THE JHARIA COALFIELD, USING SATELLITE BASED REMOTE SENSING TECHNIQUES

Report for

BHARAT COKING COAL LIMITED (BCCL)

(A SUBSIDIARY OF COAL INDIA LTD.)

**ENVIRONMENT DEPARTMENT, KOYLA BHAWAN
KOYLA NAGAR, DHANBAD – 826 005, JHARKHAND**

GEODYNAMICS AND GEOHAZARDS DIVISION

GEOSCIENCES GROUP

REMOTE SENSING APPLICATIONS AREA

NATIONAL REMOTE SENSING CENTRE

INDIAN SPACE RESEARCH ORGANISATION

DEPT. OF SPACE, GOVT. OF INDIA

HYDERABAD-500 037

AUGUST, 2021



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15	Abstract (with Keywords): Coal fire is a serious problem in Jharia coal field, where high grade coals are gradually burnt due to these fires. The combined effect of surface and sub-surface fires and mining related subsidence has affected the environmental stability of Jharia coal field. Coupled with the ecological changes instigated by open cast mining, the landscape in and around Jharia have changed drastically over the years. In the present study, delineation of coal fire and mining related land subsidence have been addressed. Thermal band data of Landsat-8 (100m resolution) have been used to demarcate the coal mine fire areas from non fire areas. For this study, Landsat-8 data of May, 2021 have been used. The band 10 (10.60-11.19 μm) of Landsat-8 data are used to derive the relative radiant temperature. Further ALOS-PALSAR 2, L band microwave data have been used to delineate zone of probable land subsidence (using differential interferometry) due to mining. The study reflects that, compared to 2017, the eastern flanks (Lodna and Tisra etc) show a significant reduction in total fire area. The western flank (Block II and Shatabdi) and the northern flank (Katras and Gaslitand) show isolated fire pockets in active mines as well as in OB dumps. The current total fire area mapped is 1.8 sq.km. Apart from this, one distinctive area of land subsidence has been identified using interferometric method. These are primarily caused by older or active underground mining in the Moonidih Project. The coal mine fire and subsidence areas are further verified on the ground. The final coal mine fire and subsidence maps of Jharia coal field are prepared by using remote sensing data analysis with field validation.				

PROJECT TEAM

1. **Dr. K VINOD KUMAR**, Group Director, Geosciences Group
Project formulation and co-ordination
2. **Dr. Tapas R. Martha**, Head, Geodynamics and Geohazards Division
Review and report preparation
3. **Shri Priyom Roy**, Scientist 'SE'
Image processing, interpretation, field survey, maps and report preparation

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EXECUTIVE SUMMARY

Coal fire is a serious problem in Jharia coal field, where high grade coals are gradually burnt due to these fires. The combined effect of surface and sub-surface fires and mining related subsidence has affected the environmental stability of Jharia coal field. Coupled with the ecological changes instigated by open cast mining, the landscape in and around Jharia have changed drastically over the years. In the present study, delineation of coal fire and mining related land subsidence has been addressed. Thermal band data of Landsat-8 (100m resolution) have been used to demarcate the coal mine fire areas from non fire areas. For this study, Landsat-8 data of May, 2021 have been used. The band 10 (10.60-11.19 μm) of Landsat-8 data are used to derive the relative radiant temperature. Further ALOS-PALSAR 2, L band microwave data have been used to delineate zone of probable land subsidence (using differential interferometry) due to mining. The study reflects that, compared to 2017, the eastern flanks (Lodna and Tisra etc) show a significant reduction in total fire area. The western flank (Block II and Shatabdi) and the northern flank (Katras and Gaslitand) show isolated fire pockets in active mines as well as in OB dumps. The current total fire area mapped is 1.8 sq.km. Apart from this, one distinctive area of land subsidence has been identified using interferometric method. These are primarily caused by older or active underground mining in the Moonidih Project. The coal mine fire and subsidence areas are further verified on the ground. The final coal mine fire and subsidence maps of Jharia coal field are prepared by using remote sensing data analysis with field validation.

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CHAPTER I

INTRODUCTION

Coal fire is a perennial problem in Jharia coal field (JCF) covering 447 sq. km. area in the Dhanbad district of Jharkhand state. Subsurface and surface coal fires are a serious problem in many coal-producing countries. The severity and extent of mine fires in some of the Indian coalfields, particularly Jharia and Raniganj coalfields, are quite alarming. Combustion can occur either within coal or in coal dumps on the surface. Considerable economic loss and environmental problem arises due to the coal fire. Coal fire burns valuable coal and also creates difficulties in mining by increasing the cost of production or making existing operations difficult. Noxious gases like sulphur dioxide, nitrogen oxide, carbon monoxide, carbon dioxides, which are the result of coal burning processes, often affect the immediate surroundings of an active coal fire area (Gangopadhyay, 2003). These greenhouse gases not only affect local atmosphere but also play a crucial role in the damages, found associated with coal fire such as land surface subsidence and surface cracking. Coal fires are caused by oxidation of coal but the reaction involved in oxidation of coal is not understood till date. Broadly, the potential for spontaneous combustion lies in its ability to react with oxygen at ambient temperature. This occurs through the reaction of oxygen at the surface of the coal resulting in an exothermic reaction. As a consequence, the temperature of coal rises and if temperature reaches the threshold temperature, ranging between 80⁰ to 120⁰C, a steady reaction starts, which produces carbon dioxide. Temperature keeps on increasing once CO₂ started to form and at 2300°C, the exothermic reaction becomes rapid. It is known that high grade coals (high carbon content) are more fire prone, though the reason behind this is not well understood. Another important parameter, which controls fire, is the size of the particles. Larger the effective area of coal (fire particles), more rapidly the reaction proceeds. Cracks, fissures play a role like positive catalysts to coal oxidation by slowly supplying oxygen / air through their conduits.

Coal mining in Jharia Coal Field (JCF) started way back in 1895. History of fire in Jharia Coal Field date back to 1916 when the first incidence of fire was reported from XIV seam of Bhowrah colliery. JCF was nationalised in 1972 and over the decades, the fire has spread or been contained but never extinguished. The combination of underground fire and subsidence have affected vast areas of JCF.

1.1 Background

Remote sensing technique in thermal band offers a cost-effective and time-saving technology for mapping various geoenvironmental / hazardous features such as coal fires, forest fires, oil well fires, volcanic eruptions etc. NRSC has carried out coal fire mapping projects in the past; conducting an airborne campaign in 1989 and using Landsat-5 TM data in 1995 (Bhattacharya *et. al.*, 1995), over Jharia coalfield, Jharkhand and using Landsat-5 TM data for 2001 over Raniganj coalfield, West Bengal. Further, projects were executed in 2006 and 2012 in which coal fires of the JCF were mapped using Landsat-7 ETM+ and ASTER data, respectively. Additionally, a R&D study was taken up in 2013 to delineate subsidence areas using differential interferometric (DInSAR) technique. An operational fire and subsidence mapping activity was taken up in 2017. In view of the past experiences, based on the letter (Ref. no. MP/19/270) from General manager (JMP), BCCL addressed to Director, NRSC on 24-10-2019, a project was formulated to take up Coal fire and Land Subsidence study of the Jharia Coal Field using space-borne remote sensing technique. The formal Memorandum of Understanding between BCCL and NRSC was signed on 7th August, 2020.

1.2 Objectives

The following objectives are formulated on the basis of the above mentioned background:

- I. To map Coal fire in the study area based on pixel integrated relative radiant temperature derived from latest available Landsat-8 data of 2020 time period.
- II. To compare the change in the coal fire distribution in the Jharia coalfield between the period of 2017 and 2020.
- III. To delineate probable subsidence areas in the region using differential interferometry method.

1.3 Study Area

Jharia Coalfield is located in the Dhanbad district of Jharkhand state (Figure 1) and it is named after the main coal mining town of Jharia. It is situated in the Damodar River valley and is about 250 km NW of Kolkata. The coalfield is contained approximately within latitudes $23^{\circ} 42' N$ and $23^{\circ} 50' N$ and longitudes $86^{\circ} 09' E$ and $86^{\circ} 30' E$.

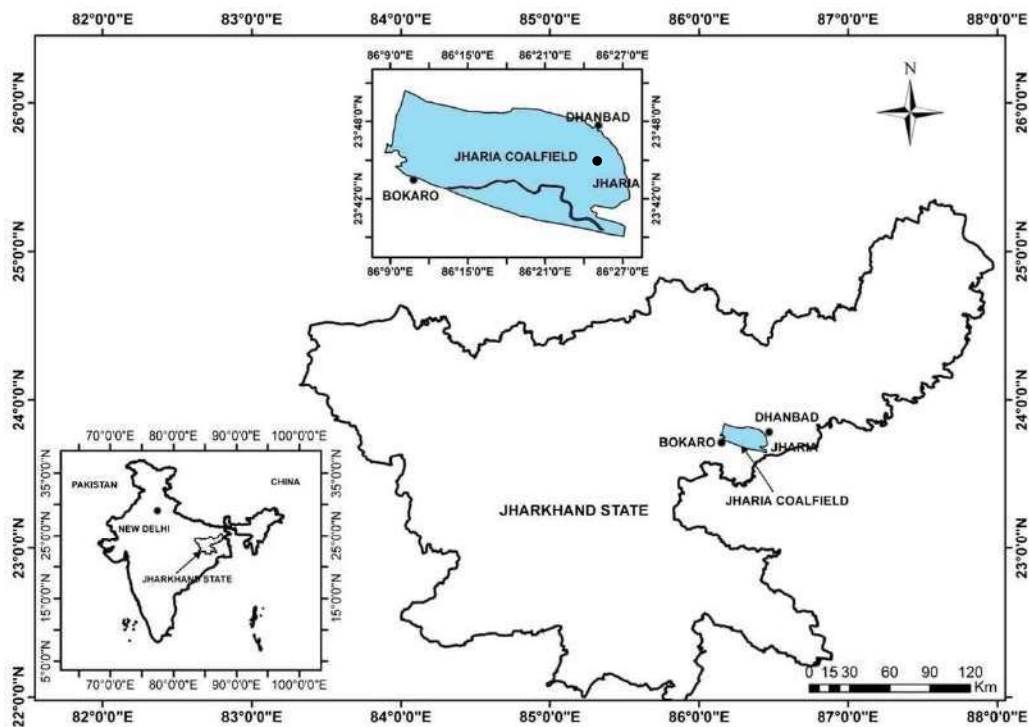


Figure 1: Study area map of Jharia Coalfield, Jharkhand

CHAPTER II

GENERAL DESCRIPTION OF THE STUDY AREA

2.1 Location and Accessibility

Jharia is an old mining town in the Dhanbad district of Jharkhand. This town is famous for its surrounding mines producing high grade coal and supplying mainly to the neighbouring industrial areas. Jharia is approximately 6 km in south western direction from Dhanbad town and connected by metal road. Dhanbad is well connected to Kolkata by road and rail.

2.2 Physiography, Drainage and Climate

Jharia coalfield is characterised by undulatory topography with very low rolling slope towards the eastern part of the area. The average height of the area is around 200 meters above the mean sea level. Damodar is the major river in the study area. The other tributaries to the Damodar River in this area are Jamuniya Nadi, Khudia Nadi, Khatri Nadi, Jarian Nala, Kari Jora and Domohani Nadi. Damodar River flows from west to east in this area. The minimum temperature is ~10° C in the month of December – January and maximum temperature is ~50° C in the month of May – June.

2.3 General Geology

Gondwana Super Groups of rocks of Up. Carboniferous to Lr. Cretaceous age (i.e. from 320 MY to 98 MY) are exposed here. Gondwana Super Group rocks unconformably overlie Archaean rocks. In Gondwana Rocks, Raniganj and Barakar Formations of Permian age have more potential as far as the coal production is concerned. Barakar Formation is exposed in north and north eastern part of the basin (Figure 2). Most of the coal mines are confined to the Barakar Formation in JCF. Barakars consists of coarse, medium grey and white sandstones, shales and coal seams. Raniganj consists of grey and greenish soft feldspathic sandstones, shales and coal seams. Faults are prevalent in this portion of basins (Figure 2). NW trending faults are conspicuous north to Jharia. Many lamprophyre and dolerite dykes are also exposed in this area in a criss-cross manner. The Raniganj Formation though coal bearing, has suffered much deformation due to faulting, thus causing difficulty for

mining in the area. The generalised stratigraphy of JCF is mentioned below (after Saraf, et al., 1995).

FORMATION	LITHOLOGY	MAXIMUM THICKNESS
Supra Panchet	Red and Grey sandstones and shales	300m
Panchet	Micaceous Yellow and Grey sandstones, Red and Greenish shales	600m
Raniganj	Grey and Greenish soft feldspathic sandstones, shales and coal seams	1050m
Ironstone Shales	Dark carbonaceous shales with ironstone bands	360m
Barakar	Coarse and medium Grey and white sandstones, shales and coal seams	630m
Talchir Boulder Bed	Coarse sandstones above and Greenish shales below	300m

Table 1: Generalised stratigraphy of JCF.

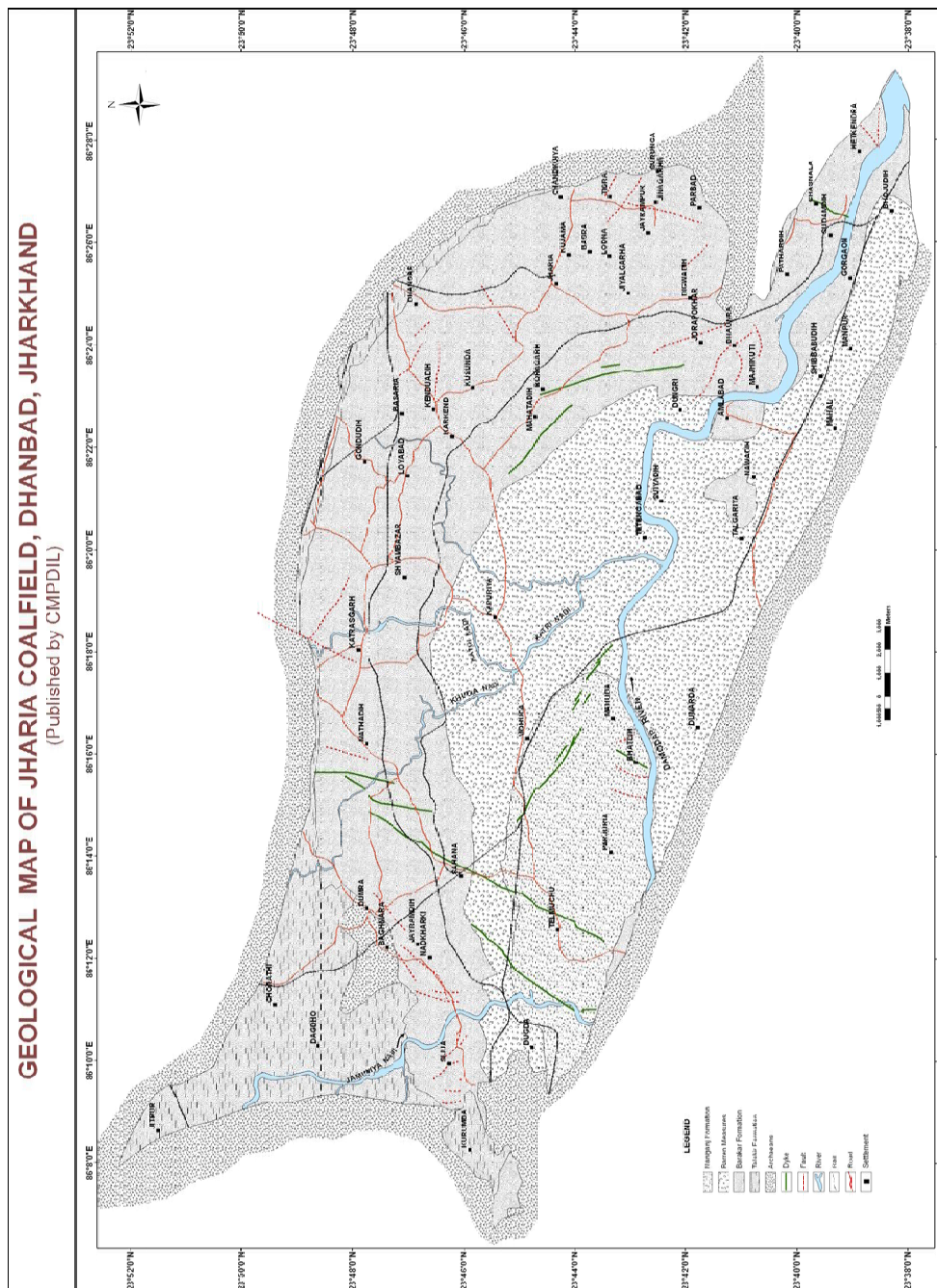


Figure 2 : Geological map of Jharia coal field, Dhanbad, Jharkhand (published by CMPDIL)

CHAPTER III**DATA REQUIREMENTS****3.1 Remote Sensing Data**

Coal fire map was created from LANDSAT 8 TIRS data of 22 May 2020. Further, the coal fire map of 2017 prepared by NRSC (NRSC, 2017) from LANDSAT 8 data (of 14 May 2017), was used as a reference to identify the changes that has occurred in the extent and disposition of the fires from 2017 to 2020.

For the land subsidence study, L-band microwave data from ALOS-PALSAR satellite (JAXA) were used. Five scenes of "Fine Beam mode" SLC data were taken from PALSAR-2 archives over a period from September, 2017 to February, 2020. This was done to identify long term terrain changes and differentiate the same from short term changes due to mining excavations and overburden dumping.

Table 2: List of satellite data used in the present study.

Satellite	Sensor	Resolution	Time	Date	Data source
LANDSAT-8	TIRS	100m resampled to 30m	Daytime	22 May 2020	USGS, USA
ALOS	PALSAR-2 (Fine Beam mode)	10 m	NA	30 September 2017	JAXA, Japan
				3 March 2018	
				19 January 2019	
				02 March, 2019	
				29 February. 2020	

3.2 Ancillary data

1. Geological map of Jharia coal field.
2. Mine surface plans as provided by BCCL.

CHAPTER IV

REMOTE SENSING DATA ANALYSIS

4.1 Methodology

4.1.1 Processing of Landsat 8 Data

With the launch of the LANDSAT-8 mission in February, 2013; thermal space borne data are available from its thermal infrared sensor (TIRS). This has enabled monitoring of the earth with a spatial resolution of 100 m in the thermal domain with a repeat cycle of 16 days. The LANDSAT-8 has two channels (Band 10 and Band 11) in the thermal infrared region (Table 1) which ranges from 10.4 micrometer to 12.5 micrometer (Gangopadhyay et al. 2012). In present study, band 10 of TIRS sensor (acquired on 22 May, 2020) has been used coal fire mapping. The spectral domain of the band is known for its maximum transmittance (Chatterjee et al. 2007; Martha et al. 2010). The data are freely accessible through USGS portal (Landsat 8 download source: <http://landsatlook.usgs.gov>).

Landsat-8 data are available in GeoTiff format and the data are converted to top of the atmosphere spectral radiance using the radiance rescaling factors provided in the metadata file, using equation 1.

$$L_{\lambda} = M_L Q_{cal} + A_L \dots\dots\dots (1)$$

Where:

L_{λ} = Spectral radiance (Watts/ (m² * srad * μm)).

M_L = Band-specific multiplicative rescaling factor from the metadata.

A_L = Band-specific additive rescaling factor from the metadata.

Q_{cal} = Quantized and calibrated standard product pixel values (DN).

Once the spectral radiance (L_{λ}) for Landsat-8 band 10 data is generated, it is possible to calculate radiant (brightness) temperature directly using equation 2. Planck's radiation function (Planck, 1914) forms the basis of radiant temperature derivation from spectral radiances and the theory is discussed in detail in existing literature (Gupta, 2003).

$$T_R = K_2 / \ln ((K_1 / L_{\lambda}) + 1) \dots\dots\dots (2)$$

T_R = Radiant (brightness) temperature,

K_1 = Calibration constant (1260.56 K),

K_2 = Calibration constant (666.09 watts/ (m² *srad* μ m)),

L_λ = Spectral radiance

4.1.2 Thresholding of radiant temperature image

Once the Landsat-8 data are converted to radiant temperature image, the next step was to segregate fire pixels from the background, which requires the estimation of the cut-off temperature. This has been attempted by the statistical analysis of sensor derived radiant temperature to delineate clusters (in the scatter-plot) indicative for fire and non-fire pixels. Mean and maximum radiant temperatures are derived from randomly sampled uniform sized pixel blocks distributed in entire spatial extent of Barakar Formation (Figure 3) known for fire bearing coal seams. The pixel block sizes are chosen to adequately represent the overall areal extent of the coalfield and homogeneously encompass all the mining blocks (27x27 pixels for Landsat-8, Figure 3). The maximum temperature value recorded in each representative area, derived from each of the datasets, is plotted against the mean temperature. The maximum temperature represents that of fire (wherever present), whereas the mean temperature represents the average background temperature, for normalization. The fire and background populations show considerable variance, separating coal fire and background radiant temperatures. The cut-off temperature derived is the maximum temperature of the background cluster, above which all temperatures represent coal fires. In the case of the Landsat-8 data used in this study, the cut-off temperature was determined around 36.5°C (Figure 4). Based on this cut-offs, regional coal fire map was prepared (Figure 5).

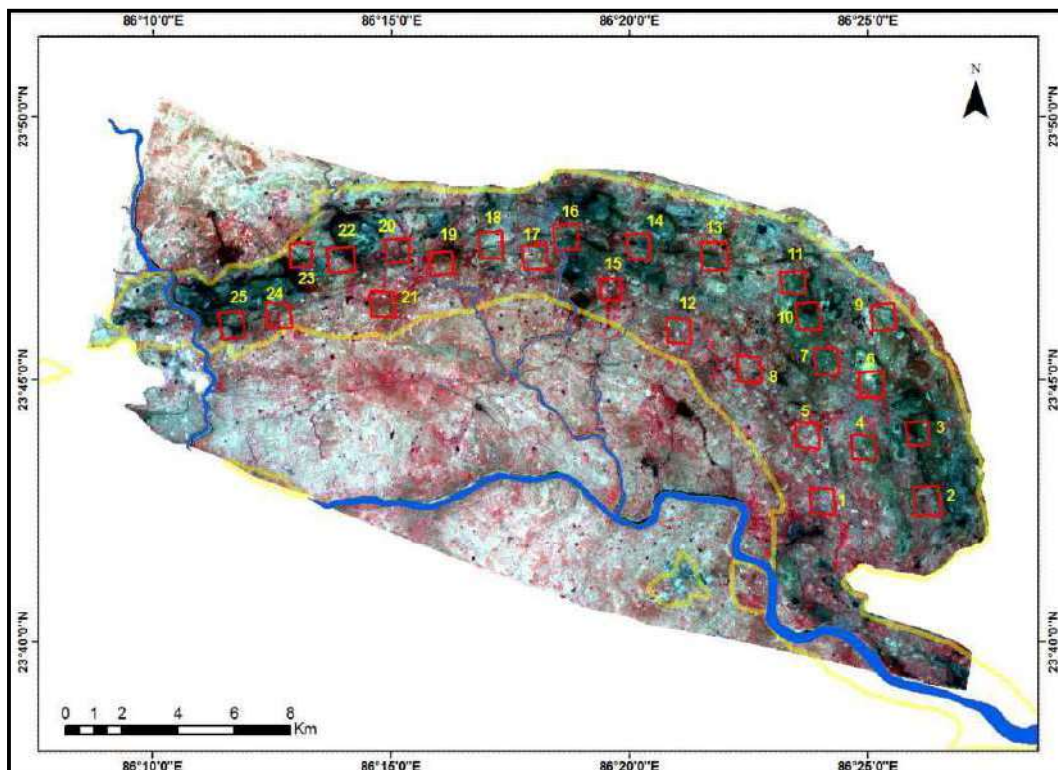


Figure 3. False colour composite image of Jharia Coalfield, with subset blocks (in red boxes) to obtain temperature values (from radiant temperature image) within the Barakar formation across the Jharia coalfield.

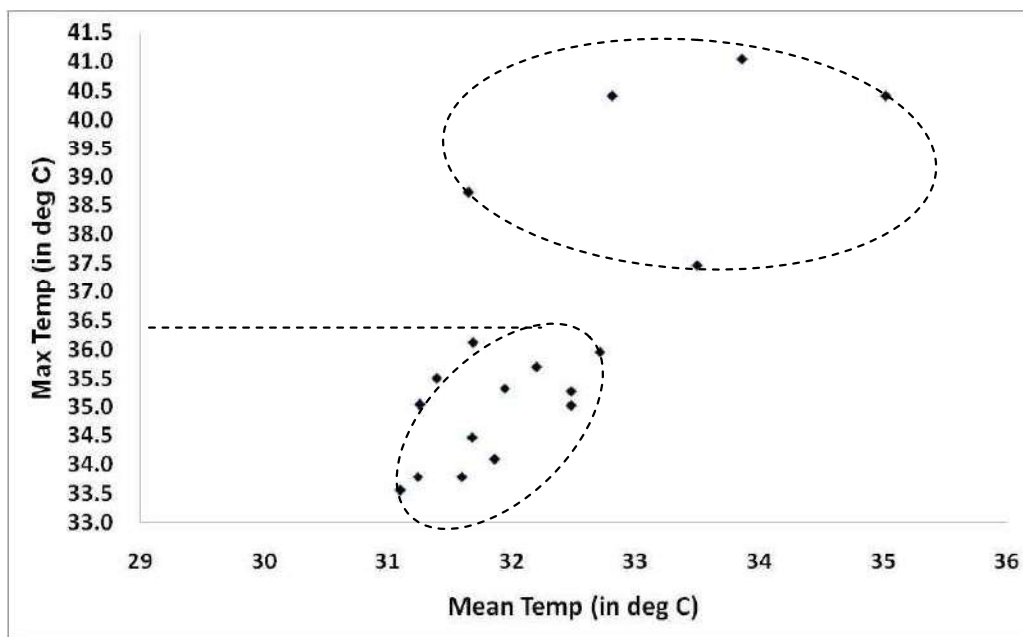


Figure 4. Maximum temperature plotted against mean temperature for various locations; cluster separation observed around 36.5 °C (marked with arrow)

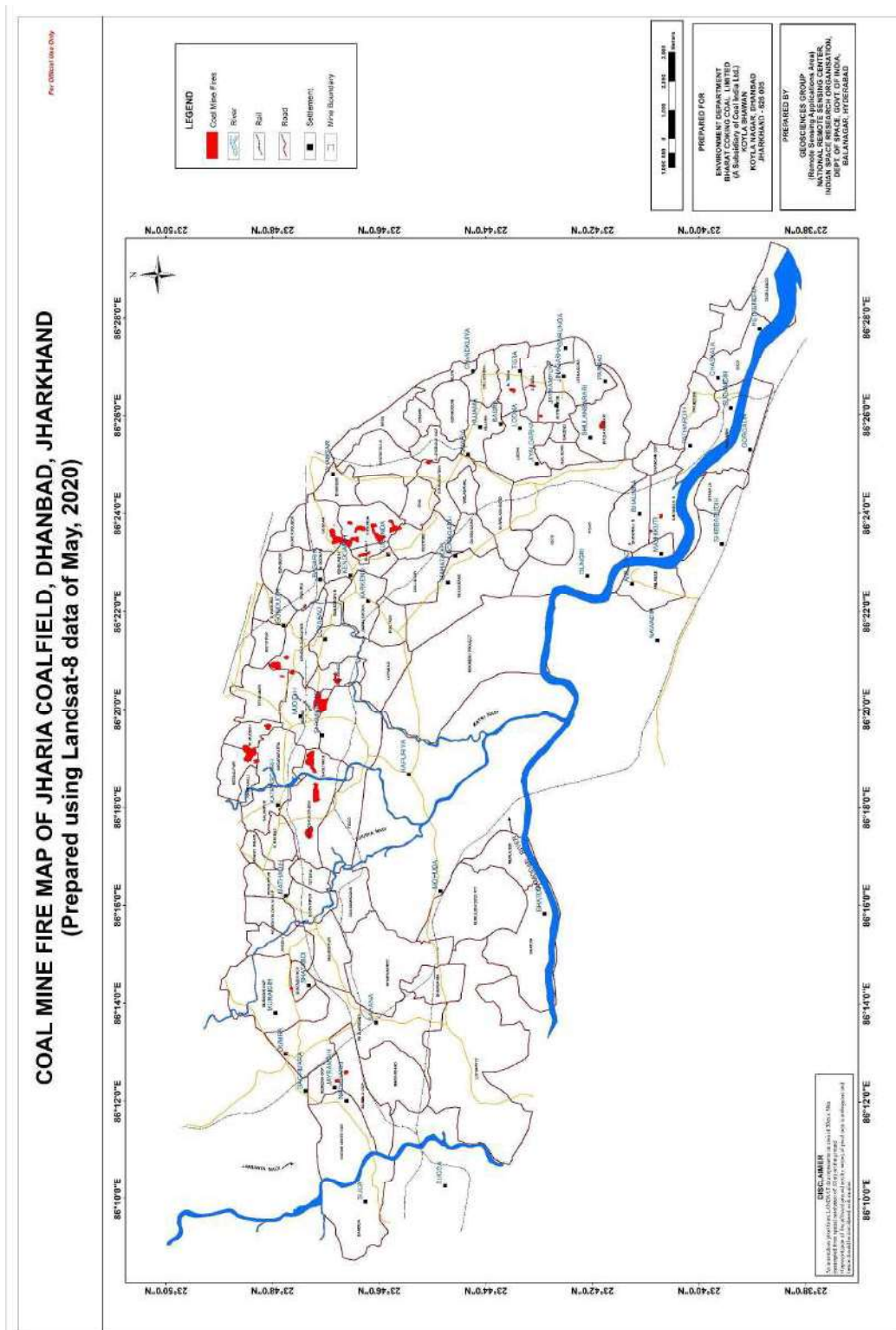


Figure 5: Coal mine fire map (May, 2020) of Jharia coal field, Dhanbad. The fire areas shown in this map have been verified in the field as per field points in figure 12.

4.2 Methodology For Subsidence Detection

4.2.1 Processing of ALOS-PALSAR 2 Data

Differential Interferometric SAR (DInSAR) techniques consist of combination of two SAR images of the same area acquired from slightly different positions (Figure 6).

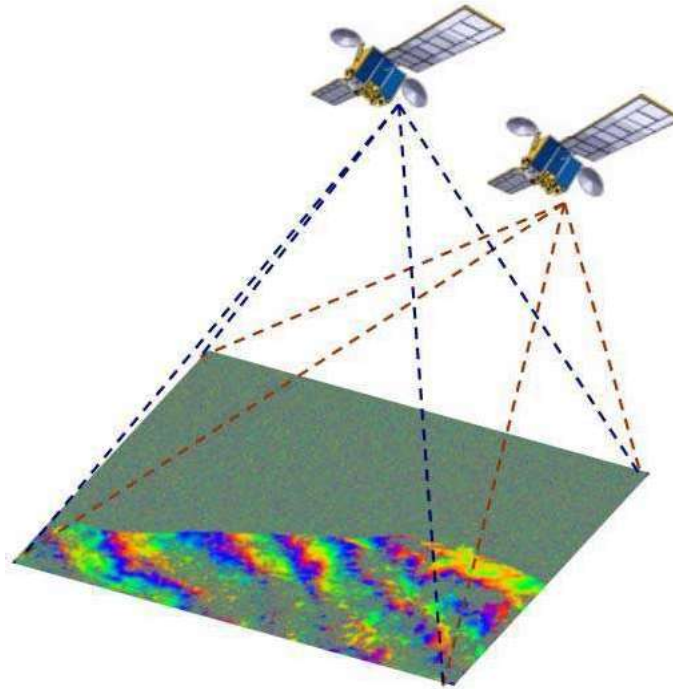


Figure 6. DInSAR acquisition scheme.

The result of this combination provides a new image, known as 'interferogram', whose phase component is formed by the following term:

$$\Delta\Phi_{Int} = \Phi_{Topo} + \Phi_{Mov} + \Phi_{Atm} + \Phi_{Noise} \quad (3)$$

where, Φ_{Topo} denotes the topographic component, Φ_{Mov} denotes the terrain deformation/ displacement component, Φ_{Atm} is the noise component and Φ_{Noise} is the thermal noise.

Topography, atmospheric effects and thermal noise needs to be removed or optimized to obtain precise measurements of terrain movement. When working with classical DInSAR interferograms (combination of two SAR images) the main problem is the presence of atmospheric artefacts, since there is no way to cancel them without a priori information. On the other hand, the term related with topography can be cancelled out using an external Digital Elevation Model (DEM) and the orbital ephemeris from the SAR acquisitions, considering no height errors on the DEM.

$$\Delta\Phi_{dif} = \Phi_{ErrorTopo} + \Phi_{Mov} + \Phi_{Atm} + \Phi_{Noise} \quad (4)$$

Since the coal mine area is very dynamic in terms of its surficial changes (open cast mine, abandoned mine, fire affected waste/reclaimed land, over burden dumps) over time, it is proposed to utilize an advanced DInSAR technique. It is a recent remarkable improvements in SAR differential interferometry that has led to an innovative approach based on the use of a large dataset of SAR images over the same area to overcome the intrinsic limitations of conventional DInSAR in terms of temporal and geometrical decorrelation as well as atmospheric disturbances (Carnec et al., 1996; Bürgmann et al., 2000).

Broad work flow diagram for generating land subsidence map using satellite based DInSAR technique is shown in Figure 7.

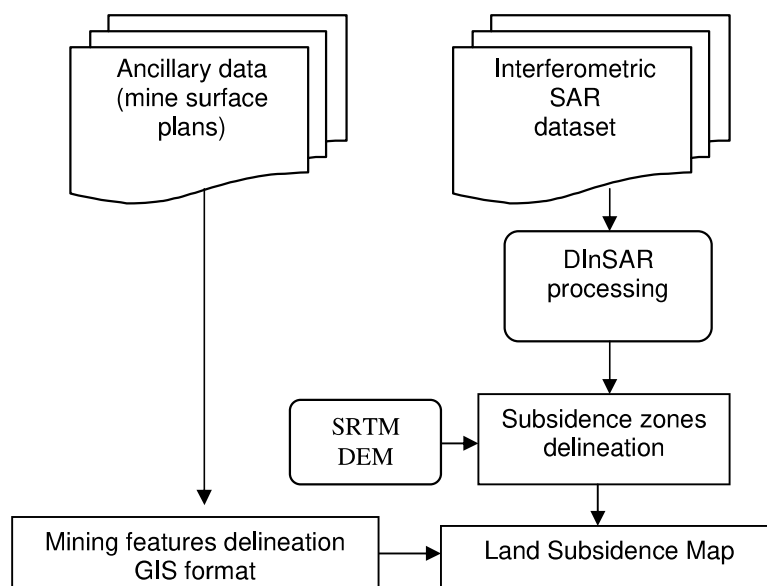


Figure 7. Work flow diagram for generating land subsidence map using DInSAR technique.

In the present study, 5 sets of ALOS-PALSAR L-band microwave data (as mentioned in table 1) were procured. The datasets were paired into master-slave pairs as per short and long temporal baselines. The short temporal base lines include master slave pairs of time difference of six months to one year, whereas long temporal baselines include data pairs of time difference of ~ one year.

This has been illustrated in figure 8.

		SLAVE IMAGE				
		30 September 2017	03 March 2018	19 January 2019	02 March 2019	29 February 2020
MASTER IMAGE	30 September 2017					
	03 March 2018					
	19 January 2019					
	02 March 2019					
	29 February 2020					
		Short Temporal Baseline Pair (less than 1 year)				
		Long Temporal Baseline Pair (~ 1 year)				

Figure 8. ALOS-PALSAR - 2 Master-Slave pairs for short and long temporal baseline processing

The interferometric fringes generating from short baseline pairs will generally indicate terrain changes due to mining activity happening over a short period of time. This will include mining excavations and creation of new OB dumps adjacent to the mining area. Any incidences of slow land subsidence will not be demarcated in the results (figure 9).

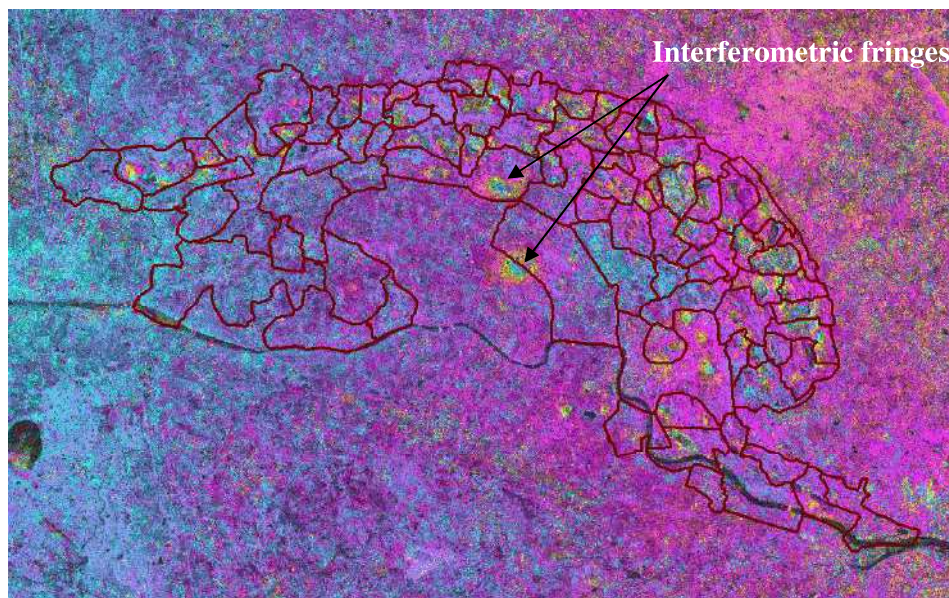


Figure 9. Fringe patterns generated from short baseline processing (e.g. Master: Oct, 19, Slave: Feb, 20).

On the other hand, master-slave pairs of long temporal baseline (approximately one year as shown in figure 8) will incorporate terrain changes due to mining activities as well, as long term ground subsidence from underground mining where ever present (figure10)

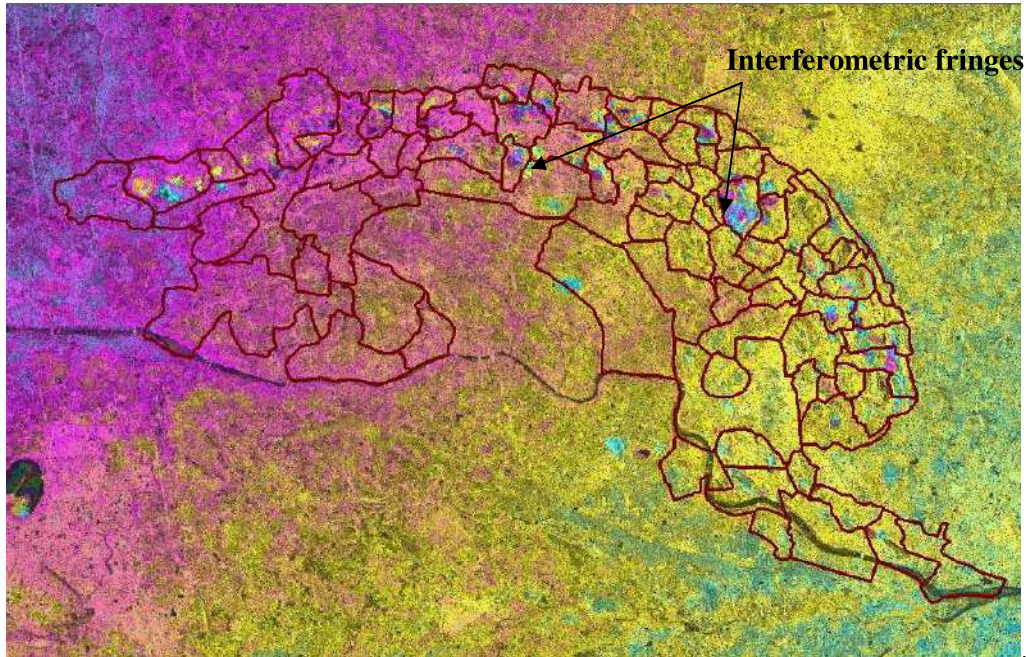


Figure 10. Fringe patterns generated from long baseline processing (e.g. Master: Sept, 17, Slave: Feb, 2020).

The results from the long and short baseline processing can be compared and zone where fringes have been developed due to terrain changes due to mining excavation and dumping, can be systematically identified and demarcated. The remaining fringes from the long temporal baseline processing will then indicated towards zones where subsidence has taken place due to underground mining. Using this, a subsidence map of the Jharia Coalfield was generated due to mining activities and subsidence areas (Figure 11).

LAND SUBSIDENCE MAP OF THE JHARIA COALFIELD, DHANBAD, JHARKHAND (Prepared using Palsar-2 data)

For CDRI (S) Data Only

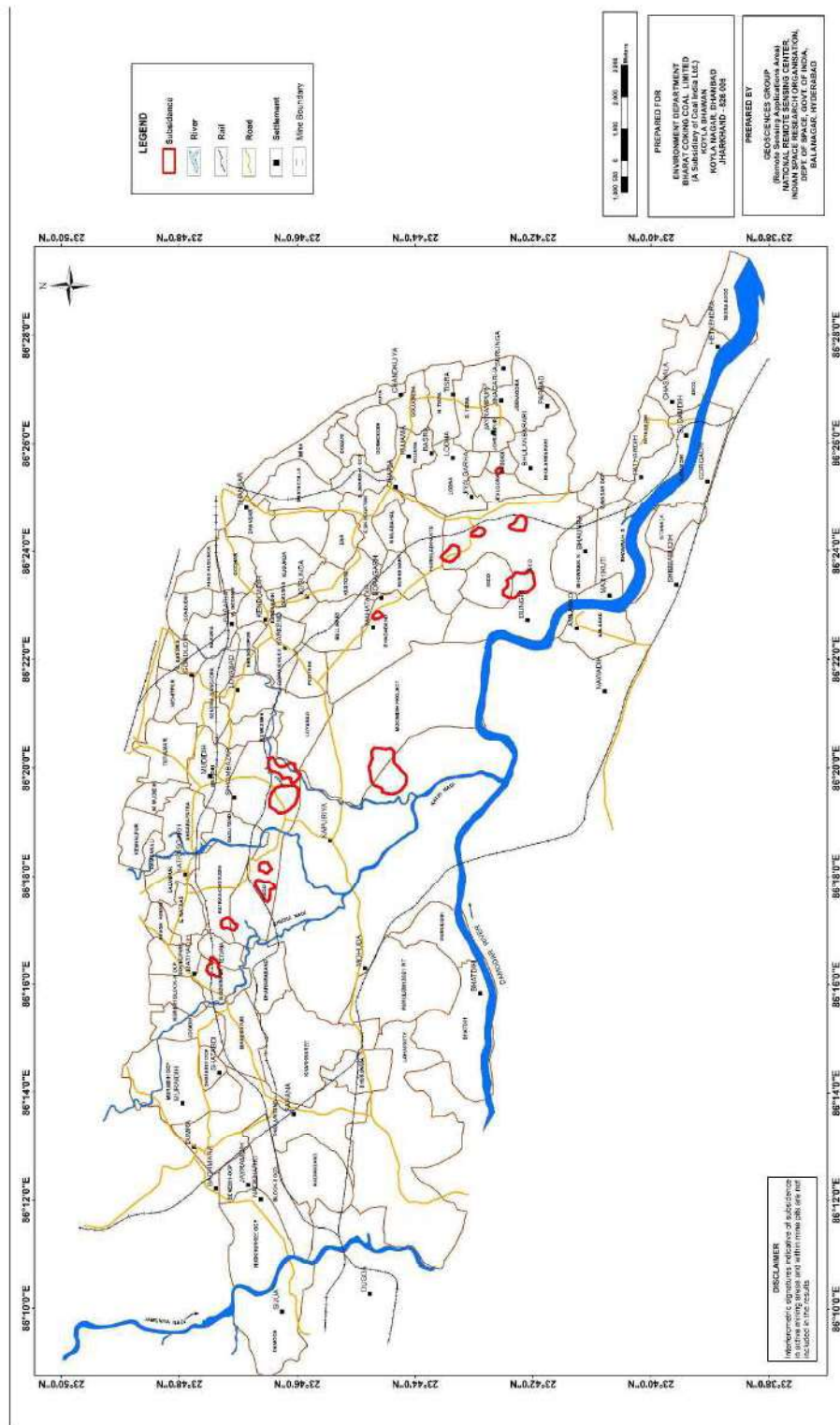


Figure 11: Subsidence map (2017-2020) of the Jharia coal field, Dhanbad.

CHAPTER V**FIELD WORK**

A field work for verification of the coal fire locations and the subsidence zones as identified by the satellite data were taken up during 2nd to 8th August, 2021. Both the coal fire and the subsidence locations were further independently verified by NRSC during the fieldwork. A total of 39 coal fire points and 13 land subsidence locations were identified from the satellite data analysis (figure 12). All 39 points were confirmed to be fire bearing as per the present status of fire in Jharia coalfield. The field observations of coal fire at each location are provided in table 3.

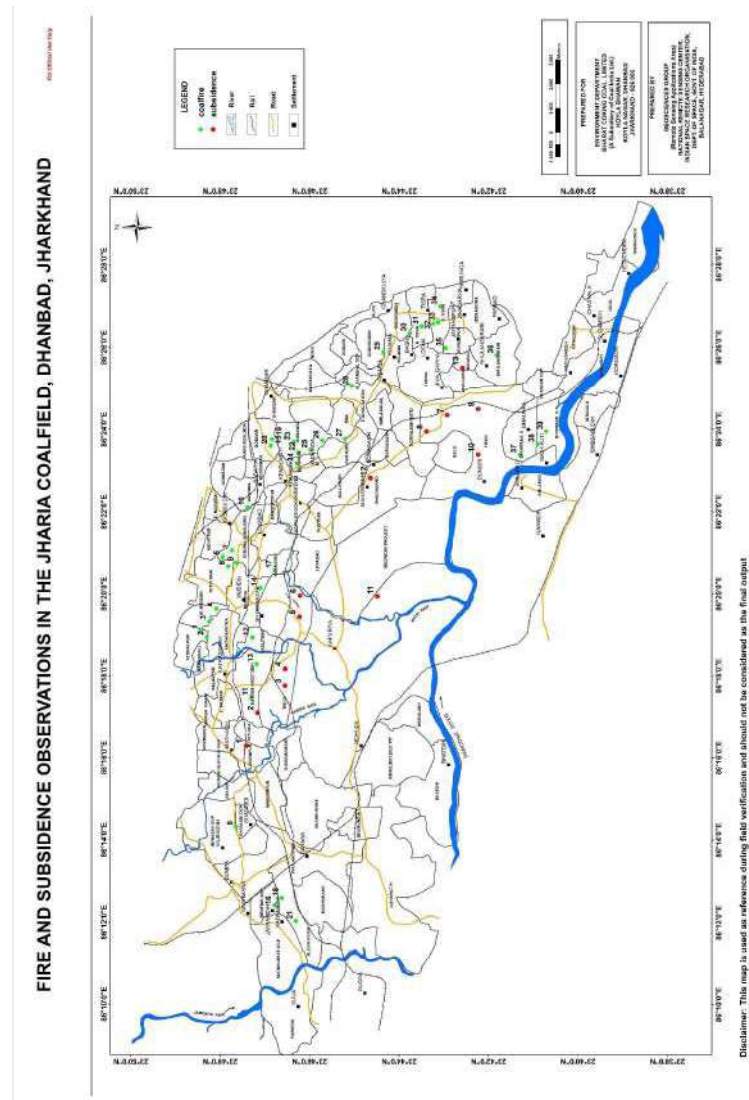


Figure 12. Field data points for coal fire and subsidence verification

Table 3: Summary of field observations (refer figure 12)

Field observation Point	Mine	Status of Fire (comments)*
1	Keshalpur	Active mine fire
2	Keshalpur	Active mine fire
3	W. Mudidih	Active mine fire
4	W. Mudidih	Active mine fire
5	Sendra Bansjora	Active mine fire
6	Tetulmari	Active mine fire
7	Sendra Bansjora	Active mine fire
8	Shatabdhi	Old Fire patch (minor fires)
9	Sendra Bansjora	Active mine fire
10	Sendra Bansjora	OB dump fire
11	Katras-Chotudih	Active mine fire (Confirmed by BCCL)
12	Gaslitand	Active mine fire
13	Katras-Chotudih	Active mine fire (Confirmed by BCCL)
14	Mudidih	Active mine fire
15	Godhar	Active mine fire
16	Benedih OCP	Active mine fire
17	Kankanee	Active mine fire
18	Block II OCP	Active mine fire
19	Kusunda	Active mine fire
20	Godhar	Active mine fire (High Risk)
21	Block II OCP	Active mine fire
22	Kusunda	Active mine fire
23	Kusunda	Active mine fire
24	Alkusha	Active mine fire
25	Kusunda	Active mine fire
26	Kusunda	Active mine fire
27	Ena	OB dump fire (small pockets of active mine fire)
28	R -OCP	Active mine fire
29	Goonhodih	Abandoned mine Fire(Fire cutting planned)
30	NT-ST	OB dump fire (small pockets)
31	NT-ST	Active mine fire (Ongoing mitigation measures)
32	NT-ST	Active mine fire (Ongoing mitigation measures)
33	NT-ST	Active mine fire (Ongoing mitigation measures)
34	NT-ST	Active mine fire (Ongoing mitigation measures)
35	Jayrampur	Abandoned mine Fire
36	Bhulanbarari	OB dump fire
37	Bhaura	OB dump fire (small pockets of active mine fire)
38	Bhaura	OB dump fire (small pockets of active mine fire)
39	Bhaura	OB dump fire (small pockets of active mine fire)

* Fire Temperature reading from hand held IR thermometer were seen to be inconsistent due to rains and wet ground condition and hence are not reported.

Subsidence location observations:

1. Subsidence locations as identified by the data are difficult to verify in the field, unless there are tell-tale signatures like large cracks or fissures on the ground or damage to anthropogenic constructions like vertical cracks on building cracks etc.
2. Out of the 13 identified subsidence locations from the microwave data, the main area where subsidence is occurring in a pervasive scale is that in the Moonidih Underground Project. The Moonidih Project is an underground long wall mine where excavations are going on for over decades. This may have resulted in pervasive subsidence in the region. The signatures of subsidence such as sagged ground are observed in the area.
3. Three other minor subsidence areas are identified within the South Govindpur, Bhagaband and Bagdigi mines, where old underground workings are present. However, there was no clear evidence of subsidence from the field based observations.
4. The 9 other locations where subsidence is seen from microwave data, falls within the mining lease of TISCO and IISCO, hence are not under the purview of BCCL mining authorities.

DISCUSSIONS AND CONCLUSIONS

CHAPTER VII

7.1 Discussions

7.1.1 Coal fire analysis

The present study is aimed to provide the status of coal fire in the Jharia coal field for the period of 2020. Landsat-8 data of 22 May, 2020 was used to prepare the coal mine fire map (Figure 5) for the year 2020. The data have 100 m spatial resolution in the thermal bands and is as on study date, the best thermal satellite data available. The Coal fire maps of 2020 when compared to map of 2017 (NRSC, 2017) depicts the dynamics of coal fire. Coal fire is difficult to mitigate because of its dynamic nature. But the understanding the trend in the shift of coal fire zones and over all distribution of coal fire will help in environmental and risk management related to coal mining activities.

The coal mine fire map for the year 2020 (Figure 5) illustrates the overall fire distribution in the area. The maps reveal that the coal fires are distributed across the Jharia coal field in pockets associated with major open cast mining activities. All most all the coal mine fires are restricted to the Barakar Formation where coal seams are exposed. In the eastern flank of the arcuate shaped mining extent, the collieries in Tisra (North and South) and Bhaura, Bhulanbarari and R-OCP are affected by multiple small fire pockets. In Bhaura, the fire is seen mostly in OB dumps with minor presence of active mine fires. Similarly in Bhulanbarari, fire is seen in the OB dump only. The North and South Tisra mines have visible presence of fire, mostly manifested by high temperature fume cracks. Active fires are also seen in the R-OCP. Further, towards the north east, in Ena, Alkusha and Kusunda active fires are more prevalent and the area is extensively affected. The highest radiant temperatures (in order of $\sim 50^{\circ}\text{C}$) are recorded by the satellite sensors in these areas. In the north, a large number of moderate to small fire pockets are seen in the areas around the related to the mining areas of Katras, Gaslitand, Mudidih and Sendra Bansjora. In the western flank, three distinguishable fire affected zones are seen. Toward the western end of the mining area, the Benedih and Block II OCP are affected by smaller fires from isolated coal seams. An older fire patch is also seen in the Shatabdi mine.

Comparison of the 2020 coal fire map with that of 2017 (NRSC, 2017) indicated the dynamism in the spatial extent and distribution of the coal fires. The changes are highlighted as follows:

- i. In reference to the map generated in 2017, the 2020 map shows that the significant decrease of fires in the eastern flank, namely Bhaura, Tisra (North and Soth), Lodna and R-OCP etc. Similar decrease is also observed in Bastacolla and Bhulanbarari.
- ii. The areal extent of major fire zone around Kusunda and Ena also appears to have decreased with change in the spatial location of the anomalies. This is probably due to the mitigation and active fire mining in this region.
- iii. The fire zones in Benedih/Block II OCP and Shatabdi OCP have also changed/diminished in areal extent with presence of isolated smaller anomalies.
- iv. The spatial disposition of fire areas around Katras, Keshalpur, Gaslitand and Mudidih show minor increase. The fire pockets observed in 2017, have given away to a few fire zones of moderate disposition.

In summary, there is a change in the areal disposition of the fires from 2017 to 2020. Satellite and field observations both suggest that there has been an overall decrease in the extent of fire in the JCF. A quantitative comparison of the 2017 and 2020 data was carried out. As compared 2017, when the total fire affected extent of the JCF was about 3.28 km²; in 2020 total fire affected extent is about 1.89 km² (including TISCO mines). Within the mining lease of BCCL (excluding TISCO) in comparison 2017, when the total fire affected extent of the JCF was about 3.27 km²; in 2020 total fire affected extent is about 1.86 km². The colliery wise break-up of change in fire area from 2017 to 2020 is given in Annexure-I. Herein, it should be noted that the minimum mapable unit from satellite image is 30m by 30m or 0.0009 km².

7.1.2 Subsidence analysis

An attempt to identify subsidence zones in the Jharia Coalfield was also carried out using ALOS-PALSAR-2 L band microwave data using differential interferometric technique. 5 scenes of PALSAR-2 data spanning over a period of 2017 to 2020 were used to delineate the subsidence if any in the region and separately identify them from the terrain changes due to mining. Verification of the subsidence zones as seen from

data is difficult as it requires visible signatures of subsidence in the form of cracks on the ground and damage to anthropogenic structures. In this study, data analysis and consequent field verification resulted in identification of 4 subsidence areas, within the BCCL mine boundary. Of these, the major area where considerable ground subsidence is occurring is the Moonidih UG project. Long term underground mining has resulted in continuous subsidence in the area. Apart from this, the other three areas are south of South Govindpur, Bagdigi and Bhagaband mines, however, the field evidences of the same are not conclusive. No quantitative estimates of the subsidence have been carried out in the study.

7.2 Conclusions

The following conclusions can be made:

1. As of the date of study in the year 2020 and in comparison with the previous study done in 2017, there has been a change in areal extent and disposition of the fire affected areas. On the other hand, persistent subsidence is seen in the Moonidih area due to underground mining activities.
2. Compared to 2012, the eastern flanks (Lodna, Tisra, Bhulanbarai areas) show considerable decrease in fire disposition and the western flank (Shatabdi and Block II area) show diminished fire presence.
3. The fires are continuation of existing fire affected areas as seen in the 2017 study.
4. The mines in Kusunda remain to be the worst affected with maximum presence of active fires.
5. There is a decrease in areal extent of the fire from 2017 to 2020. As compared 2017, when the total fire affected extent of the JCF was about 3.28 km²; in 2020 total fire affected extent is about 1.89 km² (including TISCO mines). Within the mining lease of BCCL (excluding TISCO) in comparison 2017, when the total fire affected extent of the JCF was about 3.27 km²; in 2020 total fire affected extent is about 1.86 km².

Note: The minimum mapable unit from satellite image is 30m by 30m or 0.0009 km². Estimations of fire extent (in terms of sq.km.) both in 2017 and in the present 2020 study are pixel based. They may differ from the actual ground area under fire. These estimations are made for comparative purpose only, to indicate the increase or decrease of areal disposition of fire. Hence, they should not be quoted as fire area on the ground.

CHAPTER VIII

LIMITATIONS

Delineation and mapping of coal fire from thermal data of remote sensing platforms carries with it some inherent limitations which needs to be understood in order to decipher the results obtained from it. This will assist in deducing the correct information and remove any ambiguity associated with the results. The key limitations of the data and the results obtained are as follows:

- 1) An anomalous pixel from LANDSAT data represents an area of 30m x 30m (resampled from spatial resolution of 100m) on the ground whose temperature is considerably higher than its surroundings. This can be attributed to two circumstances, namely the area has a very high intensity fire located within a smaller pocket or there are a number of low intensity fires spread across it. In both the mentioned cases the actual areal extent of the fire on the surface differs, but appears as a single anomalous pixel in the data. Hence, representation of fire affected ground area by means of pixel area is ambiguous and hence should be considered with caution.
- 2) There are locations as observed during the fieldwork, where coal seams are affected by active fires along vertical/semi-vertical sections of open cast mines (see cover page). In such cases, the actual areal expression of the fire affected area as seen by the sensor changes considerably and the representation from the same is not accurate.
- 3) As discussed in section 4.1.2, thresholding the data to separate the fires from the non fire areas, is a statistical technique. However, this method is dependent on how the temperature of non-fire background area is distinctive from the fire temperature.
- 4) The background temperatures vary with the time of the day when the data are collected, topography, and season of the year when the data is acquired. Night-time data has lower background temperature as compared to day-time. Similarly a data collected in October-November will have a considerably lower background temperature than that collected in May-June due to seasonal temperature variations. Hence, identification of the background temperature range becomes essential in

estimation of threshold temperature and the same varies depending upon the discussed controlling factors.

6) Due to the mitigation measures taking place in various mines, it is seen that in a number of places the fire affected seam is excavated and dumped as overburden. However, these overburden dumps retain the excavated burning coals and thus are seen to have active fires occasionally. There lies a possibility that the same will be identified as anomalous pixels and hence, although the fire is not a part of any active coal seam, it will be included as a fire affected area in the final map.

7) Considering the precision of DInSAR data for different wavelengths, topographic and atmospheric errors, slow subsidence rates may not be detected. Further, the displacement measured is along the line of sight of the sensor and not vertical displacement.

8) Temporal decorrelation and noise due to adverse land use and land cover may affect DInSAR based detection and monitoring of land subsidence. Changes in vegetation pattern over time can cause significant decorrelation between the master and slave image, thus producing a very low coherent output. Under such conditions, subsidence information may not be retrieved.

9) Verification of the subsidence zones as detected from the interferometric technique is sometimes difficult due to lack of observable signatures of subsidence such as cracks on the ground and damage to anthropogenic structures.

Therefore, in quantitative estimation of fire affected areas and areas denoted as subsidence, the above mentioned limitations need to be taken into account diligently, as it is inevitable that the area estimate will not define the actual fire/subsidence affected area on the ground. However, the areal extent estimated from the data can be "like to like" compared to earlier estimates of similar studies to understand the change and dynamism of the fire in terms of area affected and spatial disposition.

References

1. Gangopadhyay, P.K., Lahiri-dutt, K., Saha, K. (2005): "Application of remote Sensing to identify coal fires in the Raniganj coal belt, India." *Int. Jour of Applied Earth Observation and Geoinformation*.
2. Gangopadhyay, P.K., Malthuis.B, Van Dink (2005): "Aster Derived emissivity and coal-fire related surface temperature anomaly a case study in Wuda, North China," *Int. Jour. of Remote Sensing*, vol-26, No.-24, pp-5555-5571.
3. Schmugge, T., French, Ritchie, J.C., Rango, A., Pelgrum, H. (2002): "Temperature and emissivity separation from multispectral thermal infrared observation," *Remote Sensing of Environment*, 79, pp-189-198.
4. Saraf A.K., Prakash A., Sengupta, S., Gupta, R.P (1995): "Landsat-TM data for estimating ground temperature and depth of sub-surface coal fire in the Jharia coalfield, India," *Int. Jour. Remote sensing vol-16, no-12*, 2111-2124.
5. Gangopadhyay P.K., (2003): "Coalfire detection and monitoring in Wuda, North China, A multispectral and multi-sensor approach:-Ph.D. Thesis, ITC Netherland.
6. Gupta, R.P. (2003): "Remote Sensing Geology", *Springer-Verlag.Third ed.*pp-183-216.
7. Kealey, P.S and Hook S.J(1993): "Separating temperature and emissivity in thermal infrared Multispectral Scanner Data: Implication for recovering land surface temperatures", *IEE Transaction on Geoscience and Remote Sensing*,vol,31,no-6,pp-1155-1164
8. Zhang, J., Wagner, W., Prakash, A., Mehl,H. and Voigt,S.(2004): "Detecting coal fires using remote sensing techniques," *Int. Jour. Remote sensing*, vol-25, no-6, pp 3193-3220.
9. Bhattacharya, A. and Reddy, C.S.S. (1995): Inventory and monitoring of underground and surface coal mine fire in Jharia coalfield, Bihar using thematic mapper thermal IR data: *Geosciences Group, Official report, NRSA*.
10. Coal mine fire delineation and surface features mapping using satellite data in Jharia coal field, Dhanbad, Jharkhand. Geology and Geophysics division. *Official report, NRSA, 2006*
11. Coal mine fire delineation and surface features mapping using satellite data in Jharia coal field, Dhanbad, Jharkhand. Geosciences Group. *Official report, NRSC, 2014*
12. Coal mine fire delineation and surface features mapping using satellite data in Jharia coal field, Dhanbad, Jharkhand. Geosciences Group. *Official report, NRSC, 2017*.

13. Carnec C, Massonnet D, King C (1996) Two examples of the use of SAR interferometry on displacement fields of small spatial extent. *Geophysical Research Letters* 23:3579–3582, 10.1029/96gl03042.
14. Bürgmann R, Rosen PA, & Fielding EJ (2000). Synthetic aperture radar interferometry to measure Earth's surface topography and its deformation. *Annual review of earth and planetary sciences*, 28(1), 169-209

Annexure –I

Colliery wise break-up of change in fire area from 2017 to 2020

COLLIERY AREA NAME	FIRE AREA 2017 (SQ. KM.)	FIRE AREA 2020 (SQ. KM.)	AREA CHANGE (SQ. KM.)	Increase/Decrease
BENEDIH OCP	0.045	0.020	-0.026	DECREASE
BLOCK-II OCP	0.135	0.034	-0.101	DECREASE
MURAIIDH OCP	0.002	0.006	0.004	INCREASE
SHATABDI OCP	0.036	0.005	-0.031	DECREASE
PHULARITAND	0.021	0.000	-0.021	DECREASE
KATRAS-CHOITUDIH	0.137	0.214	0.077	INCREASE
KESHALPUR	0.001	0.134	0.132	INCREASE
BASURIA	0.000	0.012	0.012	INCREASE
TETULMARI	0.022	0.011	-0.011	DECREASE
GODHAR	0.000	0.132	0.132	INCREASE
INDUSTRY	0.051	0.000	-0.051	DECREASE
KUSUNDA	0.740	0.399	-0.340	DECREASE
SENDRA-BANSJORA	0.027	0.110	0.083	INCREASE
BASTACOLLA	0.081	0.000	-0.081	DECREASE
GOLUCKDIH	0.112	0.000	-0.112	DECREASE
KUJAMA	0.240	0.000	-0.240	DECREASE
S. JHARIA-R. OCP	0.112	0.010	-0.102	DECREASE
GONHOODIH	0.032	0.001	-0.031	DECREASE
ENA	0.043	0.004	-0.040	DECREASE
N. TISRA	0.180	0.031	-0.149	DECREASE
LODNA	0.353	0.000	-0.353	DECREASE
S. TISRA	0.102	0.021	-0.081	DECREASE
BARAREE	0.107	0.040	-0.068	DECREASE
KENDUADIH	0.000	0.001	0.001	INCREASE
GASLITAND	0.122	0.156	0.034	INCREASE
KANKANEE	0.052	0.057	0.004	INCREASE
MUDIDIH	0.110	0.220	0.110	INCREASE
LOYABAD	0.006	0.000	0.079	DECREASE
E.BHUGGATDIH	0.021	0.020	-0.001	DECREASE
ALKUSHA	0.029	0.046	0.016	INCREASE
KUSTORE	0.046	0.014	-0.032	DECREASE
ANGARAPATRA	0.015	0.036	0.021	INCREASE
BHOWRAH. N	0.098	0.006	-0.092	DECREASE
BAGDIGI	0.021	0.000	-0.021	DECREASE
JEALGORA	0.007	0.000	-0.007	DECREASE
JEENAGORA	0.047	0.000	-0.047	DECREASE
JOYRAMPUR	0.104	0.011	-0.093	DECREASE

TOTAL AREA	3.3	1.8	1.5	DECREASE
Note:				
1) The minimum mapable unit from satellite image is 30m by 30m or 0.0009 km²				
2) "INCREASE" implies, increase in fire area OR emergence of fire areas not identified in 2017 study				
3) "DECREASE" implies, decrease in fire area OR fire areas in 2017 not identified in present study (either absent or below sensor resolution)				
4) Values marked in "blue" are collieries where fire has been reported in 2017 study but presently shows no such signatures.				

Annexure –II

Figure 13: Active fires in Keshalpur-West Mudidih. (Points 1, 2, 3 & 4 in figure 12)



Figure 14: Active fires in Sendra-Bansjora Mines (Points 5, 6, 7 & 9 in figure 12)



Figure 15: OB dump fires in Sendra Bansjora (Points 10 in figure 12)



Figure 16: Active fires in Godhar-Kusunda Mines (Points 20 to 24 in figure 12)



Figure 17: Fire in R-OCP. (Point 28 in figure 12)



Figure 18: Active fires in N-S Tisra mines (Points 31-33 in figure 12).



Figure 19: Subsidence area in Bagdigi Mines



Figure 20: Subsidence (sag ponds) around Moonidih mine area

Annexure –III

Coordinates of Fire locations.

Mine	UTM_X	UTM_Y	Longitude	Latitude
Keshalpur	430560.28	2633068.44	86.3183	23.8074
Keshalpur	430287.86	2632817.14	86.3156	23.8051
W. Mudidih	430935.00	2632710.00	86.3220	23.8042
W. Mudidih	431468.57	2632417.14	86.3273	23.8015
Kendra Bansjora	433626.56	2632140.94	86.3484	23.7991
Tetulmari	433245.00	2631915.00	86.3447	23.7971
Kendra Bansjora	433899.00	2631765.00	86.3511	23.7958
Shatabdhi	422415.00	2631645.00	86.2384	23.7942
Kendra Bansjora	433383.75	2631563.75	86.3461	23.7939
Kendra Bansjora	435666.92	2631113.08	86.3685	23.7899
Katras-Chotudih	427797.06	2630997.35	86.2913	23.7886
Gaslitand	430270.06	2630936.18	86.3156	23.7881
Katras-Chotudih	429170.29	2630763.09	86.3048	23.7865
Mudidih	432313.36	2630596.98	86.3356	23.7851
Godhar	438450.00	2630085.00	86.3959	23.7808
Benedih OCP	419198.18	2630070.00	86.2069	23.7798
Kankanee	433072.50	2629995.00	86.3431	23.7797
Block II OCP	419491.36	2629772.73	86.2098	23.7771
Kusunda	438532.86	2629547.14	86.3967	23.7759
Godhar	438187.50	2630145.00	86.3933	23.7813
Block II OCP	418545.00	2629200.00	86.2006	23.7719
Kusunda	437910.00	2629005.00	86.3906	23.7710
Kusunda	438335.37	2629195.97	86.3948	23.7727
Alkusha	437452.80	2629068.00	86.3861	23.7715
Kusunda	438007.50	2628495.00	86.3916	23.7664
Kusunda	438392.33	2628011.36	86.3954	23.7620
Ena	438465.00	2627070.00	86.3962	23.7535
R -OCP	440644.55	2626785.45	86.4176	23.7510
Goonhodih	442050.00	2625480.00	86.4314	23.7393
NT-ST	442815.00	2624385.00	86.4389	23.7294
NT-ST	443100.00	2623890.00	86.4418	23.7250
NT-ST	443205.00	2623410.00	86.4428	23.7206
NT-ST	443253.33	2623211.67	86.4433	23.7189
NT-ST	443910.00	2623110.00	86.4497	23.7180
Jayrampur	442200.00	2622915.00	86.4330	23.7161
Bhulanbarari	441898.64	2620804.77	86.4301	23.6971
Bhaura	437768.57	2619865.71	86.3896	23.6884
Bhaura	438202.50	2619131.25	86.3939	23.6818
Bhaura	438720.00	2618775.00	86.3990	23.6786

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

(FOR THE MONTH APRIL, 2024)

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



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

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EXECUTIVE SUMMARY

1.0 Introduction

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

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

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

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

2.2 Water sampling stations

The Water sampling stations were selected for mine discharge water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM₁₀), Fine Particulate Matter (PM_{2.5}), Sulphur Di-oxide

(SO₂) and Nitrogen Oxides (NO_x). Respirable Dust Samplers (RDS) were used for sampling of PM₁₀, SO₂, & NO_x and Fine Dust Sampler (PM_{2.5} sampler) were used for sampling of PM_{2.5} at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analyzed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

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

3.3 Noise level monitoring

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

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like PM₁₀, PM_{2.5}, SO₂ and NO_x are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM₁₀& PM_{2.5} exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

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

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

4.2 Water quality

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

4.3 Noise Level

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

INTRODUCTION

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

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

- 1.1 The Cluster-XIII is in the Northern part of the Jharia coalfield. It includes a group of 7 Mines (viz. Murlidih, Bhurungiya, Mucharadih, Hantoodih, Padugora, Murlidih 20/21 Pits & Bhatdih. The Cluster – XIII is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster – XIII are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Katri River & Damodar River..

- 1.2 The Cluster-XIII is designed to produce 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal production vide letter no. J-11015/11/2010-IA.II (M) dated 06th June, 2013.

Ministry of Environment, Forests and Climate Change while granting environmental clearance has given one of the General conditions that “ Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM₁₀, PM_{2.5}, SO₂, NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.” And other conditions regarding water / effluent and noise level monitoring.

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

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

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

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Murlidih 20/21 (A19): Industrial Area

The location of the sampling station is 23°43' 51.82" N & 86° 16' 21.17" E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

II. BUFFER ZONE Monitoring Location

i) Lohapatti (A20)

The location of the sampling station is 23°44'29.42" N & 86°16'49.96" E. The sampler was placed at a height of approx. 1.5m above ground level at Safety Office.

ii) Kharkharee CISF Office (A21)

The location of the sampling station is 23°46' 29.00" N 86° 14' 37.08"E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

ii) Dumarda (A31)

The location of the sampling station is 23° 42' 50.00" N 86° 15' 4.00"E. The location was selected for studying the impact of the mining activity on the DuAPRILda village as it lies in the buffer zone for the Cluster

AMBIENT AIR QUALITY DATA



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

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Test Report for Ambient Air Samples

Month & Year		04/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000754F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	10.06.24
Project		Murlidih 20/21	Sample Ref. No.	REM/BCCL/2024/04	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		08.04.2024	25.04.2024	Period of Analysis	08.04.24	21.05.24	Zone of Station:	Core Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN A2004	2nd FN A2060				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	86	90	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	37	42	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	12	10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	31	24	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
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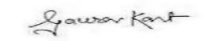
Test Report for Ambient Air Samples

Month & Year		04/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000754F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	10.06.24	
Project		Lohapatti		Sample Ref. No.	REM/BCCL/2024/04	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		13.04.2024		30.04.2024	Period of Analysis	13.04.24	21.05.24	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis	of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
				1st FN A2024	2nd FN A2080				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		80	87	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019		35	44	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		31	33	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


(Gaurav Kant)
REVIEWED BY


(Amit Raj Mishra)
Authorised Signatory

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Ambient Air Quality Test Report

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Test Report for Ambient Air Samples

Month & Year		04/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000754F			
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	10.06.24			
Project		Kharkharee		Sample Ref. No.	REM/BCCL/2024/04		Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		06.04.2024		24.04.2024	Period of Analysis	06.04.24		21.05.24		Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009			
			1st FN A2001	2nd FN A2056							
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	131	95	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100			
2	PM _{2.5}	IS -5182(Part 24):2019	68	57	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60			
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	11	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80			
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	24	26	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80			

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

[Signature]

ANALYSED BY

[Signature]

(Gaurav Kant)
REVIEWED BY

[Signature]

(Amit Raj Mishra)
Authorised Signatory

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Test Report for Ambient Air Samples

Month & Year		04/2024	Cluster	XIII				ULR No.	TC1012224000000754F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	10.06.24
Project		Dumarda		Sample Ref. No.	REM/BCCL/2024/04	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		08.04.2024		25.04.2024	Period of Analysis	08.04.24	21.05.24	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN A2005	2nd FN A2061					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	81	79	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	48	45	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	11	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	25	26	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

[Signature]

ANALYSED BY

[Signature]

(Gaurav Kant)
REVIEWED BY

[Signature]

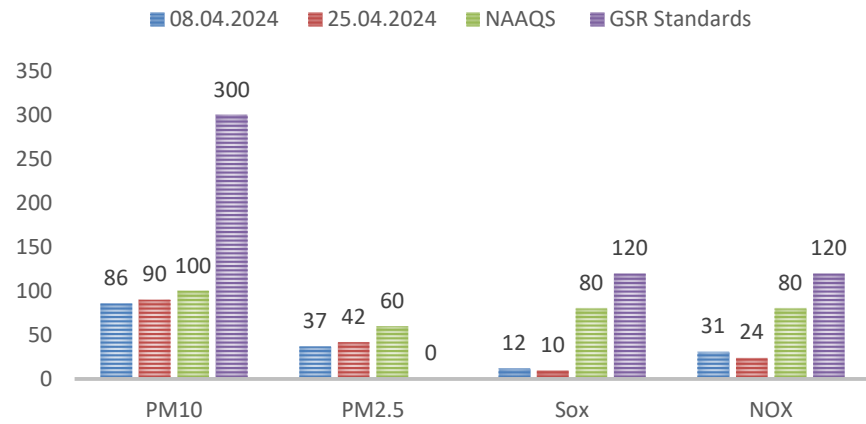
(Amit Raj Mishra)
Authorised Signatory

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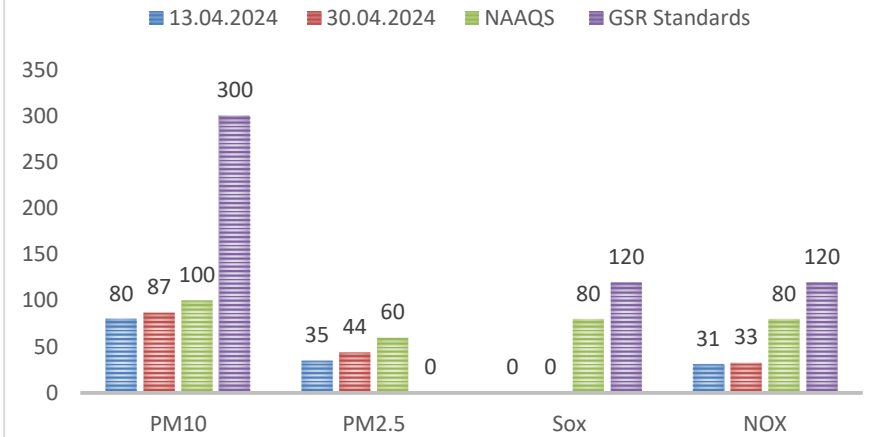
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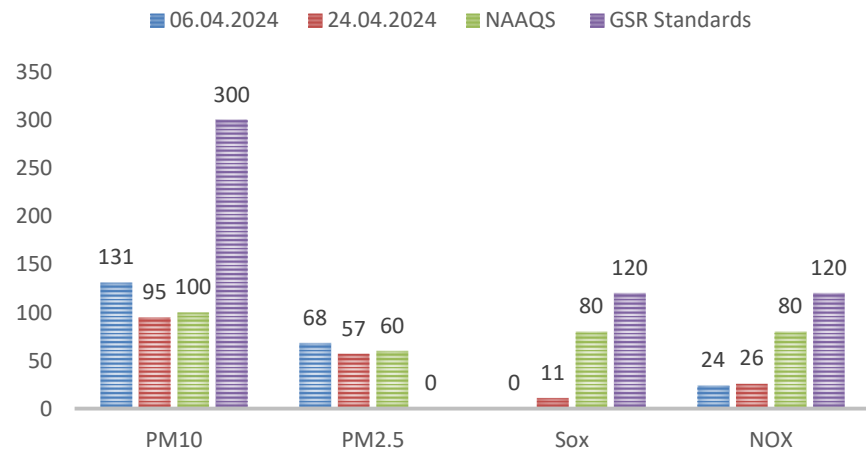
AMBIENT AIR QUALITY AT MURLIDIH 20/21



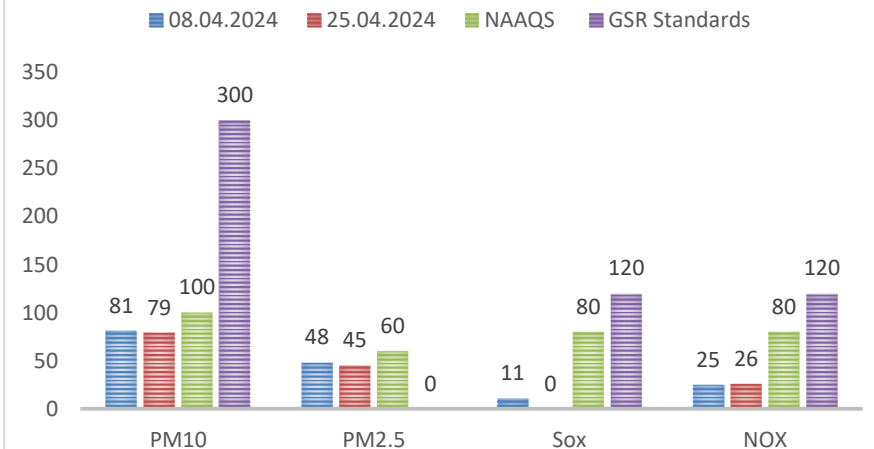
AMBIENT AIR QUALITY AT LOHAPATTI



AMBIENT AIR QUALITY AT KHARKHAREE



AMBIENT AIR QUALITY AT DUMARDA



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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
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Test Report for Mine Effluent samples

Month & Year	04/2024	Cluster	Cluster XIII		ULR No.		TC1012224000000771F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	10.06.2024	
Project		Sampling Ref. No.	REM/BCCL/2024/04		Sampling Method		IS 3025 (Part-1) CMPDI/RI-II/LPM 13	
Sampling Stations	(i)	Murlidih 20/21	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	01.04.24 to 03.05.24	
			Date of Sampling		15.04.2024	29.04.2024		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight M0856	Second Fortnight M0879				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	37	39	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	8.01	8	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	40	32	250 (Max)	4		

***Grab sampling carried out for water samples **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

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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 during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. 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 & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night 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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDIL, RI-II
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Month & Year	04/2024	Cluster	Cluster XIII					ULR No.	TC1012224000000788F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	10.06.2024
Project			Sample Ref. No.		REM/BCCL/2024/04		Sampling Method		CMPDI/RI-II/LPM 22	
Sampling Stations	i	Murlidih		Date of Sampling		08.04.2024	25.04.2024	Zone Category of Station:		Core Zone
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
			First Fortnight	Second Fortnight				Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	51	50.9	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	51.1	51.3						
3		08:00 - 09:00	53.3	54.4						
4		09:00 – 10:00	52.5	53.5						
5		10:00 - 11:00	55.5	55.5						
6		11:00 - 12:00	56	55.6						
7		12:00 - 13:00	57.6	58.7						
8		13:00 - 14:00	58	58.1						
9		14:00 - 15:00	58.5	58.7						
10		15:00 - 16:00	59.7	60.8						
11		16:00 - 17:00	59.5	59						
12		17:00 - 18:00	57	57						
13		18:00 - 19:00	53.5	54.4						
14		19:00 - 20:00	53.2	53.5						
15		20:00 - 21:00	52.1	52.1						
16		21:00 - 22:00	51.9	51.8						
		Leq DAY	56.0	56.4						
1	Noise Level dB(A)Leq -Night	22:00-23:00	39.4	39.6	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	39	39.5						
3		00:00- 01:00	38.7	39.2						
4		01:00-02.00	38.6	39.1						
5		02.00-03.00	38.5	38.7						
6		03.00-04.00	39	38.5						
7		04.00-05.00	39.2	39						
8		05:00-06:00	39.4	39.1						
		Leq Night	39.0	39.1						

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

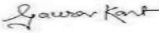
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Month & Year	04/2024	Cluster	Cluster XIII					ULR No.	TC101222400000788F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	10.06.2024
Project		Sample Ref. No.	REM/BCCL/2024/04			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Lohapatti	Date of Sampling	13.04.2024	30.04.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	45.8	45.4	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	45.1	45.9					
3		08:00 - 09:00	48.1	49.4					
4		09:00 - 10:00	51.2	50.9					
5		10:00 - 11:00	52.7	51.6					
6		11:00 - 12:00	52.1	56.4					
7		12:00 - 13:00	62.1	60.8					
8		13:00 - 14:00	59.7	60.2					
9		14:00 - 15:00	62.3	63.1					
10		15:00 - 16:00	46.1	46.5					
11		16:00 - 17:00	70.9	71					
12		17:00 - 18:00	49.2	58.6					
13		18:00 - 19:00	46.5	47.1					
14		19:00 - 20:00	45.5	45.1					
15		20:00 - 21:00	45.8	44.7					
16		21:00 - 22:00	45.6	44.9					
		Leq Day	60.4	60.7					
1	Noise Level dB(A)Leq -Night	22:00-23:00	44.1	44.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	43.8	43.8					
3		00:00- 01:00	42.6	42.5					
4		01:00-02:00	42.2	43.1					
5		02:00-03:00	42.1	42.4					
6		03:00-04:00	42	42.1					
7		04:00-05:00	41.6	42.2					
8		05:00-06:00	42.4	42.7					
		Leq Night	42.7	43.0					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants ANALYSED BY	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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Ambient Noise Level Test Report

CMPDIL, RI-II
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Month & Year	04/2024	Cluster	Cluster XIII				ULR No.	TC1012224000000788F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	10.06.2024	
Project		Sample Ref. No.	REM/BCCL/2024/04			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Kharkharee	Date of Sampling	06.04.2024	24.04.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	45.9	45.1	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	46.2	46.7					
3		08:00 - 09:00	48.2	46.9					
4		09:00 - 10:00	50.5	51.4					
5		10:00 - 11:00	53.2	53.7					
6		11:00 - 12:00	54.3	52.3					
7		12:00 - 13:00	61.2	60.9					
8		13:00 - 14:00	62.1	59.8					
9		14:00 - 15:00	62.5	62.4					
10		15:00 - 16:00	57.6	57.9					
11		16:00 - 17:00	70.9	61.2					
12		17:00 - 18:00	59.1	57.2					
13		18:00 - 19:00	45.9	46.5					
14		19:00 - 20:00	46.1	45.9					
15		20:00 - 21:00	45.6	46.2					
16		21:00 - 22:00	48.7	46.5					
		Leq Day	60.8	56.5					
1	Noise Level dB(A)Leq - Night	22:00-23:00	46.8	46.1	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	45.4	44.9					
3		00:00- 01:00	43.1	43.5					
4		01:00-02:00	41.3	42.5					
5		02:00-03:00	41	37.9					
6		03:00-04:00	40.5	41.8					
7		04:00-05:00	40.3	39.2					
8		05:00-06:00	39	36.9					
		Leq Night	43.0	42.6					

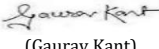
**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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Month & Year	04/2024	Cluster	XIII					ULR No.	TC1012224000000788F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	10.06.2024
Project		Sample Ref. No.	REM/BCCL/2024/04			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Dumarda	Date of Sampling	08.04.2024	25.04.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	46.5	47.1	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	50.6	51.8					
3		08:00 - 09:00	51.7	52.5					
4		09:00 - 10:00	52.1	53					
5		10:00 - 11:00	57.6	54.7					
6		11:00 - 12:00	63.5	62.9					
7		12:00 - 13:00	66.5	65.5					
8		13:00 - 14:00	68	66.4					
9		14:00 - 15:00	62	61					
10		15:00 - 16:00	52.8	52.7					
11		16:00 - 17:00	54.4	52.7					
12		17:00 - 18:00	51.6	51.8					
13		18:00 - 19:00	59.1	60.3					
14		19:00 - 20:00	53.4	57.9					
15		20:00 - 21:00	51.8	57.3					
16		21:00 - 22:00	46.4	47.2					
		Leq Day	60.4	59.7					
1	Noise Level dB(A)Leq -Night	22:00-23:00	44.6	45.1	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	44.3	45					
3		00:00- 01:00	44.2	44.7					
4		01:00-02:00	44.1	44.3					
5		02:00-03:00	43.7	44.2					
6		03:00-04:00	43.2	43.6					
7		04:00-05:00	42.9	43.2					
8		05:00-06:00	44.6	44.7					
		Leq Night	44.0	44.4					
**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit									
Sampling Assistants		 (Gaurav Kant) ANALYSED BY			 (Amit Raj Mishra) REVIEWED BY Authorised Signatory				
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.									
---- End of Report ----									
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Ambient Air Quality Standards for Jharia Coal Field
As per the Environment (Protection) Amendment Rules, 2000 notified vide notification G.S.R.
742(E), dated 25.9.2000.

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
1	2	3	4	5
III Coal mines located in the coal fields of • Jharia • Raniganj • Bokaro	Suspended Particulate Matter (SPM)	Annual Average * 24 hours **	500 µg/m ³ 700 µg/m ³	- High Volume Sampling (Average flow rate not less than 1.1
	Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average * 24 hours **	250 µg/m ³ 300 µg/m ³	Respirable Particulate Matter sampling and analysis
	Sulphur Dioxide (SO ₂)	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1.Improvedwest and Gaeke method 2.Ultraviolet fluorescene
	Oxide of Nitrogen as NO ₂	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1. Jacob & Hochheiser Modified (Na-Arsenic) Method 2. Gas phase Chemilumine-scence

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause 2.

** 24 hourly/8 hourly values shall be met 92% of the time in a year. However, 8% of the time it may exceed but not on two consecutive days.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th November 2009

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

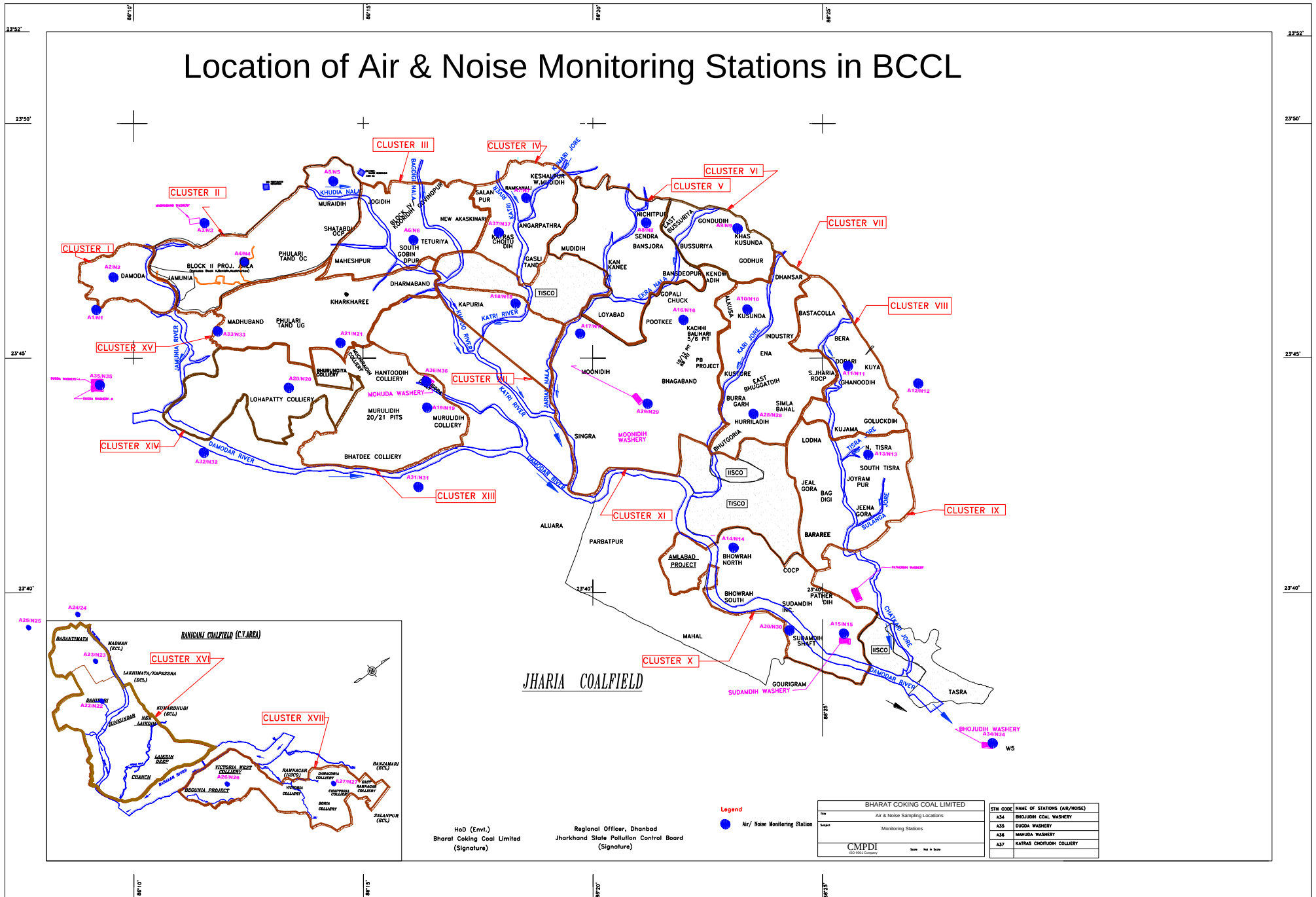
Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO₂), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen dioxide (NO₂), µg/m³	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM₁₀, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or PM_{2.5}, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O₃), µg/m³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb), µg/m³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH₃), µg/m³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C₆H₆), µg/m³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m³	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

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

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

NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, the area shall be treated as non-attainment area.

Location of Air & Noise Monitoring Stations in BCCL



Water Sampling Locations in BCCL

Water Sampling Locations in BCCL

INDEX

Cluster	Surface Water (U/S, D/S)	Name of River/Nala/Jore	Name of Effluent Water	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamunia River	MW1	Damoda Area	GW1	Chutway Village
II	SW3, SW4	Khudia Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudia Nala, Bagdigi Nala	MW3	Govindpur Colliery	GW3	Jogdih Village
IV	SW8, SW11, SW9, SW10	Kali River, Kuman Jore	MW4	Chotudih	GW4	Kankanees Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Mudih	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bassuria UGP	GW6	Bansira Sorewell
VII	SW16, SW17	Kari Jore	MW7	Dobari UGP	GW7	Hurridih
VIII	SW18, SW19	Kashi Jore	MW8	Jehanpura UGP	GW8	Gharudih
IX	SW19, SW20	Kashi Jore	MW9	Jehanpura UGP	GW9	Lodna
X	SW21, SW22	Damodar River	MW10	Bhowrah North	GW10	Bhowrah South
XI	SW23, SW24, SW25, SW26	Jarian Nala, Damodar River	MW11	Bhagaband UGP	GW11	Bhagaband
XII	SW27, SW28	Kari River	MW12	Kapuria	GW12	Kapuria
XIII	SW29, SW30	Damodar River	MW13	Muridih (20/21)	GW13	Muridih
XIV	SW31, SW32	Damodar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW35, SW36	Kharkhane UGP	MW15	Kharkhane UGP	GW15	Kharkhane
XVI	SW33, SW34	Khudia River	MW16	Dabbari OCP	GW16	Patlaban Village
XVII	SW35, SW36	Barakar River	MW17	Damodar Colliery	GW17	Chaptoria

Legend

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

HaD (Env.)
Bharat Coking Coal Limited
(Signature)

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

COMPDI
Date: Not to Date

INDEX						
Cluster	Surface Water (LUS, DS)	Name of River/ Jore	Minel Effluent	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamuna River	MW1	Jamoda Area	GW1	Chaturva Village
II	SW3, SW4	Khudia Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudia Nala, Bagpadi Nala	MW3	Govindpur Colliery	GW3	Jogdih Village
IV	SW8, SW11, SW9, SW10	Kali River, Kuman Jore	MW4	Chotdih	GW4	Kankane Village
V	SW12, SW13, SW15	Janian Nala, Ekra Nala	MW5	Mudih	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bussaria UGP	GW6	Bansjor Borewell
VII	SW16, SW17	Kari Jore	MW7	Chandpur UGP	GW7	Humildih
VIII	SW17, SW19	Kashi Jore	MW8	Dobani UGP	GW8	Ghanduh
IX	SW19, SW20	Kashi Jore	MW9	Jeenagora	GW9	Lodna
X	SW21, SW22	Damdodar River	MW10	Showrah North	GW10	Showrah South
XI	SW23, SW24, SW25, SW26	Janian Nala, Damodar River	MW11	Shagaband UGP	GW11	Shagabandh
XII	SW27, SW28	Katti Damodar River	MW12	Kapuria Muridih (2002)	GW12	Kapuria
XIII	SW29, SW30	Damdodar River	MW13	Chandpur UGP	GW13	Muridih
XIV	SW31, SW29	Damdodar River	MW14	Lohapatti	SW14	Lohapatti
XV	SW5, SW32	Khudia Nala	MW15	Charkhara UGP	GW15	Charkharae
XVI	SW33, SW34	Khudia Nala	MW16	Dahibani UGP	GW16	Pallabani Village
XVII	SW35, SW36	Blankar River	MW17	Jemagora Colliery	GW17	Chaptoria

Legend

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

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

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

Customer	BHARAT COKING COAL LIMITED	
Title	WATER SAMPLING LOCATIONS	
Subject	MONITORING STATIONS	
 Scale Not to Scale		

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

(FOR THE MONTH MAY, 2024)

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



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

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EXECUTIVE SUMMARY

1.0 Introduction

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

Bharat Coking Coal Limited (BCCL), a Subsidiary company of Coal India Limited is operating Underground and Opencast Mines in Jharia Coalfield (JCF) is a part of Gondwana Coalfields located in Dhanbad district of Jharkhand, the JCF is bounded by 23⁰37' N to 23⁰52' N latitudes and 86⁰09' E to 86⁰30' E longitude occupying an area of 450 Sq.km. BCCL has awarded Environmental monitoring work of Jharia Coalfield (JCF) to Central Mine Planning & Design Institute Limited (CMPDIL). The environmental monitoring has been carried out as per the conditions laid down by the MoEF&CC while granting environmental clearance of project, consent letter issued by the respective SPCB, and other statutory requirements.

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

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

2.2 Water sampling stations

The Water sampling stations were selected for mine discharge water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM₁₀), Fine Particulate Matter (PM_{2.5}), Sulphur Di-oxide

(SO₂) and Nitrogen Oxides (NO_x). Respirable Dust Samplers (RDS) were used for sampling of PM₁₀, SO₂, & NO_x and Fine Dust Sampler (PM_{2.5} sampler) were used for sampling of PM_{2.5} at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analyzed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

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

3.3 Noise level monitoring

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

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like PM₁₀, PM_{2.5}, SO₂ and NO_x are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM₁₀& PM_{2.5} exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

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

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

4.2 Water quality

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

4.3 Noise Level

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

INTRODUCTION

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

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

- 1.1 The Cluster-XIII is in the Northern part of the Jharia coalfield. It includes a group of 7 Mines (viz. Murlidih, Bhurungiya, Mucharadih, Hantoodih, Padugora, Murlidih 20/21 Pits & Bhatdih. The Cluster – XIII is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster – XIII are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Katri River & Damodar River..

- 1.2 The Cluster-XIII is designed to produce 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal production vide letter no. J-11015/11/2010-IA.II (M) dated 06th June, 2013.

Ministry of Environment, Forests and Climate Change while granting environmental clearance has given one of the General conditions that “ Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM₁₀, PM_{2.5}, SO₂, NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.” And other conditions regarding water / effluent and noise level monitoring.

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

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

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

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Murlidih 20/21 (A19): Industrial Area

The location of the sampling station is 23°43' 51.82" N & 86° 16' 21.17" E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

II. BUFFER ZONE Monitoring Location

i) Lohapatti (A20)

The location of the sampling station is 23°44'29.42" N & 86°16'49.96" E. The sampler was placed at a height of approx. 1.5m above ground level at Safety Office.

ii) Kharkharee CISF Office (A21)

The location of the sampling station is 23°46' 29.00" N 86° 14' 37.08"E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

ii) Dumarda (A31)

The location of the sampling station is 23° 42' 50.00" N 86° 15' 4.00"E. The location was selected for studying the impact of the mining activity on the DuAPRILda village as it lies in the buffer zone for the Cluster

AMBIENT AIR QUALITY DATA



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
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Ambient Air Quality Test Report

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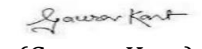
Test Report for Ambient Air Samples

Month & Year		05/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000806F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	10.07.24	
Project		Murlidih 20/21		Sample Ref. No.	REM/BCCL/2024/05	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		04.05.2024		29.05.2024	Period of Analysis	04.05.2024	24.06.2024	Zone of Station:	Core Zone
Sl. No.	Parameter	Method Analysis	of	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
				1st FN A2092	2nd FN A2139				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		91	95	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100
2	PM _{2.5}	IS -5182(Part 24):2019		36	44	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		<10	<10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		23	24	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

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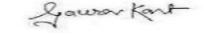
Test Report for Ambient Air Samples

Month & Year		05/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000806F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	10.07.24	
Project		Lohapatti		Sample Ref. No.	REM/BCCL/2024/05	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		11.05.2024		18.05.2024	Period of Analysis	11.05.2024	24.06.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis	of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
				1st FN A2117	2nd FN A2144				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		84	81	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019		35	46	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		26	26	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

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Ambient Air Quality Test Report

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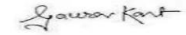
Test Report for Ambient Air Samples

Month & Year		05/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000806F		
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	10.07.24		
Project		Kharkharee		Sample Ref. No.	REM/BCCL/2024/05		Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		11.05.2024		21.05.2024	Period of Analysis	11.05.2024	24.06.2024	Zone of Station:	Buffer Zone	
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009		
			1st FN A2116	2nd FN A2152						
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	92	98	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100		
2	PM _{2.5}	IS -5182(Part 24):2019	51	56	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60		
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80		
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	24	26	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80		

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

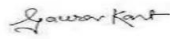
Test Report for Ambient Air Samples

Month & Year		05/2024	Cluster	XIII				ULR No.	TC1012224000000806F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	10.07.24
Project		Dumarda		Sample Ref. No.	REM/BCCL/2024/05	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		04.05.2024		18.05.2024	Period of Analysis	04.05.2024	24.06.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN A2091	2nd FN A2143					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	88	96	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	69	77	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	23	19	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

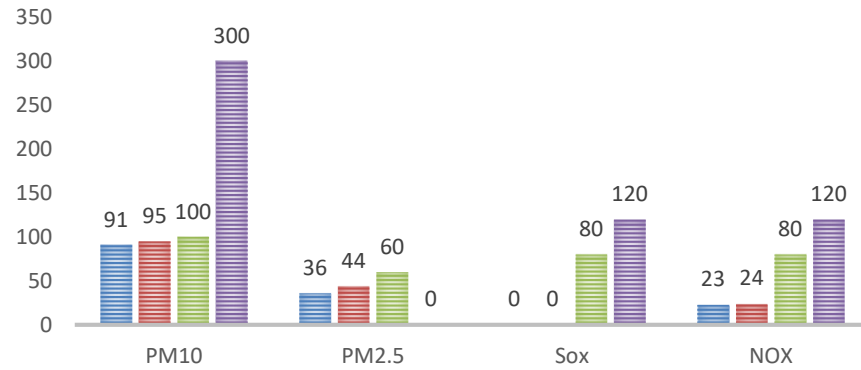
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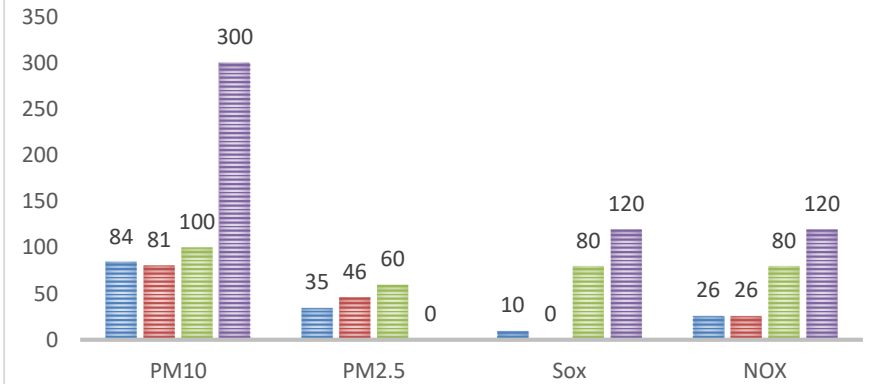
AMBIENT AIR QUALITY AT MURLIDIH 20/21

04.05.2024 29.05.2024 NAAQS GSR Standards



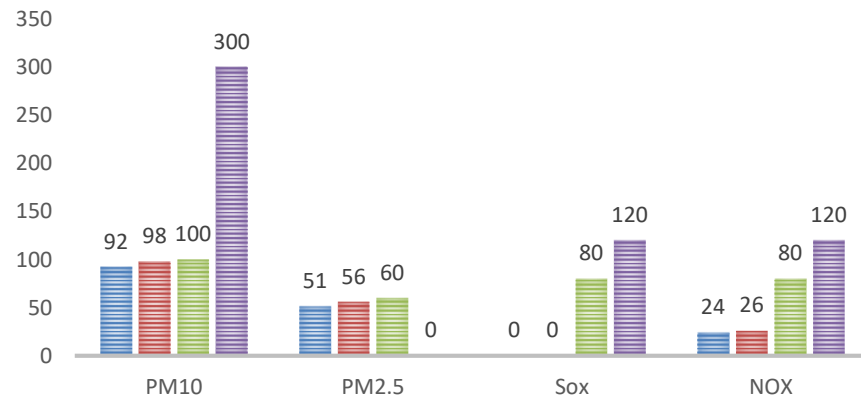
AMBIENT AIR QUALITY AT LOHAPATTI

11.05.2024 18.05.2024 NAAQS GSR Standards



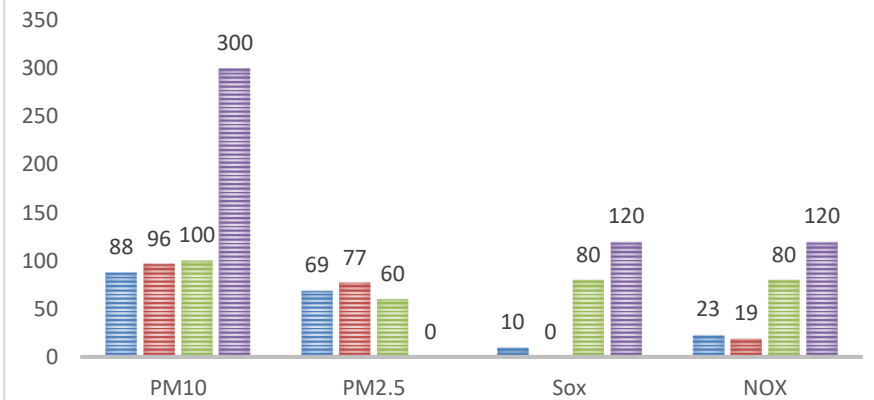
AMBIENT AIR QUALITY AT KHARKHAREE

11.05.2024 21.05.2024 NAAQS GSR Standards



AMBIENT AIR QUALITY AT DUMARDA

04.05.2024 18.05.2024 NAAQS GSR Standards



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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Mine Effluent samples

Month & Year	05/2024	Cluster	Cluster XIII		ULR No.		TC101222400000823F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	10.07.2024	
Project		Sampling Ref. No.	REM/BCCL/2024/05		Sampling Method		IS 3025 (Part-1) CMPDI/RI-II/LPM 13	
Sampling Stations	(i)	Murlidih 20/21	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	06.05.24 to 28.05.24	
			Date of Sampling		06.05.24	27.05.24		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight M0891	Second Fortnight M0921				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	47	49	100 (Max)		10	
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.88	7.89	5.5 - 9.0		0.2	
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)		2	
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	40	36	250 (Max)		4	

***Grab sampling carried out for water samples **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

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 during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. 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 & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night 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.



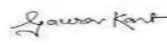
CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	05/2024	Cluster	Cluster XIII					ULR No.	TC1012224000000840F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	10.07.2024
Project			Sample Ref. No.		REM/BCCL/2024/05		Sampling Method		CMPDI/RI-II/LPM 22	
Sampling Stations	i	Murlidih		Date of Sampling		04.05.2024	29.05.2024	Zone Category of Station:		Core Zone
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
			First Fortnight	Second Fortnight				Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	52.3	52.2	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	52.4	52.6						
3		08:00 - 09:00	54.6	55.7						
4		09:00 – 10:00	53.8	54.8						
5		10:00 - 11:00	56.9	56.9						
6		11:00 - 12:00	57.4	57						
7		12:00 - 13:00	59	60.1						
8		13:00 - 14:00	59.4	59.5						
9		14:00 - 15:00	59.9	60.1						
10		15:00 - 16:00	61.2	62.3						
11		16:00 - 17:00	61	60.5						
12		17:00 - 18:00	58.4	58.4						
13		18:00 - 19:00	54.8	55.7						
14		19:00 - 20:00	54.5	54.8						
15		20:00 - 21:00	53.4	53.4						
16		21:00 - 22:00	53.2	53.1						
		Leq DAY	57.4	57.8						
1	Noise Level dB(A)Leq -Night	22:00-23:00	39.5	39.7	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	39.1	39.6						
3		00:00- 01:00	38.8	39.3						
4		01:00-02:00	38.7	39.2						
5		02:00-03:00	38.6	38.8						
6		03:00-04:00	39.1	38.6						
7		04:00-05:00	39.3	39.1						
8		05:00-06:00	39.5	39.2						
		Leq Night	39.0	39.2						

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

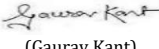
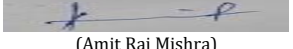
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 cmpdi A Mini Ratna Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD, -826005 Phone:0326-223-850 email: rdri2cmodi@coalindia.in									
Month & Year	05/2024	Cluster	Cluster XIII					ULR No.	TC101222400000840F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	10.07.2024
Project		Sample Ref. No.	REM/BCCL/2024/05			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Lohapatti	Date of Sampling	11.05.2024	18.05.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	46.9	46.5	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	46.2	47					
3		08:00 - 09:00	49.3	50.6					
4		09:00 - 10:00	52.5	52.2					
5		10:00 - 11:00	54	52.9					
6		11:00 - 12:00	53.4	57.8					
7		12:00 - 13:00	63.6	62.3					
8		13:00 - 14:00	61.2	61.7					
9		14:00 - 15:00	63.8	64.7					
10		15:00 - 16:00	47.2	47.6					
11		16:00 - 17:00	72.6	72.7					
12		17:00 - 18:00	50.4	60					
13		18:00 - 19:00	47.6	48.3					
14		19:00 - 20:00	46.6	46.2					
15		20:00 - 21:00	46.9	45.8					
16		21:00 - 22:00	46.7	46					
		Leq Day	62.0	62.3					
1	Noise Level dB(A)Leq -Night	22:00-23:00	44.2	44.4	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	43.9	43.9					
3		00:00- 01:00	42.7	42.6					
4		01:00-02:00	42.3	43.2					
5		02:00-03:00	42.2	42.5					
6		03:00-04:00	42.1	42.2					
7		04:00-05:00	41.7	42.3					
8		05:00-06:00	42.5	42.8					
		Leq Night	42.7	43.0					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants ANALYSED BY  (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	05/2024	Cluster	Cluster XIII				ULR No.	TC1012224000000840F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	10.07.2024	
Project		Sample Ref. No.	REM/BCCL/2024/05			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Kharkharee	Date of Sampling	11.05.2024	21.05.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	47	46.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	47.3	47.8					
3		08:00 - 09:00	49.4	48.1					
4		09:00 - 10:00	51.7	52.7					
5		10:00 - 11:00	54.5	55					
6		11:00 - 12:00	55.6	53.6					
7		12:00 - 13:00	62.7	62.4					
8		13:00 - 14:00	63.6	61.3					
9		14:00 - 15:00	64	63.9					
10		15:00 - 16:00	59	59.3					
11		16:00 - 17:00	72.6	62.7					
12		17:00 - 18:00	60.6	58.6					
13		18:00 - 19:00	47	47.6					
14		19:00 - 20:00	47.2	47					
15		20:00 - 21:00	46.7	47.3					
16		21:00 - 22:00	49.9	47.6					
		Leq Day	62.4	58.0					
1	Noise Level dB(A)Leq - Night	22:00-23:00	46.9	46.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	45.5	45					
3		00:00- 01:00	43.2	43.6					
4		01:00-02:00	41.4	42.6					
5		02:00-03:00	41.1	38					
6		03:00-04:00	40.6	41.9					
7		04:00-05:00	40.4	39.3					
8		05:00-06:00	39.1	37					
		Leq Night	43.0	42.7					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants ANALYSED BY	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD - 826005
 Phone: 0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	05/2024	Cluster	XIII				ULR No.	TC1012224000000840F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	10.07.2024	
Project		Sample Ref. No.	REM/BCCL/2024/05			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Dumarda	Date of Sampling	04.05.2024	18.05.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	47.6	48.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	51.8	53.1					
3		08:00 - 09:00	53	53.8					
4		09:00 - 10:00	53.4	54.3					
5		10:00 - 11:00	59	56					
6		11:00 - 12:00	65.1	64.4					
7		12:00 - 13:00	68.1	67.1					
8		13:00 - 14:00	69.7	68					
9		14:00 - 15:00	63.5	62.5					
10		15:00 - 16:00	54.1	54					
11		16:00 - 17:00	55.7	54					
12		17:00 - 18:00	52.9	53.1					
13		18:00 - 19:00	60.6	61.8					
14		19:00 - 20:00	54.7	59.3					
15		20:00 - 21:00	53.1	58.7					
16		21:00 - 22:00	47.5	48.4					
		Leq Day	62.0	61.2					
1	Noise Level dB(A)Leq -Night	22:00-23:00	44.7	45.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	44.4	45.1					
3		00:00- 01:00	44.3	44.8					
4		01:00-02:00	44.2	44.4					
5		02:00-03:00	43.8	44.3					
6		03:00-04:00	43.3	43.7					
7		04:00-05:00	43	43.3					
8		05:00-06:00	44.7	44.8					
		Leq Night	44.1	44.5					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

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

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
1	2	3	4	5
III Coal mines located in the coal fields of • Jharia • Raniganj • Bokaro	Suspended Particulate Matter (SPM)	Annual Average * 24 hours **	500 µg/m ³ 700 µg/m ³	- High Volume Sampling (Average flow rate not less than 1.1 m ³ /min)
	Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average * 24 hours **	250 µg/m ³ 300 µg/m ³	Respirable Particulate Matter sampling and analysis
	Sulphur Dioxide (SO ₂)	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1.Improvedwest and Gaeke method 2.Ultraviolet fluorescene
	Oxide of Nitrogen as NO ₂	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1. Jacob & Hochheiser Modified (Na-Arsenic) Method 2. Gas phase Chemilumine-scence

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause 2.

** 24hourly/8hourly values shall be met 92% of the time in a year. However, 8% of the time it may exceed but not on two consecutive days.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th November 2009

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

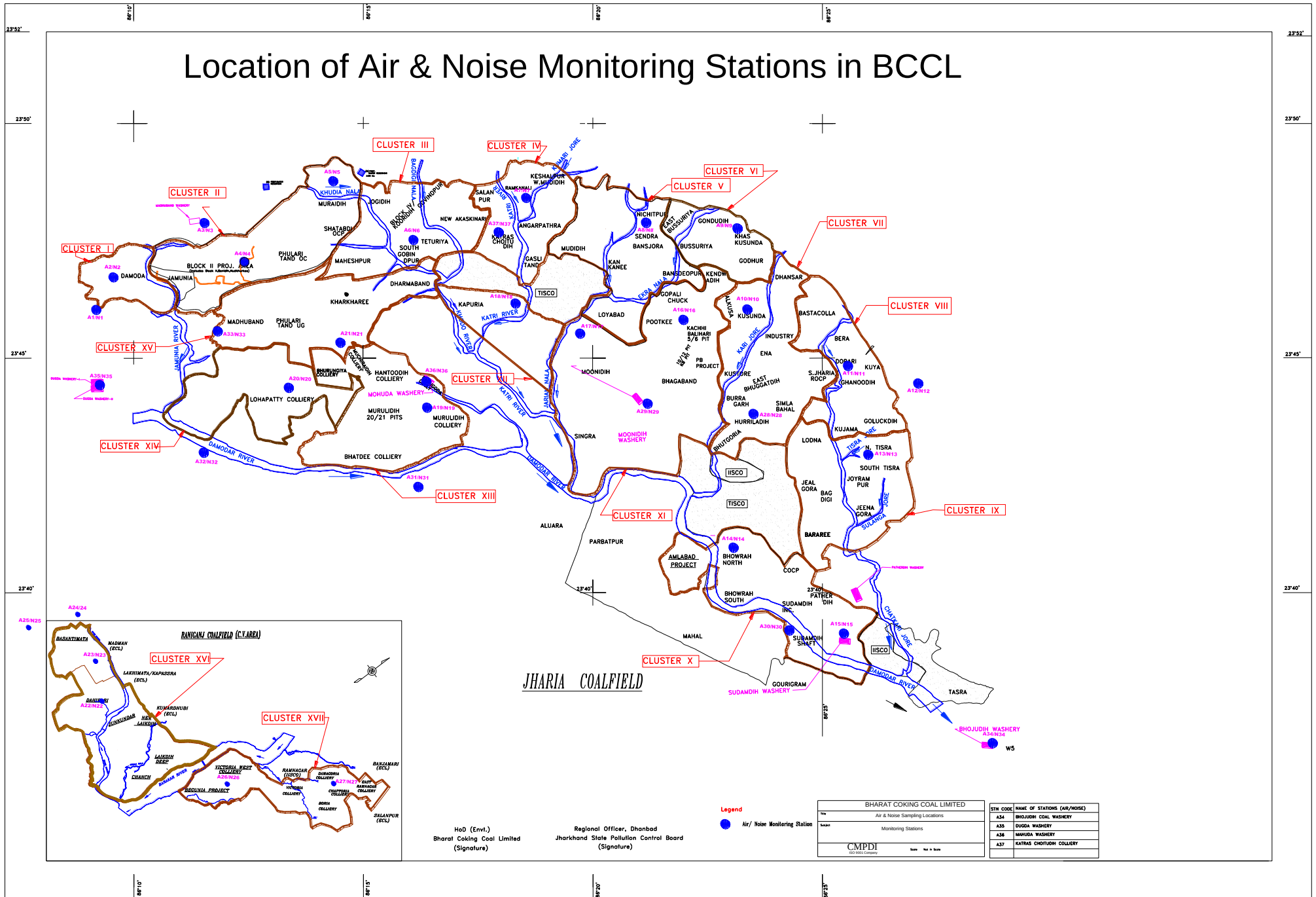
Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO₂), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen dioxide (NO₂), µg/m³	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM₁₀, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or PM_{2.5}, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O₃), µg/m³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb), µg/m³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH₃), µg/m³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C₆H₆), µg/m³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m³	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

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

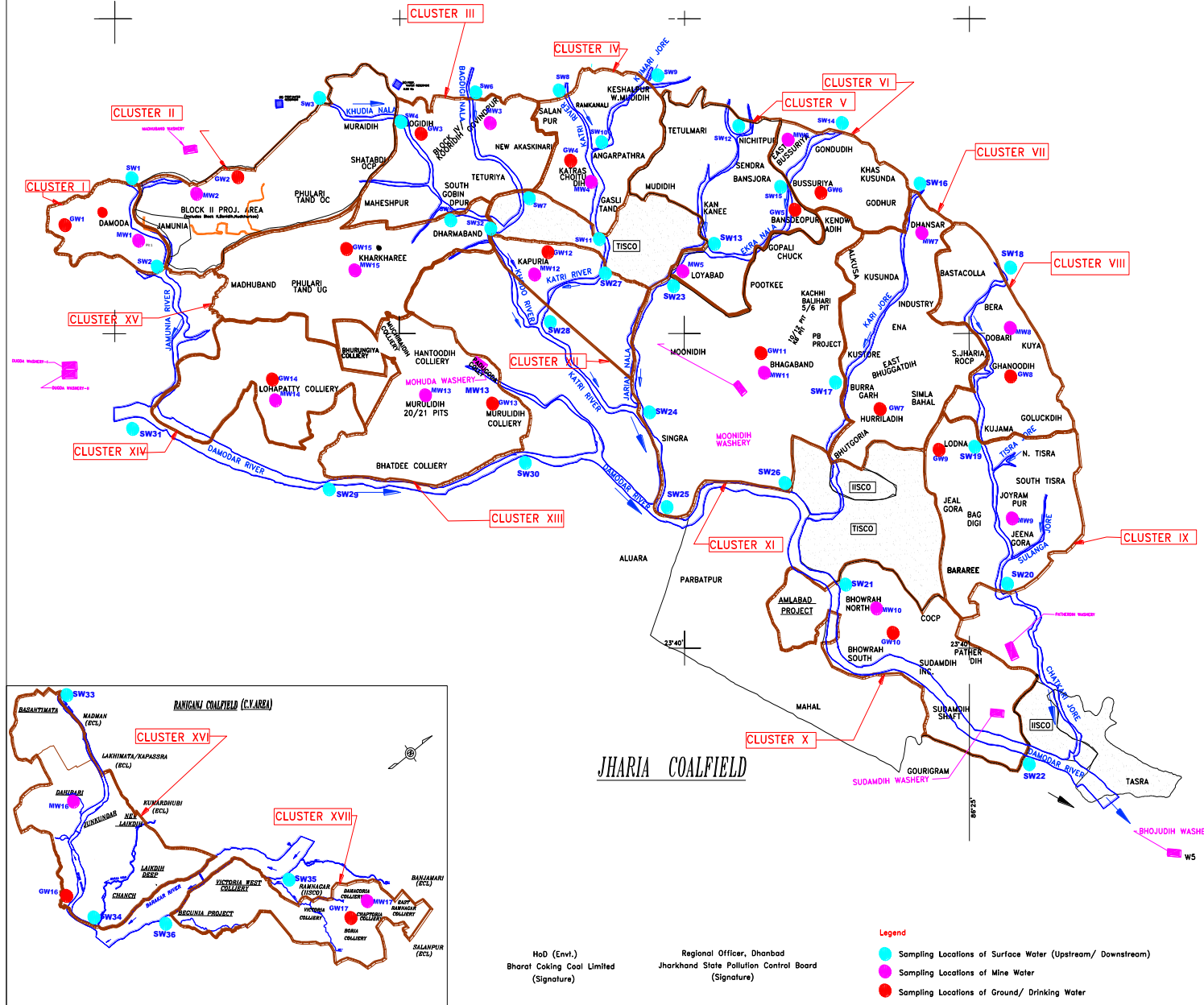
** 24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they JUNE exceed the limits but not on two consecutive days of monitoring.

NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category,

Location of Air & Noise Monitoring Stations in BCCL



Water Sampling Locations in BCCL



INDEX

Cluster	Surface Water (U/S, D/S)	Name of River/Nala/Jore	Minel Effluent Water	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamunia River	MW1	Damoda Area	GW1	Chutway Village
II	SW3, SW4	Khudra Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudra Nala, Bagdigi Nala	MW3	Govindpur Colliery	GW3	Jogdih Village
IV	SW8, SW11, SW9, SW10	Kan River, Kuman Jore	MW4	Chotudih	GW4	Kankanees Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Mudidih	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bassuria UGP	GW6	Bansara Borewell
VII	SW16, SW17	Kan Jore	MW7	Doban UGP	GW7	Humradih
VIII	SW18, SW19	Kan Jore	MW8	Doban UGP	GW8	Gharudih
IX	SW19, SW20	Kan Jore	MW9	Jemagora	GW9	Lodna
X	SW21, SW22	Damodar River	MW10	Bhowrah North	GW10	Bhowrah South
XI	SW23, SW24, SW25, SW26	Jarian Nala, Damodar River	MW11	Bhagaband UGP	GW11	Bhagaband
XII	SW27, SW28	Kan River	MW12	Kapuria	GW12	Kapuria
XIII	SW29, SW30	Damodar River	MW13	Murudih (20/21)	GW13	Murudih
XIV	SW31, SW32	Damodar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW5, SW32	Kharkharee UGP	MW15	Kharkharee	GW15	Kharkharee
XVI	SW33, SW34	Khudra River	MW16	Bahabari OCP	GW16	Pallabani Village
XVII	SW35, SW36	Barakar River	MW17	Damagoria Colliery	GW17	Chaptoria

Legend

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

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

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

Company	BHARAT COKING COAL LIMITED
Title	WATER SAMPLING LOCATIONS
Subject	MONITORING STATIONS
Scale	Not to Scale

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

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

(FOR THE MONTH JUNE, 2024)

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



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

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3.	CHAPTER-III	RESULTS	7-19
4.	CHAPTER-IV	STANDARDS AND PLANS	20-21

EXECUTIVE SUMMARY

1.0 Introduction

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

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

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

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

2.2 Water sampling stations

The Water sampling stations were selected for mine discharge water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM₁₀), Fine Particulate Matter (PM_{2.5}), Sulphur Di-oxide

(SO₂) and Nitrogen Oxides (NO_x). Respirable Dust Samplers (RDS) were used for sampling of PM₁₀, SO₂, & NO_x and Fine Dust Sampler (PM_{2.5} sampler) were used for sampling of PM_{2.5} at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analyzed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

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

3.3 Noise level monitoring

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

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like PM₁₀, PM_{2.5}, SO₂ and NO_x are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM₁₀& PM_{2.5} exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

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

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

4.2 Water quality

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

4.3 Noise Level

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

INTRODUCTION

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

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

- 1.1 The Cluster-XIII is in the Northern part of the Jharia coalfield. It includes a group of 7 Mines (viz. Murlidih, Bhurungiya, Mucharadih, Hantoodih, Padugora, Murlidih 20/21 Pits & Bhatdih. The Cluster – XIII is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster – XIII are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Katri River & Damodar River..

- 1.2 The Cluster-XIII is designed to produce 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal production vide letter no. J-11015/11/2010-IA.II (M) dated 06th June, 2013.

Ministry of Environment, Forests and Climate Change while granting environmental clearance has given one of the General conditions that “ Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM₁₀, PM_{2.5}, SO₂, NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.” And other conditions regarding water / effluent and noise level monitoring.

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

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

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

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Murlidih 20/21 (A19): Industrial Area

The location of the sampling station is 23°43' 51.82" N & 86° 16' 21.17" E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

II. BUFFER ZONE Monitoring Location

i) Lohapatti (A20)

The location of the sampling station is 23°44'29.42" N & 86°16'49.96" E. The sampler was placed at a height of approx. 1.5m above ground level at Safety Office.

ii) Kharkharee CISF Office (A21)

The location of the sampling station is 23°46' 29.00" N 86° 14' 37.08"E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

ii) Dumarda (A31)

The location of the sampling station is 23° 42' 50.00" N 86° 15' 4.00"E. The location was selected for studying the impact of the mining activity on the DuAPRILda village as it lies in the buffer zone for the Cluster

AMBIENT AIR QUALITY DATA



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

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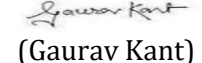
Test Report for Ambient Air Samples

Month & Year		06/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000862F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	22.08.2024	
Project		Murlidih 20/21		Sample Ref. No.	REM/BCCL/2024/06	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		11.06.2024		24.06.2024	Period of Analysis	11.06.2024	25.07.2024	Zone of Station:	Core Zone
Sl. No.	Parameter	Method Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN A2223	2nd FN A2268					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	94	99	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	36	55	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	23	25	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----



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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

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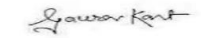
Test Report for Ambient Air Samples

Month & Year		06/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000862F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	22.08.2024	
Project		Lohapatti		Sample Ref. No.	REM/BCCL/2024/06	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		08.06.2024		21.06.2024	Period of Analysis	08.06.2024	25.07.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN A2214	2nd FN A2260					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	87	83	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	35	53	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	26	26	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

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Ambient Air Quality Test Report

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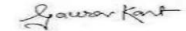
Test Report for Ambient Air Samples

Month & Year		06/2024	Cluster	Cluster XIII			ULR No.	TC1012224000000862F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	22.08.2024	
Project		Kharkharee		Sample Ref. No.	REM/BCCL/2024/06	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		12.06.2024		25.06.2024	Period of Analysis	12.06.24	25.07.24	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN A2229	2nd FN A2271					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	90	95	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	51	52	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	26	27	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY

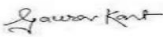

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REVIEWED BY


 (Amit Raj Mishra)
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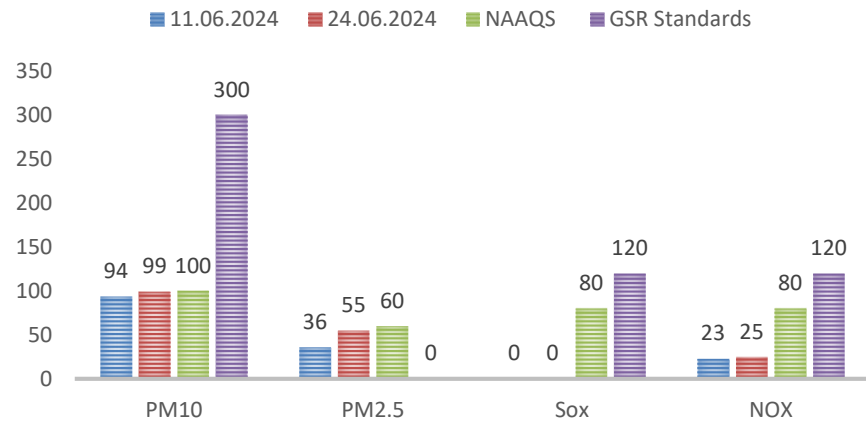
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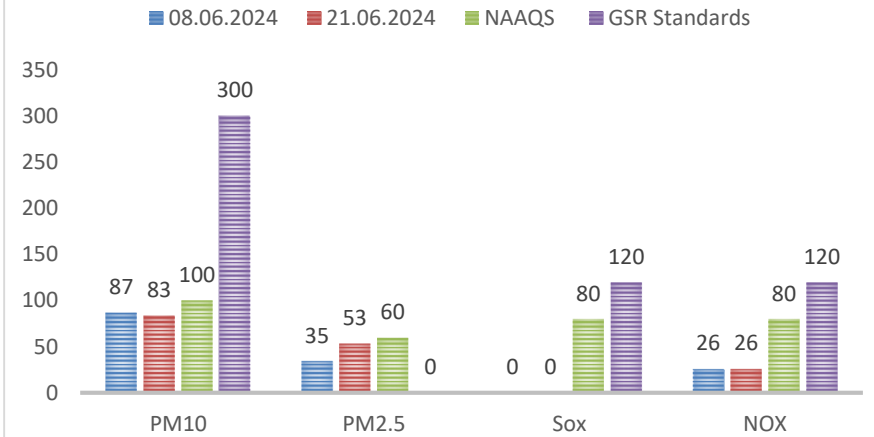
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		CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Air Quality Test Report				CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in		
Test Report for Ambient Air Samples								
Month & Year	06/2024	Cluster	XIII			ULR No.	TC1012224000000862F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	22.08.24	
Project	Dumarda	Sample Ref. No.	REM/BCCL/2024/06		Sampling Method	CMPDI/RI-II/LPM 11, (IS 5182)		
Date of Sampling	10.06.2024	24.06.2024	Period of Analysis	10.06.24	25.07.24	Zone of Station:	Buffer Zone	
Sl. No.	Parameter	Method of Analysis	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN A2219	2nd FN A2267				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	90	95	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	52	54	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	24	20	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80
* LDL indicates Lower Detection Limit,								
**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,								
 ANALYSED BY		 REVIEWED BY		 Authorised Signatory				
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---- End of Report ----								
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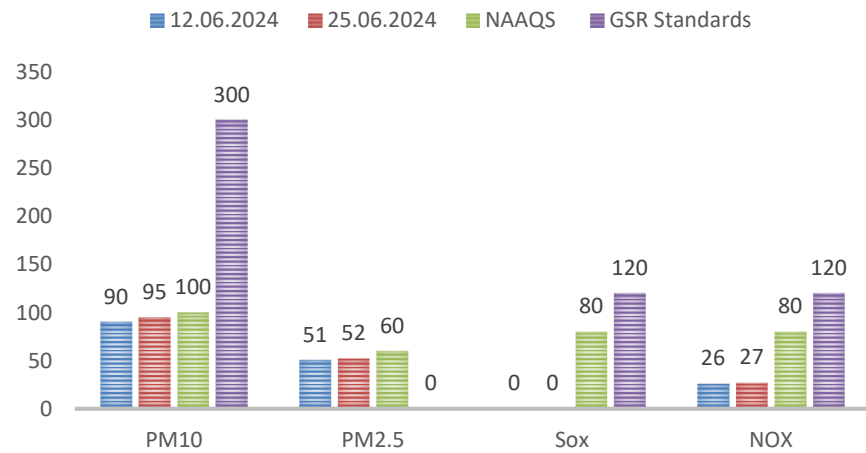
AMBIENT AIR QUALITY AT MURLIDIH 20/21



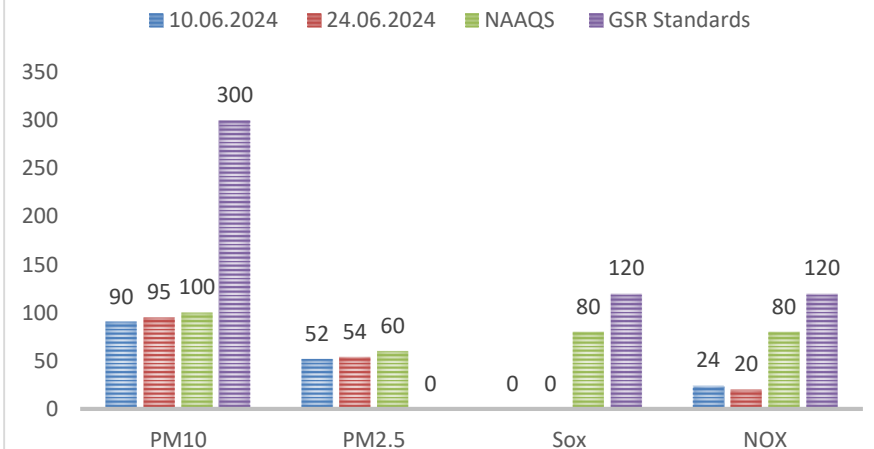
AMBIENT AIR QUALITY AT LOHAPATTI



AMBIENT AIR QUALITY AT KHARKHAREE



AMBIENT AIR QUALITY AT DUMARDA



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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

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Test Report for Mine Effluent samples

Month & Year	06/2024	Cluster	Cluster XIII		ULR No.		TC1012224000000879F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	22.08.2024	
Project		Sampling Ref. No.	REM/BCCL/2024/06		Sampling Method		IS 3025 (Part-1) CMPDI/RI-II/LPM 13	
Sampling Stations	(i)	Murlidih 20/21	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	10.06.2024 to 29.06.2024	
			Date of Sampling		10.06.2024	22.06.2024		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight M0945	Second Fortnight M0962				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	40	42	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.67	7.66	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	32	28	250 (Max)	4		

***Grab sampling carried out for water samples **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)
REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

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 during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. 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 & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night 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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	06/2024	Cluster	Cluster XIII				ULR No.	TC1012224000000879F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	22.08.2024	
Project			Sample Ref. No.	REM/BCCL/2024/06		Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Murlidih		Date of Sampling			Zone Category of Station:	Core Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	45.9	45.8	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	46	46.2					
3		08:00 - 09:00	48	48.9					
4		09:00 - 10:00	47.2	48.1					
5		10:00 - 11:00	49.9	49.9					
6		11:00 - 12:00	50.4	50					
7		12:00 - 13:00	51.8	52.8					
8		13:00 - 14:00	52.2	52.3					
9		14:00 - 15:00	52.6	52.8					
10		15:00 - 16:00	53.7	54.7					
11		16:00 - 17:00	53.5	53.1					
12		17:00 - 18:00	51.3	51.3					
13		18:00 - 19:00	48.1	48.9					
14		19:00 - 20:00	47.9	48.1					
15		20:00 - 21:00	46.9	46.9					
16		21:00 - 22:00	46.7	46.6					
		Leq DAY	50.3	50.6					
1	Noise Level dB(A)Leq -Night	22:00-23:00	39.3	39.5	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	38.9	39.4					
3		00:00- 01:00	38.6	39.1					
4		01:00-02:00	38.5	39					
5		02:00-03:00	38.4	38.6					
6		03:00-04:00	38.9	38.4					
7		04:00-05:00	39.1	38.9					
8		05:00-06:00	39.3	39					
		Leq Night	38.9	39.0					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
ANALYSED BY		

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

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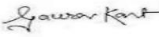
 CMPDI A Mini Ratna Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in										
Month & Year	06/2024	Cluster	Cluster XIII					ULR No.	TC101222400000879F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	22.08.2024
Project		Sample Ref. No.	REM/BCCL/2024/06				Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Lohapatti	Date of Sampling			Zone Category of Station:	Buffer Zone			
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
								Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	33.8	34.5	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	43.6	42.9						
3		08:00 - 09:00	38.8	43.4						
4		09:00 - 10:00	36.3	38.5						
5		10:00 - 11:00	38.8	40.1						
6		11:00 - 12:00	37.5	42.3						
7		12:00 - 13:00	38.5	40.9						
8		13:00 - 14:00	39.7	42.5						
9		14:00 - 15:00	39.1	40.4						
10		15:00 - 16:00	41.5	41.8						
11		16:00 - 17:00	41.6	41.7						
12		17:00 - 18:00	41.4	42.5						
13		18:00 - 19:00	41.4	42.3						
14		19:00 - 20:00	40.9	40.6						
15		20:00 - 21:00	40.8	40.7						
16		21:00 - 22:00	40.7	40.6						
		Leq Day	40.2	41.4						
1	Noise Level dB(A)Leq -Night	22:00-23:00	42.9	42.9	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	42.8	42.3						
3		00:00- 01:00	42.5	42.4						
4		01:00-02:00	42.1	43						
5		02:00-03:00	42	42.3						
6		03:00-04:00	41.9	42						
7		04:00-05:00	41.5	42.1						
8		05:00-06:00	42.3	42.6						
		Leq Night	42.3	42.5						
**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit										
Sampling Assistants		 (Gaurav Kant) ANALYSED BY		 (Amit Raj Mishra) REVIEWED BY Authorised Signatory						
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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	06/2024	Cluster	Cluster XIII				ULR No.	TC101222400000879F		
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	22.08.2024
Project		Sample Ref. No.	REM/BCCL/2024/06				Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Kharkharee	Date of Sampling				Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
			First Fortnight	Second Fortnight				Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	40.6	41.3	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	54.9	54.8						
3		08:00 - 09:00	65.2	65.4						
4		09:00 - 10:00	65.1	64.9						
5		10:00 - 11:00	61.7	60.7						
6		11:00 - 12:00	59.1	58.7						
7		12:00 - 13:00	56.9	57.8						
8		13:00 - 14:00	55.3	54.7						
9		14:00 - 15:00	53.3	52.6						
10		15:00 - 16:00	51.8	52.1						
11		16:00 - 17:00	52.1	52.7						
12		17:00 - 18:00	51.9	52.5						
13		18:00 - 19:00	49.5	49.5						
14		19:00 - 20:00	47.9	48						
15		20:00 - 21:00	46	46.2						
16		21:00 - 22:00	45.4	45.8						
		Leq Day	58.3	58.2						
1	Noise Level dB(A)Leq -Night	22:00-23:00	45.6	43.5	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	42.9	43.4						
3		00:00- 01:00	43	43.4						
4		01:00-02:00	41.2	42.4						
5		02:00-03:00	40.9	37.8						
6		03:00-04:00	40.4	41.7						
7		04:00-05:00	40.2	39.1						
8		05:00-06:00	38.9	36.8						
		Leq Night	42.1	41.7						
**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit										
Sampling Assistants		 (Gaurav Kant) ANALYSED BY				 (Amit Raj Mishra) REVIEWED BY Authorised Signatory				
Note: The results above relate to the samples tested as received. This report cannot be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.										
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 cmpdi A Mini Ratna Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	06/2024	Cluster	XIII	ULR No.	TC1012224000000879F				
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)				Date of Issue	22.08.2024			
Project		Sample Ref. No.	REM/BCCL/2024/06		Sampling Method	CMPDI/RI-II/LPM 22			
Sampling Stations	i	Dumarda	Date of Sampling		Zone Category of Station:	Buffer Zone			
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	41.8	42.4	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	45.5	46.6					
3		08:00 - 09:00	46.5	47.2					
4		09:00 - 10:00	46.9	47.7					
5		10:00 - 11:00	51.8	49.2					
6		11:00 - 12:00	57.1	56.6					
7		12:00 - 13:00	59.8	58.9					
8		13:00 - 14:00	61.2	59.7					
9		14:00 - 15:00	55.8	54.9					
10		15:00 - 16:00	47.5	47.4					
11		16:00 - 17:00	48.9	47.4					
12		17:00 - 18:00	46.4	46.6					
13		18:00 - 19:00	53.2	54.3					
14		19:00 - 20:00	48	52.1					
15		20:00 - 21:00	46.6	51.6					
16		21:00 - 22:00	41.7	42.5					
		Leq Day	53.9	53.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	44.5	45	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	44.2	44.9					
3		00:00- 01:00	44.1	44.6					
4		01:00-02:00	44	44.2					
5		02:00-03:00	43.6	44.1					
6		03:00-04:00	43.1	43.5					
7		04:00-05:00	42.8	43.1					
8		05:00-06:00	44.5	44.6					
		Leq Night	43.9	44.3					
**All noise measurements are integrated for a 01 hour period. All units in dB(A) *LDL indicates Lower Detection Limit									
Sampling Assistants		 (Gaurav Kant) ANALYSED BY				 (Amit Raj Mishra) REVIEWED BY Authorised Signatory			
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.									
---- End of Report ---- Page -1 of 1									

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

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
1	2	3	4	5
III Coal mines located in the coal fields of • Jharia • Raniganj • Bokaro	Suspended Particulate Matter (SPM)	Annual Average * 24 hours **	500 µg/m ³ 700 µg/m ³	- High Volume Sampling (Average flow rate not less than 1.1 m ³ /min)
	Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average * 24 hours **	250 µg/m ³ 300 µg/m ³	Respirable Particulate Matter sampling and analysis
	Sulphur Dioxide (SO ₂)	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1.Improvedwest and Gaeke method 2.Ultraviolet fluorescene
	Oxide of Nitrogen as NO ₂	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1. Jacob & Hochheiser Modified (Na-Arsenic) Method 2. Gas phase Chemilumine-scence

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause 2.

** 24hourly/8hourly values shall be met 92% of the time in a year. However, 8% of the time it may exceed but not on two consecutive days.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th November 2009

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

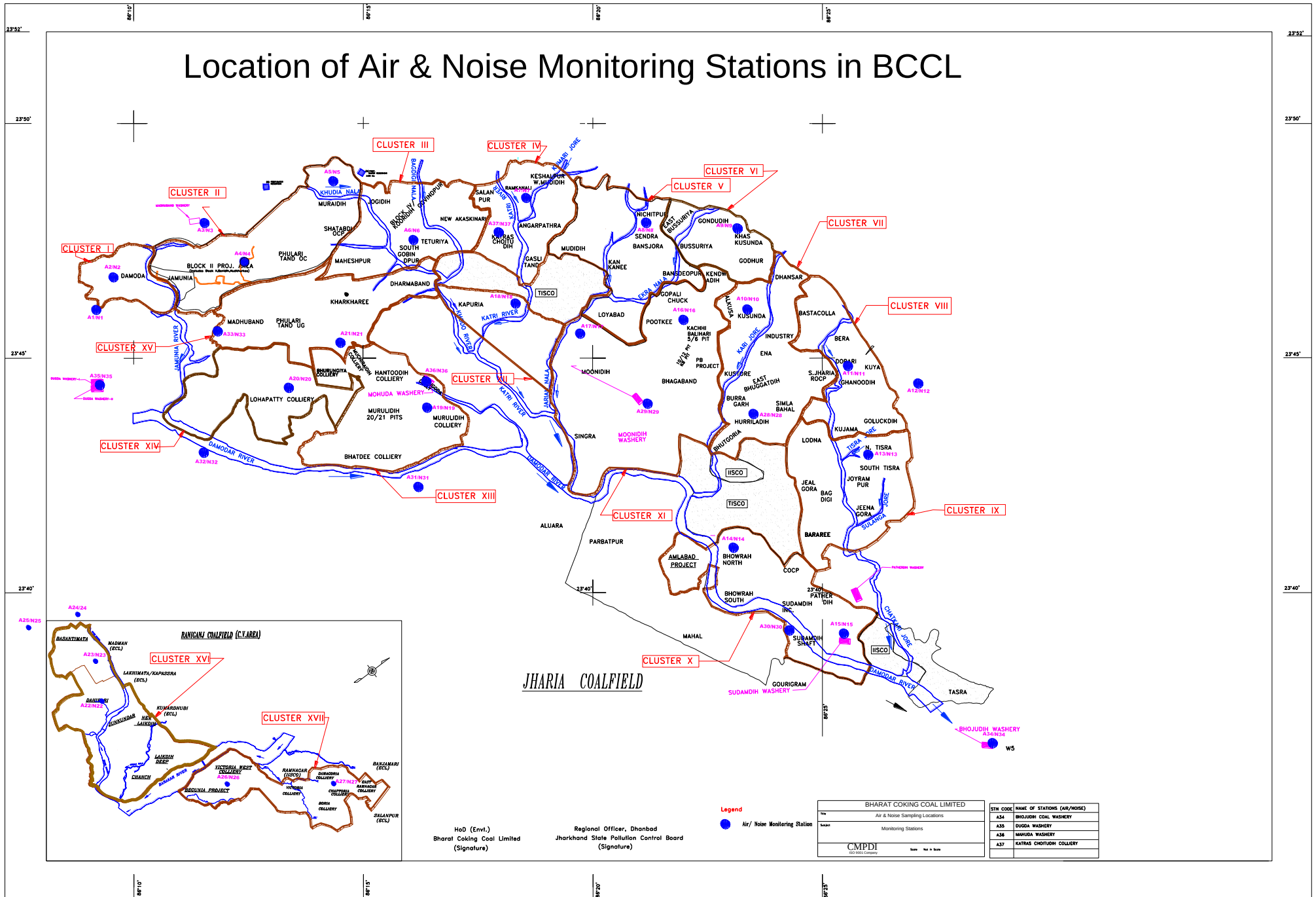
Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO₂), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogendioxide (NO₂), µg/m³	Annual * 24 Hours **	40 80	30 80	-Jacob &Hochheiser modified (NaOH-NaAsO ₂) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM₁₀, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or PM_{2.5}, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O₃) , µg/m³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb) , µg/m³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH₃), µg/m³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C₆H₆), µg/m³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m³	Annual *	01	01	-Solvent extraction followed byHPLC/GC analysis
Arsenic (As), ng/m³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

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

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

NOTE:Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category

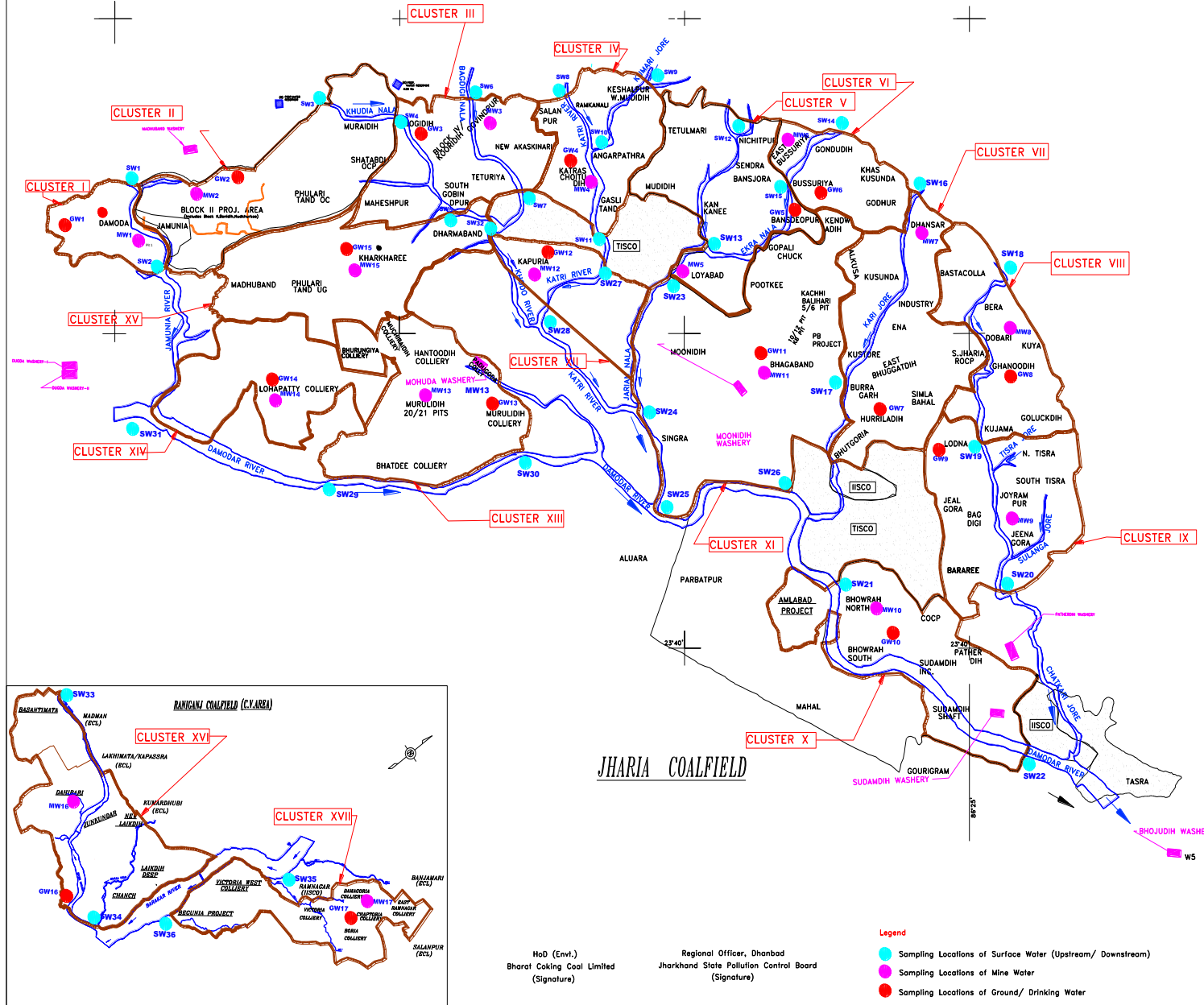
Location of Air & Noise Monitoring Stations in BCCL



Water Sampling Locations in BCCL

INDEX

Cluster	Surface Water (U/S, D/S)	Name of River/Nala/Jore	Minel Effluent Water	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamunia River	MW1	Damoda Area	GW1	Chutway Village
II	SW3, SW4	Khudia Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudia Nala, Bagdigi Nala	MW3	Govindpur Colliery	GW3	Jogdih Village
IV	SW8, SW11, SW9, SW10	Kan River, Kuman Jore	MW4	Chotudih	GW4	Kankane Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Mudidi	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bassuria UGP	GW6	Bansora Borewell
VII	SW16, SW17	Kan Jore	MW7	Doban UGP	GW7	Humridih
VIII	SW18, SW19	Kan Jore	MW8	Doban UGP	GW8	Gharudih
IX	SW19, SW20	Kan Jore	MW9	Jemagora	GW9	Lodna
X	SW21, SW22	Damodar River	MW10	Bhowrah North	GW10	Bhowrah South
XI	SW23, SW24, SW25, SW26	Kan River, Damodar River	MW11	Bhagband UGP	GW11	Bhagband
XII	SW27, SW28	Kan River	MW12	Kapuria	GW12	Kapuria
XIII	SW29, SW30	Damodar River	MW13	Murudih (20/21)	GW13	Murudih
XIV	SW31, SW32	Damodar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW5, SW32	Kharkharee UGP	MW15	Kharkharee	GW15	Kharkharee
XVI	SW33, SW34	Khudia River	MW16	Bahabari OCP	GW16	Pallabani Village
XVII	SW35, SW36	Barakar River	MW17	Damagoria Colliery	GW17	Chaptoria



Company	BARHAT COKING COAL LIMITED
Title	WATER SAMPLING LOCATIONS
Subject	MONITORING STATIONS
Scale	1:10,000
Drawn by	CHMPDI
Checked by	CHMPDI

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

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

(FOR THE MONTH JULY, 2024)

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



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

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EXECUTIVE SUMMARY

1.0 Introduction

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

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

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

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

2.2 Water sampling stations

The Water sampling stations were selected for mine discharge water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM₁₀), Fine Particulate Matter (PM_{2.5}), Sulphur Di-oxide

(SO₂) and Nitrogen Oxides (NO_x). Respirable Dust Samplers (RDS) were used for sampling of PM₁₀, SO₂, & NO_x and Fine Dust Sampler (PM_{2.5} sampler) were used for sampling of PM_{2.5} at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analyzed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

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

3.3 Noise level monitoring

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

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like PM₁₀, PM_{2.5}, SO₂ and NO_x are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM₁₀& PM_{2.5} exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

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

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

4.2 Water quality

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

4.3 Noise Level

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

INTRODUCTION

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

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

- 1.1 The Cluster-XIII is in the Northern part of the Jharia coalfield. It includes a group of 7 Mines (viz. Murlidih, Bhurungiya, Mucharadih, Hantoodih, Padugora, Murlidih 20/21 Pits & Bhatdih. The Cluster – XIII is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster – XIII are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Katri River & Damodar River..

- 1.2 The Cluster-XIII is designed to produce 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal production vide letter no. J-11015/11/2010-IA.II (M) dated 06th June, 2013.

Ministry of Environment, Forests and Climate Change while granting environmental clearance has given one of the General conditions that “ Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM₁₀, PM_{2.5}, SO₂, NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.” And other conditions regarding water / effluent and noise level monitoring.

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

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

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

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Murlidih 20/21 (A19): Industrial Area

The location of the sampling station is 23°43' 51.82" N & 86° 16' 21.17" E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

II. BUFFER ZONE Monitoring Location

i) Lohapatti (A20)

The location of the sampling station is 23°44'29.42" N & 86°16'49.96" E. The sampler was placed at a height of approx. 1.5m above ground level at Safety Office.

ii) Kharkharee CISF Office (A21)

The location of the sampling station is 23°46' 29.00" N 86° 14' 37.08"E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

ii) Dumarda (A31)

The location of the sampling station is 23° 42' 50.00" N 86° 15' 4.00"E. The location was selected for studying the impact of the mining activity on the DuAPRILda village as it lies in the buffer zone for the Cluster

AMBIENT AIR QUALITY DATA



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
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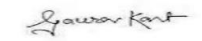
Test Report for Ambient Air Samples

Month & Year		07/2024	Cluster	Cluster XIII			ULR No.	TC1012224000001054F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	23.09.2024
Project		Murlidih 20/21		Sample Ref. No.	REM/BCCL/2024/07	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)
Date of Sampling		05.07.2024		22.07.2024	Period of Analysis	05.07.2024	20.09.2024	Zone of Station: Core Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	88	110	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	36	67	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	23	21	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

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Ambient Air Quality Test Report

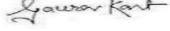
CMPDI, RI-II
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Test Report for Ambient Air Samples

Month & Year		07/2024	Cluster	Cluster XIII			ULR No.	TC1012224000001054F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	23.09.2024	
Project		Lohapatti		Sample Ref. No.	REM/BCCL/2024/07	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		04.07.2024		19.07.2024	Period of Analysis	04.07.2024	20.09.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	81	85	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	36	44	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	28	26	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

 ANALYSED BY	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

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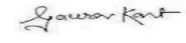
Test Report for Ambient Air Samples

Month & Year		07/2024	Cluster	Cluster XIII			ULR No.	TC1012224000001054F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	23.09.2024	
Project		Kharkharee		Sample Ref. No.	REM/BCCL/2024/07	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		03.07.2024		18.07.2024	Period of Analysis	03.07.2024	20.09.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	88	95	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	46	47	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	25	27	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

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Ambient Air Quality Test Report

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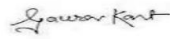
Test Report for Ambient Air Samples

Month & Year		07/2024	Cluster	XIII				ULR No.	TC1012224000001054F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	23.09.2024
Project		Dumarda		Sample Ref. No.	REM/BCCL/2024/07	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		08.07.2024		23.07.2024	Period of Analysis	08.07.2024	20.09.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	80	86	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	36	49	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	22	20	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


 ANALYSED BY


 (Gaurav Kant)
 REVIEWED BY

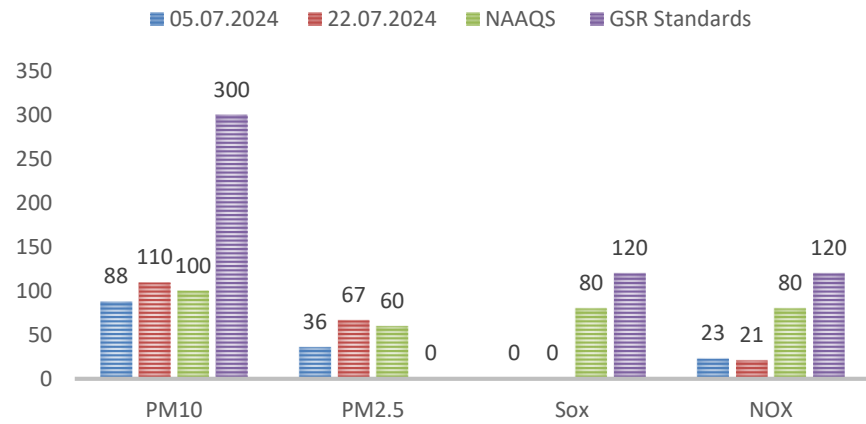

 (Amit Raj Mishra)
 Authorised Signatory

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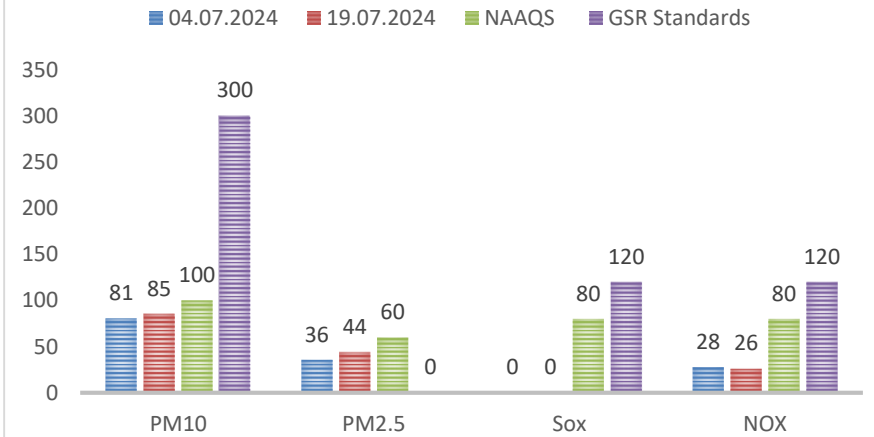
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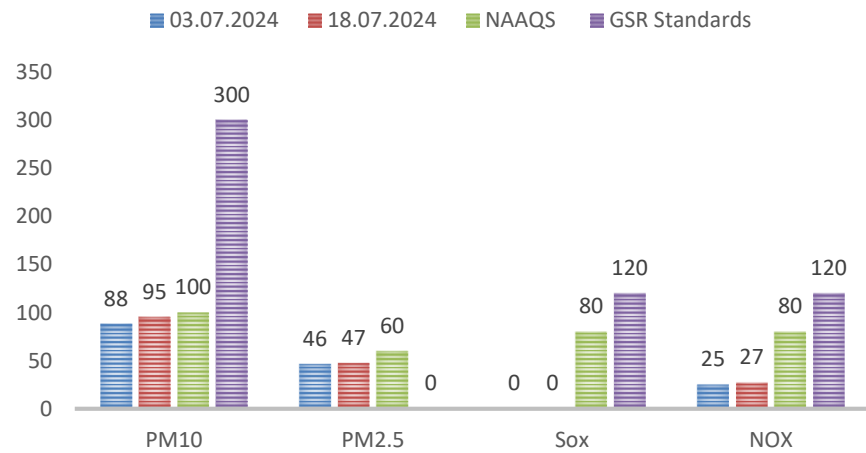
AMBIENT AIR QUALITY AT MURLIDIH 20/21



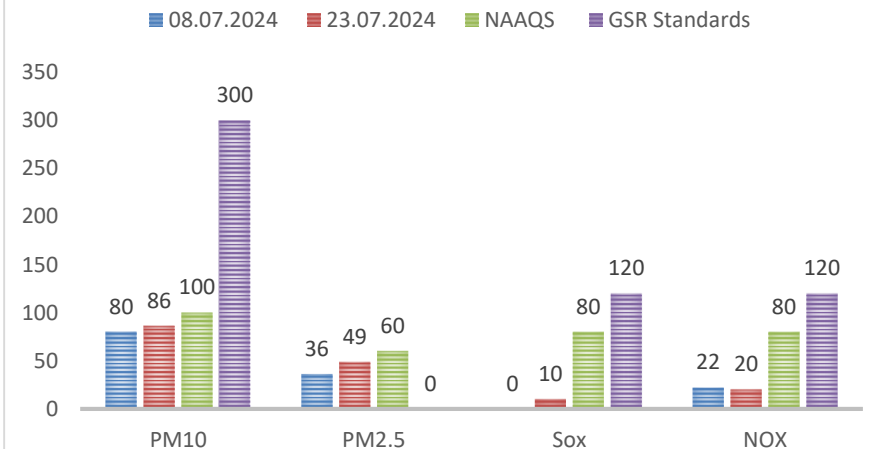
AMBIENT AIR QUALITY AT LOHAPATTI



AMBIENT AIR QUALITY AT KHARKHAREE



AMBIENT AIR QUALITY AT DUMARDA



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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
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Test Report for Mine Effluent samples

Month & Year	07/2024	Cluster	Cluster XIII		ULR No.		TC1013524000001032P	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	23.09.2024	
Project		Sampling Ref. No.	REM/BCCL/2024/07		Sampling Method		IS 3025 (Part-1) CMPDI/RI-II/LPM 13	
Sampling Stations	(i)	Murlidih 20/21	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	01.07.2023 to 06.08.2023	
			Date of Sampling		08.07.2024	29.07.2024		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight	Second Fortnight				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	43	41	100 (Max)		10	
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.64	7.66	5.5 - 9.0		0.2	
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)		2	
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	40	40	250 (Max)		4	

***Grab sampling carried out for water samples **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

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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 during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. 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 & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night 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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDI, RI-II
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Month & Year	07/2024	Cluster	Cluster XIII				ULR No.	TC1012224000001088F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	23.09.2024	
Project		Sample Ref. No.	REM/BCCL/2024/07			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Murlidih		Date of Sampling	05.07.2024	22.07.2024	Zone Category of Station:	Core Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	51.7	51.6	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	51.8	52					
3		08:00 - 09:00	54	55.1					
4		09:00 - 10:00	53.1	54.2					
5		10:00 - 11:00	56.2	56.2					
6		11:00 - 12:00	56.6	56.3					
7		12:00 - 13:00	58.3	59.4					
8		13:00 - 14:00	58.8	58.9					
9		14:00 - 15:00	59.2	59.4					
10		15:00 - 16:00	59.5	61.5					
11		16:00 - 17:00	59.2	59.7					
12		17:00 - 18:00	57.7	57.7					
13		18:00 - 19:00	54.2	55.1					
14		19:00 - 20:00	53.9	54.2					
15		20:00 - 21:00	52.7	52.7					
16		21:00 - 22:00	52.5	52.4					
		Leq DAY	56.5	57.1					
1	Noise Level dB(A)Leq -Night	22:00-23:00	37.7	37.9	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	33.5	34					
3		00:00- 01:00	33.3	33.7					
4		01:00-02:00	33.2	33.6					
5		02:00-03:00	33.1	33.3					
6		03:00-04:00	37.3	36.8					
7		04:00-05:00	37.5	37.3					
8		05:00-06:00	37.7	37.4					
		Leq Night	34.6	34.5					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

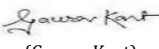
Sampling Assistants	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
ANALYSED BY		

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 CMPDI A Mini Ratna Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDI, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in										
Month & Year	07/2024	Cluster	Cluster XIII					ULR No.	TC1012224000001088F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	23.09.2024
Project		Sample Ref. No.	REM/BCCL/2024/07			Sampling Method	CMPDI/RI-II/LPM 22			
Sampling Stations	i	Lohapatti	Date of Sampling	04.07.2024	19.07.2024	Zone Category of Station:	Buffer Zone			
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
								Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	38.1	38.7	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	49.1	48.3						
3		08:00 - 09:00	43.6	48.8						
4		09:00 - 10:00	40.8	43.3						
5		10:00 - 11:00	43.6	45.1						
6		11:00 - 12:00	42.2	47.5						
7		12:00 - 13:00	43.3	46.1						
8		13:00 - 14:00	44.7	47.7						
9		14:00 - 15:00	44	45.4						
10		15:00 - 16:00	46.7	47.1						
11		16:00 - 17:00	46.8	46.9						
12		17:00 - 18:00	46.6	47.7						
13		18:00 - 19:00	46.6	47.5						
14		19:00 - 20:00	46.1	45.6						
15		20:00 - 21:00	45.9	45.7						
16		21:00 - 22:00	45.7	45.6						
		Leq Day	45.3	46.5						
1	Noise Level dB(A)Leq -Night	22:00-23:00	41.1	41.1	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	36.9	36.5						
3		00:00- 01:00	36.7	36.6						
4		01:00-02:00	36.3	37						
5		02:00-03:00	36.2	36.5						
6		03:00-04:00	40.2	40.3						
7		04:00-05:00	39.8	40.4						
8		05:00-06:00	40.6	40.8						
		Leq Night	37.5	37.8						

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants ANALYSED BY  (Gaurav Kant)	REVIEWED BY  (Amit Raj Mishra) Authorised Signatory
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Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----
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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	07/2024	Cluster	Cluster XIII				ULR No.	TC1012224000001088F		
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	23.09.2024
Project		Sample Ref. No.	REM/BCCL/2024/07				Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Kharkharee	Date of Sampling		03.07.2024	18.07.2024	Zone Category of Station:		Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
			First Fortnight	Second Fortnight				Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	45.6	46.5	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	61.7	61.6						
3		08:00 - 09:00	73.4	73.6						
4		09:00 - 10:00	73.3	72.9						
5		10:00 - 11:00	69.5	68.3						
6		11:00 - 12:00	66.5	66						
7		12:00 - 13:00	63.9	65						
8		13:00 - 14:00	62.3	61.5						
9		14:00 - 15:00	59.9	59.2						
10		15:00 - 16:00	58.3	58.7						
11		16:00 - 17:00	58.7	59.3						
12		17:00 - 18:00	58.4	59						
13		18:00 - 19:00	55.7	55.7						
14		19:00 - 20:00	53.9	54						
15		20:00 - 21:00	51.8	52						
16		21:00 - 22:00	51.1	51.6						
		Leq Day	66.2	66.0						
1	Noise Level dB(A)Leq - Night	22:00-23:00	43.7	41.7	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	36.9	37.4						
3		00:00- 01:00	37	37.4						
4		01:00-02:00	35.5	36.6						
5		02:00-03:00	35.2	32.5						
6		03:00-04:00	38.7	40						
7		04:00-05:00	38.5	37.5						
8		05:00-06:00	37.3	36.3						
		Leq Night	36.2	36.5						

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants ANALYSED BY (Gaurav Kant) REVIEWED BY	(Amit Raj Mishra) Authorised Signatory
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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	07/2024	Cluster	XIII				ULR No.	TC1012224000001088F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	23.09.2024	
Project		Sample Ref. No.	REM/BCCL/2024/07			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Dumarda	Date of Sampling	08.07.2024	23.07.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	47.1	47.6	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	51.2	52.4					
3		08:00 - 09:00	52.3	53.1					
4		09:00 - 10:00	52.7	53.7					
5		10:00 - 11:00	58.3	55.4					
6		11:00 - 12:00	64.3	63.6					
7		12:00 - 13:00	67.3	66.3					
8		13:00 - 14:00	68.8	67.2					
9		14:00 - 15:00	62.8	61.7					
10		15:00 - 16:00	53.5	53.4					
11		16:00 - 17:00	55.1	53.4					
12		17:00 - 18:00	52.2	52.4					
13		18:00 - 19:00	59.8	61.1					
14		19:00 - 20:00	54.1	58.7					
15		20:00 - 21:00	52.4	58					
16		21:00 - 22:00	47	47.7					
		Leq Day	61.2	60.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	42.7	43.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	38.1	38.7					
3		00:00- 01:00	38	38.5					
4		01:00-02:00	37.9	38.1					
5		02:00-03:00	37.6	38					
6		03:00-04:00	41.3	41.7					
7		04:00-05:00	41	41.3					
8		05:00-06:00	42.7	42.8					
		Leq Night	39.0	39.3					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants	 (Gaurav Kant) ANALYSED BY	 (Amit Raj Mishra) REVIEWED BY Authorised Signatory
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Ambient Air Quality Standards for Jharia Coal Field
As per the Environment (Protection) Amendment Rules, 2000 notified vide notification G.S.R.
742(E), dated 25.9.2000.

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

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause 2.

** 24 hourly/8 hourly values shall be met 92% of the time in a year. However, 8% of the time it may exceed but not on two consecutive days.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th November 2009

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

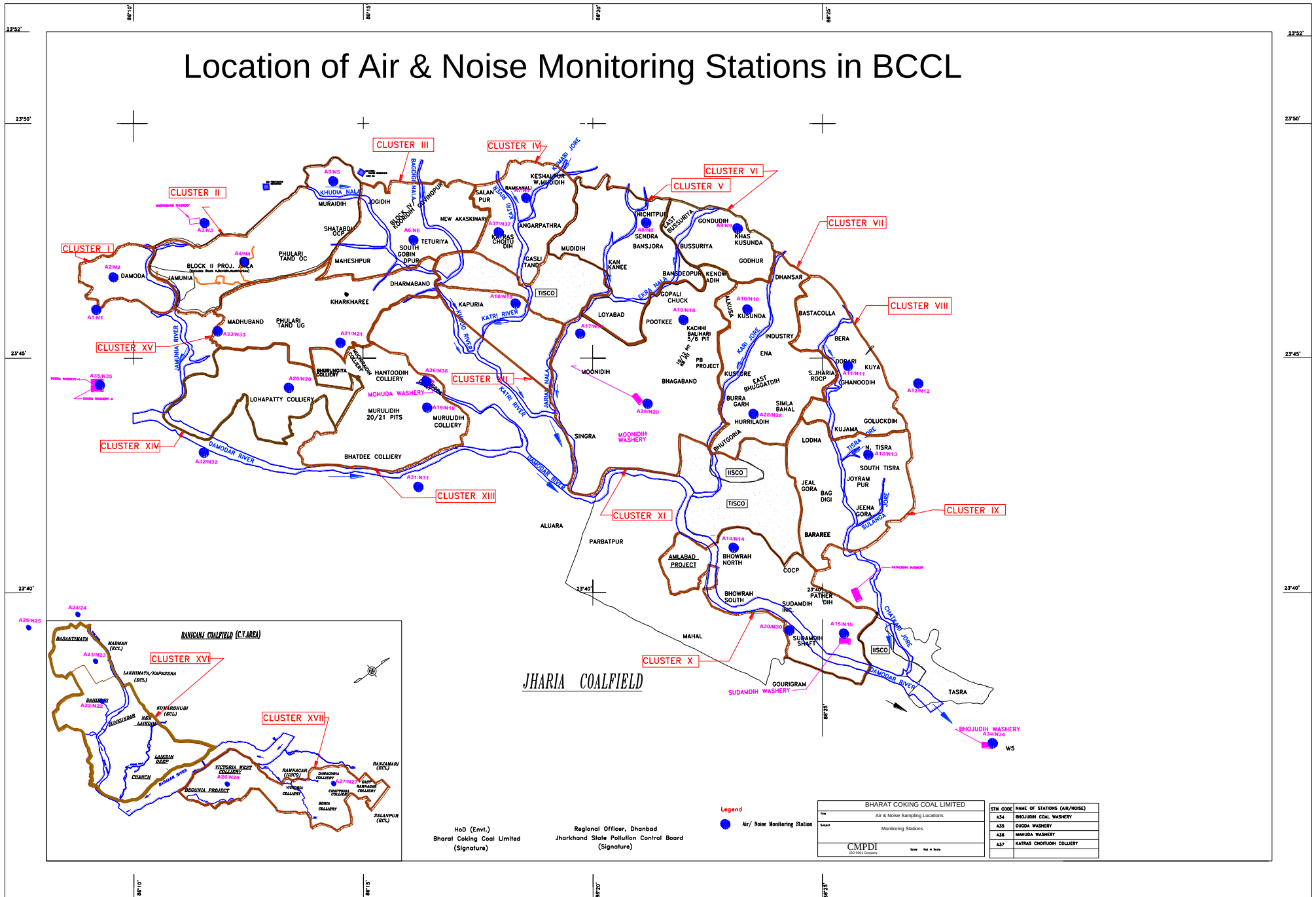
Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO₂), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen dioxide (NO₂), µg/m³	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM₁₀, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or PM_{2.5}, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O₃), µg/m³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb), µg/m³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH₃), µg/m³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C₆H₆), µg/m³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m³	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

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

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

NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category,

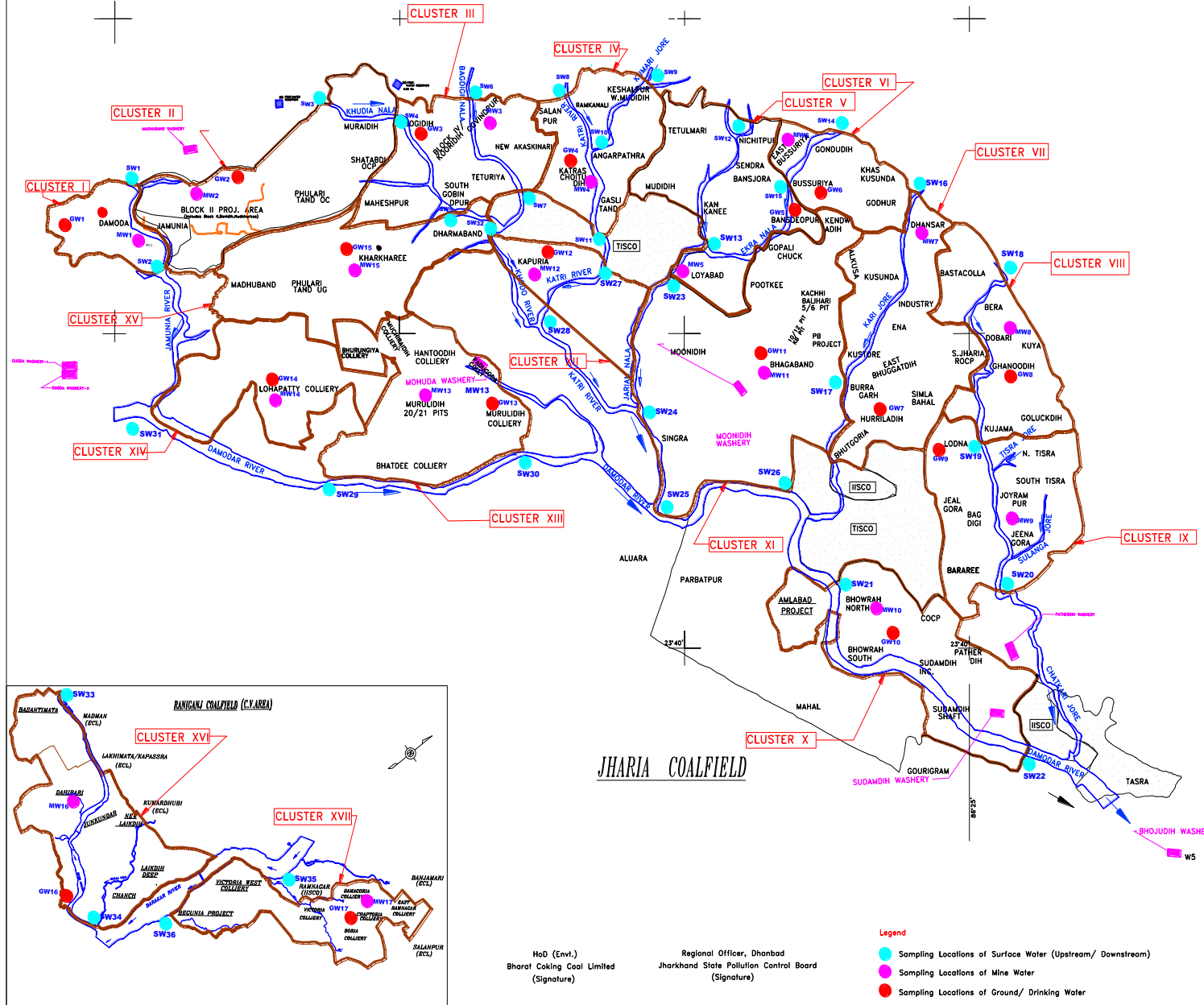
Location of Air & Noise Monitoring Stations in BCCL



Water Sampling Locations in BCCL

INDEX

Cluster	Surface Water (U/S, D/S)	Name of River/Nala	Minel Effluent Water	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamunia River	MW1	Damoda Area	GW1	Chutway Village
II	SW3, SW4	Khudia Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudia Nala, Bagdigi Nala	MW3	Govindpur Colliery	GW3	Jogdih Village
IV	SW8, SW11, SW9, SW10	Kan River, Kuman Jore	MW4	Chotudih	GW4	Kankane Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Mudidih	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bassuria UGP	GW6	Bansora Borewell
VII	SW16, SW17	Kan Jore	MW7	Doban UGP	GW7	Humradih
VIII	SW18, SW19	Kan Jore	MW8	Doban UGP	GW8	Gharudih
IX	SW19, SW20	Kan Jore	MW9	Jemagora	GW9	Lodna
X	SW21, SW22	Damodar River	MW10	Bhowrah North	GW10	Bhowrah South
XI	SW23, SW24, SW25, SW26	Kan River, Damodar River	MW11	Bhagaband UGP	GW11	Bhagaband
XII	SW27, SW28	Kan River	MW12	Kapuria	GW12	Kapuria
XIII	SW29, SW30	Damodar River	MW13	Murudih (20/21)	GW13	Murudih
XIV	SW31, SW32	Damodar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW5, SW32	Kharkharee UGP	MW15	Kharkharee	GW15	Kharkharee
XVI	SW33, SW34	Khudia River	MW16	Bahabari OCP	GW16	Palabari Village
XVII	SW35, SW36	Barakar River	MW17	Damagoria Colliery	GW17	Chaptoria



Company	BHARAT COKING COAL LIMITED
Title	WATER SAMPLING LOCATIONS
Subject	MONITORING STATIONS
Scale	Not to Scale

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

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

(FOR THE MONTH AUGUST, 2024)

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



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

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4.	CHAPTER-IV	STANDARDS AND PLANS	20-21

EXECUTIVE SUMMARY

1.0 Introduction

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

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

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

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

2.2 Water sampling stations

The Water sampling stations were selected for mine discharge water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM₁₀), Fine Particulate Matter (PM_{2.5}), Sulphur Di-oxide

(SO₂) and Nitrogen Oxides (NO_x). Respirable Dust Samplers (RDS) were used for sampling of PM₁₀, SO₂, & NO_x and Fine Dust Sampler (PM_{2.5} sampler) were used for sampling of PM_{2.5} at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analyzed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

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

3.3 Noise level monitoring

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

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like PM₁₀, PM_{2.5}, SO₂ and NO_x are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM₁₀& PM_{2.5} exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

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

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

4.2 Water quality

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

4.3 Noise Level

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

INTRODUCTION

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

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

- 1.1 The Cluster-XIII is in the Northern part of the Jharia coalfield. It includes a group of 7 Mines (viz. Murlidih, Bhurungiya, Mucharadih, Hantoodih, Padugora, Murlidih 20/21 Pits & Bhatdih. The Cluster – XIII is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster – XIII are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Katri River & Damodar River..

- 1.2 The Cluster-XIII is designed to produce 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal production vide letter no. J-11015/11/2010-IA.II (M) dated 06th June, 2013.

Ministry of Environment, Forests and Climate Change while granting environmental clearance has given one of the General conditions that “ Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM₁₀, PM_{2.5}, SO₂, NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.” And other conditions regarding water / effluent and noise level monitoring.

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

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

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

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Murlidih 20/21 (A19): Industrial Area

The location of the sampling station is 23°43' 51.82" N & 86° 16' 21.17" E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

II. BUFFER ZONE Monitoring Location

i) Lohapatti (A20)

The location of the sampling station is 23°44'29.42" N & 86°16'49.96" E. The sampler was placed at a height of approx. 1.5m above ground level at Safety Office.

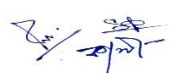
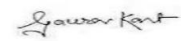
ii) Kharkharee CISF Office (A21)

The location of the sampling station is 23°46' 29.00" N 86° 14' 37.08"E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

ii) Dumarda (A31)

The location of the sampling station is 23° 42' 50.00" N 86° 15' 4.00"E. The location was selected for studying the impact of the mining activity on the DuAPRILda village as it lies in the buffer zone for the Cluster

AMBIENT AIR QUALITY DATA

   CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Air Quality Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in											
Test Report for Ambient Air Samples											
Month & Year		08/2024		Cluster		Cluster XIII		ULR No.		TC1012224000001054F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue		16.10.2024	
Project		Murlidih 20/21		Sample Ref. No.		REM/BCCL/2024/08		Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		07.08.2024		22.08.2024		Period of Analysis		07.08.2024		14.10.2024	
Zone of Station:		Core Zone									
Sl. No.	Parameter	Method Analysis	Observed Values (in $\mu\text{g}/\text{m}^3$)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)		NAAQS, 2009		
			1st FN A2479	2nd FN A2555							
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	85	80	10 $\mu\text{g}/\text{m}^3$ - 1000 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	300	100			
2	PM _{2.5}	IS -5182(Part 24):2019	40	38	10 $\mu\text{g}/\text{m}^3$ - 400 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	Not Specified	60			
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 $\mu\text{g}/\text{m}^3$ - 1050 $\mu\text{g}/\text{m}^3$	10 $\mu\text{g}/\text{m}^3$	120	80			
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	26	27	06 $\mu\text{g}/\text{m}^3$ - 420 $\mu\text{g}/\text{m}^3$	06 $\mu\text{g}/\text{m}^3$	120	80			
* LDL indicates Lower Detection Limit,											
**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,											
 ANALYSED BY			 REVIEWED BY			 Authorised Signatory					
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.											
---- End of Report ---- Page -1 of 1											



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

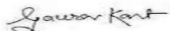
CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Ambient Air Samples

Month & Year		08/2024	Cluster	Cluster XIII			ULR No.		TC1012224000001054F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue		16.10.2024	
Project		Lohapatti		Sample Ref. No.	REM/BCCL/2024/08	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		06.08.2024		21.08.2024	Period of Analysis	06.08.2024	14.10.2024	Zone of Station:		Buffer Zone
Sl. No.	Parameter	Method Analysis	of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
				1st FN A2471	2nd FN A2547					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017		86	85	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019		36	32	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017		<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017		27	26	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

 ANALYSED BY	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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cmpdi
A Mine Rules Company

CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDI, RI-II
KOYLA BHAWAN COMPLEX
DHANBAD. -826005
Phone:0326-223-850
email: rdri2cmpdi@coalindia.in

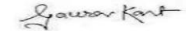
Test Report for Ambient Air Samples

Month & Year		08/2024	Cluster	Cluster XIII			ULR No.	TC1012224000001054F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	16.10.2024	
Project		Kharkharee		Sample Ref. No.	REM/BCCL/2024/08	Sampling Method	CMPDI/RI-II/LPM 11 , (IS 5182)		
Date of Sampling		05.08.2024		20.08.2024	Period of Analysis	05.08.2024	14.10.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN A2462	2nd FN A2538					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	81	78	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	38	40	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	10	12	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	27	27	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


(Gaurav Kant)
REVIEWED BY


(Amit Raj Mishra)
Authorised Signatory

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Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

CMPDIL, RI-II
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DHANBAD. -826005
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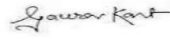
Test Report for Ambient Air Samples

Month & Year		08/2024	Cluster	XIII				ULR No.	TC1012224000001054F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	16.10.2024
Project		Dumarda		Sample Ref. No.	REM/BCCL/2024/08	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		08.08.2024		23.08.2024	Period of Analysis	08.08.2024	14.10.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN A2487	2nd FN A2563					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	94	84	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	42	36	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	12	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	24	23	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY

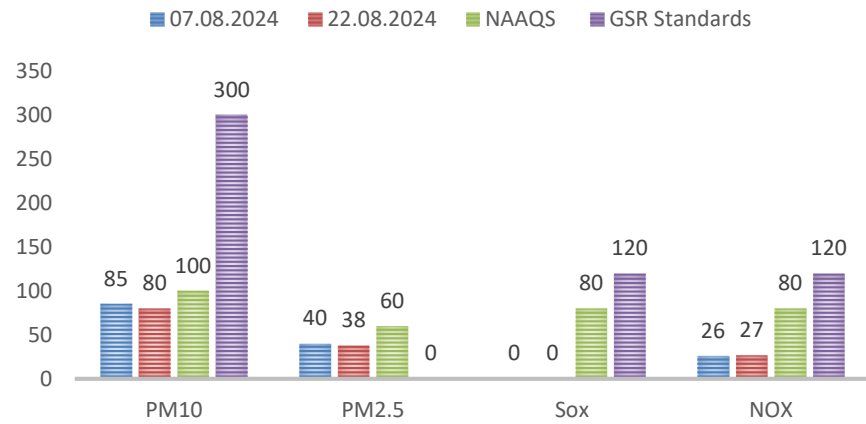

 (Amit Raj Mishra)
Authorised Signatory

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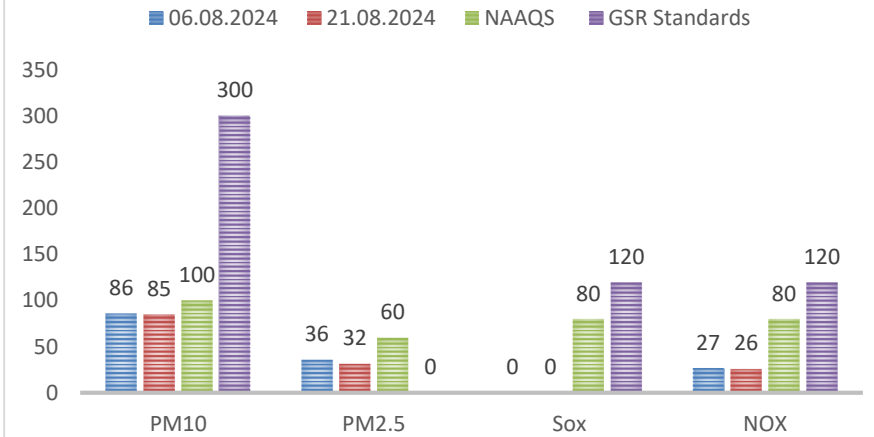
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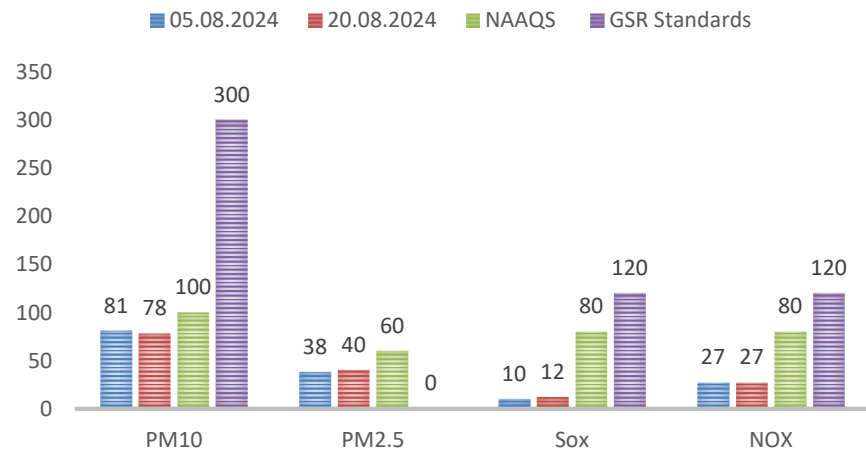
AMBIENT AIR QUALITY AT MURLIDIH 20/21



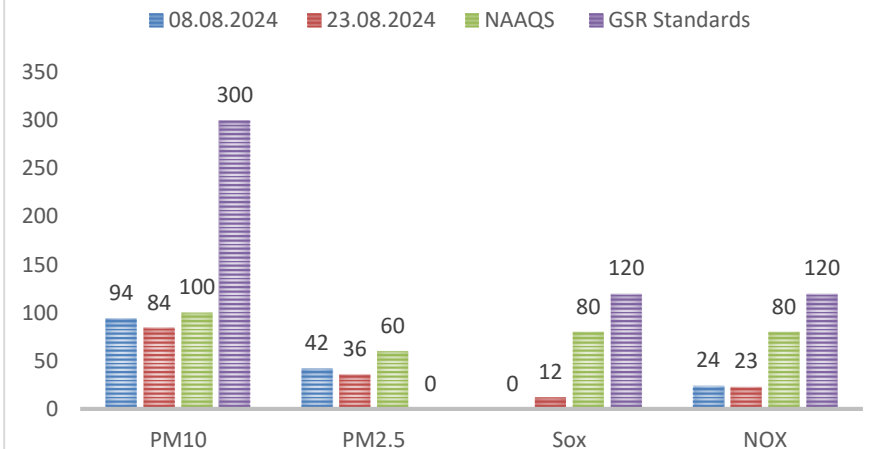
AMBIENT AIR QUALITY AT LOHAPATTI



AMBIENT AIR QUALITY AT KHARKHAREE



AMBIENT AIR QUALITY AT DUMARDA



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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
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 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Mine Effluent samples

Month & Year	08/2024	Cluster	Cluster XIII		ULR No.		TC1013524000001032P	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	16.10.2024	
Project		Sampling Ref. No.	REM/BCCL/2024/08		Sampling Method		IS 3025 (Part-1) CMPDI/RI-II/LPM 13	
Sampling Stations	(i)	Murlidih 20/21	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	12.08.2024 to 31.08.2024	
			Date of Sampling		12.08.2024	26.08.2024		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight M1036	Second Fortnight M1074				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	40	45	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.88	7.86	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<4.0	<4.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	32	36	250 (Max)	4		

**Grab sampling carried out for water samples **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

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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 during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. 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 & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night 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.

 TC-10122  cmpdi A Mine Rules Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	08/2024	Cluster	Cluster XIII				ULR No.	TC1012224000001088F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	16.10.2024	
Project			Sample Ref. No.	REM/BCCL/2024/08		Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Murlidih		Date of Sampling	07.08.2024	22.08.2024	Zone Category of Station:	Core Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
								Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	49	49	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	49.1	49.3					
3		08:00 - 09:00	51.3	52.2					
4		09:00 - 10:00	50.4	51.5					
5		10:00 - 11:00	53.4	53.4					
6		11:00 - 12:00	53.8	53.5					
7		12:00 - 13:00	55.3	56.3					
8		13:00 - 14:00	55.7	55.8					
9		14:00 - 15:00	56.1	56.3					
10		15:00 - 16:00	57.3	58.4					
11		16:00 - 17:00	57.2	56.7					
12		17:00 - 18:00	54.8	54.8					
13		18:00 - 19:00	51.5	52.2					
14		19:00 - 20:00	51.1	51.5					
15		20:00 - 21:00	50	50					
16		21:00 - 22:00	49.8	49.7					
		Leq DAY	53.8	54.1					
1	Noise Level dB(A)Leq -Night	22:00-23:00	40.2	40.5	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	39.8	40.4					
3		00:00- 01:00	39.5	40					
4		01:00-02:00	39.4	39.9					
5		02:00-03:00	39.3	39.5					
6		03:00-04:00	39.8	39.3					
7		04:00-05:00	40	39.8					
8		05:00-06:00	40.2	39.9					
		Leq Night	39.8	39.9					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
ANALYSED BY		

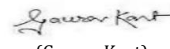
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Month & Year	08/2024	Cluster	Cluster XIII					ULR No.	TC1012224000001088F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	16.10.2024
Project		Sample Ref. No.	REM/BCCL/2024/08			Sampling Method	CMPDI/RI-II/LPM 22			
Sampling Stations	i	Lohapatti	Date of Sampling	06.08.2024	21.08.2024	Zone Category of Station:	Buffer Zone			
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A)) First Fortnight	Observed Values (in Leq dB(A)) Second Fortnight	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
								Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	36.2	36.8	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	46.6	45.8						
3		08:00 - 09:00	41.4	46.3						
4		09:00 - 10:00	38.6	41.1						
5		10:00 - 11:00	41.4	42.9						
6		11:00 - 12:00	40.1	45.1						
7		12:00 - 13:00	41.1	43.6						
8		13:00 - 14:00	42.4	45.3						
9		14:00 - 15:00	41.8	43.2						
10		15:00 - 16:00	44.3	44.7						
11		16:00 - 17:00	44.4	44.5						
12		17:00 - 18:00	44.1	45.3						
13		18:00 - 19:00	44.1	45.1						
14		19:00 - 20:00	43.6	43.4						
15		20:00 - 21:00	43.5	43.4						
16		21:00 - 22:00	43.4	43.4						
		Leq Day	42.9	44.2						
1	Noise Level dB(A)Leq -Night	22:00-23:00	43.9	43.9	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	43.8	43.3						
3		00:00- 01:00	43.4	43.4						
4		01:00-02:00	43.1	44						
5		02:00-03:00	43	43.3						
6		03:00-04:00	42.9	43						
7		04:00-05:00	42.5	43.1						
8		05:00-06:00	43.3	43.5						
		Leq Night	43.3	43.5						

****All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit**

Sampling Assistants ANALYSED BY	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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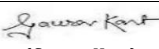
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  CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in										
Month & Year	08/2024	Cluster	Cluster XIII					ULR No.	TC1012224000001088F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	16.10.2024
Project		Sample Ref. No.	REM/BCCL/2024/08			Sampling Method	CMPDI/RI-II/LPM 22			
Sampling Stations	i	Kharkharee	Date of Sampling	05.08.2024	08.08.2024	Zone Category of Station:	Buffer Zone			
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
			First Fortnight	Second Fortnight				Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	43.4	44	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	58.6	58.5						
3		08:00 - 09:00	69.6	69.8						
4		09:00 - 10:00	69.5	69.2						
5		10:00 - 11:00	65.9	64.8						
6		11:00 - 12:00	63	62.6						
7		12:00 - 13:00	60.7	61.7						
8		13:00 - 14:00	59.1	58.4						
9		14:00 - 15:00	56.9	56.1						
10		15:00 - 16:00	55.3	55.6						
11		16:00 - 17:00	55.6	56.2						
12		17:00 - 18:00	55.4	55.9						
13		18:00 - 19:00	52.8	52.8						
14		19:00 - 20:00	51.1	51.3						
15		20:00 - 21:00	49.1	49.3						
16		21:00 - 22:00	48.6	49						
		Leq Day	62.5	62.4						
1	Noise Level dB(A)Leq - Night	22:00-23:00	46.7	44.5	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	43.9	44.4						
3		00:00- 01:00	44	44.4						
4		01:00-02:00	42.2	43.4						
5		02:00-03:00	41.8	38.8						
6		03:00-04:00	41.3	42.7						
7		04:00-05:00	41.2	40						
8		05:00-06:00	39.8	37.7						
		Leq Night	43.1	42.6						

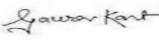
**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants ANALYSED BY  (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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  CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	08/2024	Cluster	XIII					ULR No.	TC1012224000001088F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	16.10.2024
Project		Sample Ref. No.	REM/BCCL/2024/08			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Dumarda	Date of Sampling	08.08.2024	23.08.2024	Zone Category of Station:		Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	44.7	45.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	48.7	49.7					
3		08:00 - 09:00	49.6	50.4					
4		09:00 - 10:00	50	50.9					
5		10:00 - 11:00	55.3	52.5					
6		11:00 - 12:00	60.9	60.4					
7		12:00 - 13:00	63.9	62.9					
8		13:00 - 14:00	65.4	63.8					
9		14:00 - 15:00	59.6	58.6					
10		15:00 - 16:00	50.7	50.6					
11		16:00 - 17:00	52.2	50.6					
12		17:00 - 18:00	49.5	49.7					
13		18:00 - 19:00	56.8	57.9					
14		19:00 - 20:00	51.4	55.6					
15		20:00 - 21:00	49.7	55.1					
16		21:00 - 22:00	44.6	45.3					
		Leq Day	57.9	57.2					
1	Noise Level dB(A)Leq - Night	22:00-23:00	45.6	46.1	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	45.2	46					
3		00:00- 01:00	45.1	45.7					
4		01:00-02:00	45	45.2					
5		02:00-03:00	44.6	45.1					
6		03:00-04:00	44.1	44.5					
7		04:00-05:00	43.8	44.1					
8		05:00-06:00	45.6	45.7					
		Leq Night	44.9	45.4					
**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit									
Sampling Assistants		 (Gaurav Kant) ANALYSED BY			 (Amit Raj Mishra) REVIEWED BY Authorised Signatory				
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.									
---- End of Report ----									
Page -1 of 1									

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

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
1	2	3	4	5
III Coal mines located in the coal fields of • Jharia • Raniganj • Bokaro	Suspended Particulate Matter (SPM)	Annual Average * 24 hours **	500 µg/m ³ 700 µg/m ³	- High Volume Sampling (Average flow rate not less than 1.1
	Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average * 24 hours **	250 µg/m ³ 300 µg/m ³	Respirable Particulate Matter sampling and analysis
	Sulphur Dioxide (SO ₂)	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1.Improvedwest and Gaeke method 2.Ultraviolet fluorescene
	Oxide of Nitrogen as NO ₂	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1. Jacob & Hochheiser Modified (Na-Arsenic) Method 2. Gas phase Chemilumine-scence

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause 2.

** 24 hourly/8 hourly values shall be met 92% of the time in a year. However, 8% of the time it may exceed but not on two consecutive days.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th November 2009

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

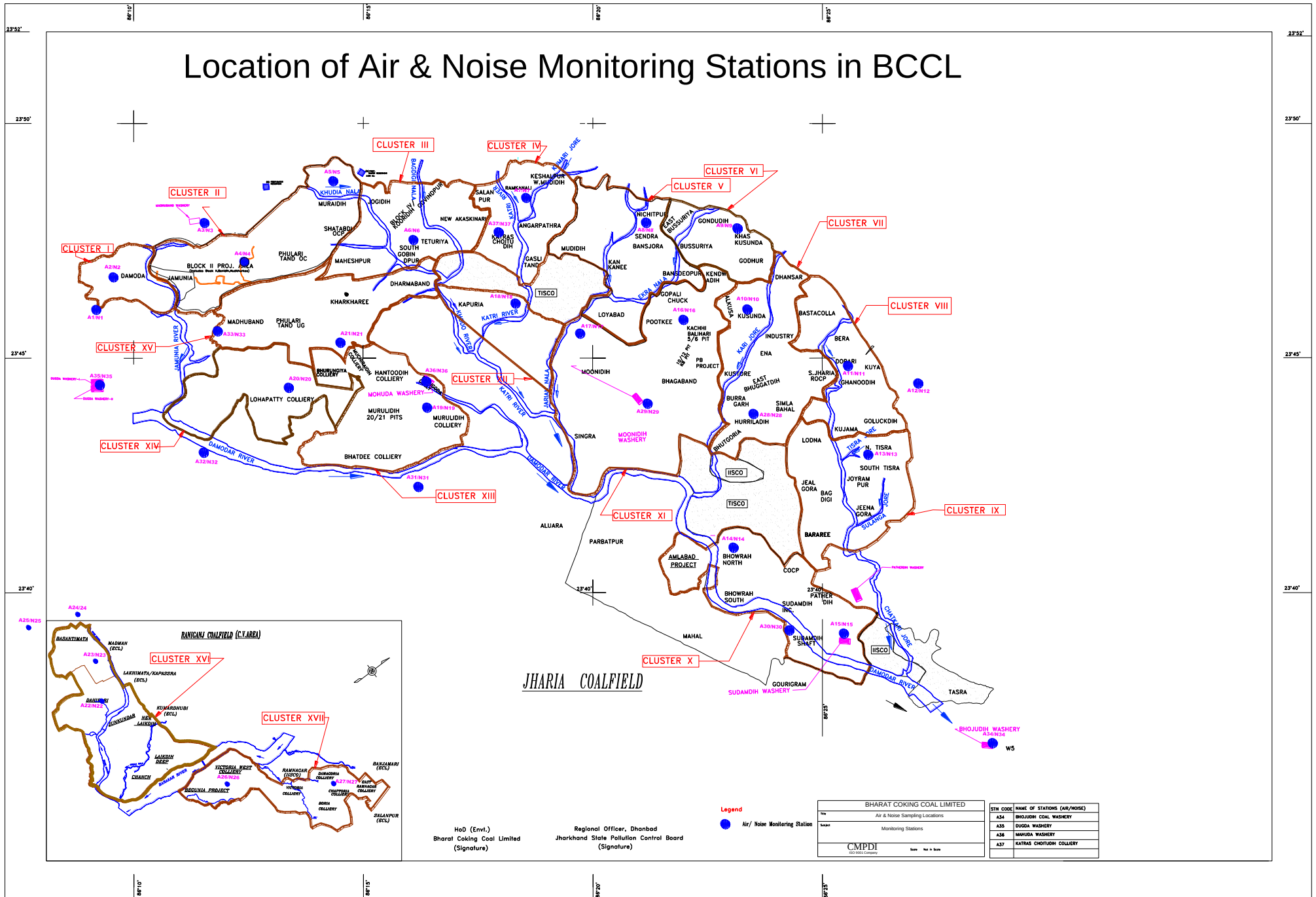
Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO₂), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen dioxide (NO₂), µg/m³	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM₁₀, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or PM_{2.5}, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O₃), µg/m³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb), µg/m³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH₃), µg/m³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C₆H₆), µg/m³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m³	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

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

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

NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, the area shall be treated as non-attainment area.

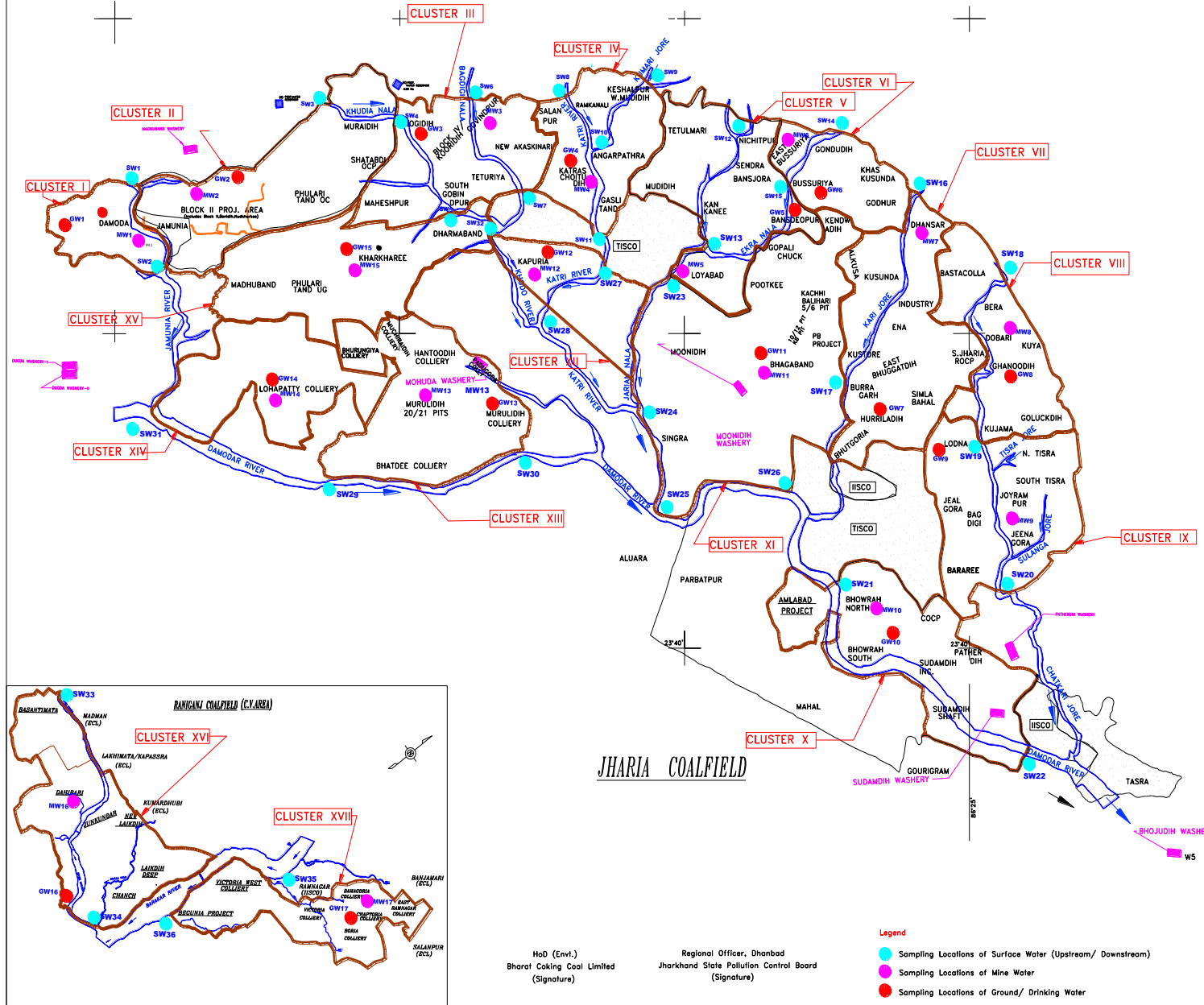
Location of Air & Noise Monitoring Stations in BCCL



Water Sampling Locations in BCCL

INDEX

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



Company	BHARAT COKING COAL LIMITED
Title	WATER SAMPLING LOCATIONS
Subject	MONITORING STATIONS
Scale	1:50,000
Date	10/10/2023

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

(FOR THE MONTH JULY, 2024)

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



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

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EXECUTIVE SUMMARY

1.0 Introduction

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

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

2.0 Sampling location and rationale

2.1 Ambient air sampling locations

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

2.2 Water sampling stations

The Water sampling stations were selected for mine discharge water.

2.3 Noise level monitoring locations

Noise levels vary depending on the various activities in mining areas. The monitoring of noise level in different locations will be helpful to take appropriate mitigating measures. The rationale has been based on the guidelines stipulated by MoEF&CC, consent letter of SPCB, as well as other statutory requirements.

3.0 Methodology of sampling and analysis

3.1 Ambient air quality

Parameters chosen for assessment of ambient air quality were Particulate Matter (PM₁₀), Fine Particulate Matter (PM_{2.5}), Sulphur Di-oxide

(SO₂) and Nitrogen Oxides (NO_x). Respirable Dust Samplers (RDS) were used for sampling of PM₁₀, SO₂, & NO_x and Fine Dust Sampler (PM_{2.5} sampler) were used for sampling of PM_{2.5} at 24 hours interval once in a fortnight and the same for the gaseous pollutants. The samples were analyzed in Environmental Laboratory of CMPDI, RI-II, Dhanbad.

3.2 Water quality

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

3.3 Noise level monitoring

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

4.0 Results and interpretations

4.1 Air quality

It has been seen from the analysis results that the 24 hours average concentration parameters like PM₁₀, PM_{2.5}, SO₂ and NO_x are mostly within the permissible limits in all sampling locations as per MoEF&CC Gazette Notification No. GSR 742(E) dt 25.09.2000 Standards for Coal Mines and National Ambient Air Quality Standard -2009. Sometimes the concentration of PM₁₀& PM_{2.5} exceeds the limits due to heavy public traffic, poor road condition, coke oven plants, burning of coal by surrounding habitants, brick making, municipal waste dumps and industries like Steel Plant, thermal Plants including their fly ash etc.

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

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

4.2 Water quality

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

4.3 Noise Level

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

INTRODUCTION

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

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

- 1.1 The Cluster-XIII is in the Northern part of the Jharia coalfield. It includes a group of 7 Mines (viz. Murlidih, Bhurungiya, Mucharadih, Hantoodih, Padugora, Murlidih 20/21 Pits & Bhatdih. The Cluster – XIII is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster – XIII are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Katri River & Damodar River..

- 1.2 The Cluster-XIII is designed to produce 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal production vide letter no. J-11015/11/2010-IA.II (M) dated 06th June, 2013.

Ministry of Environment, Forests and Climate Change while granting environmental clearance has given one of the General conditions that “ Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for PM₁₀, PM_{2.5}, SO₂, NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.” And other conditions regarding water / effluent and noise level monitoring.

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

AMBIENT AIR QUALITY MONITORING

2.1 Location of sampling station and their rationale:

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

2.1.1 Ambient Air Quality Sampling Locations

I. CORE ZONE Monitoring Location

i) Murlidih 20/21 (A19): Industrial Area

The location of the sampling station is 23°43' 51.82" N & 86° 16' 21.17" E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

II. BUFFER ZONE Monitoring Location

i) Lohapatti (A20)

The location of the sampling station is 23°44'29.42" N & 86°16'49.96" E. The sampler was placed at a height of approx. 1.5m above ground level at Safety Office.

ii) Kharkharee CISF Office (A21)

The location of the sampling station is 23°46' 29.00" N 86° 14' 37.08"E. The sampler was placed at a height of approx. 1.5m above ground level at Project Office.

ii) Dumarda (A31)

The location of the sampling station is 23° 42' 50.00" N 86° 15' 4.00"E. The location was selected for studying the impact of the mining activity on the DuAPRILda village as it lies in the buffer zone for the Cluster

AMBIENT AIR QUALITY DATA



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Air Quality Test Report

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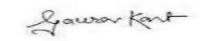
Test Report for Ambient Air Samples

Month & Year		07/2024	Cluster	Cluster XIII			ULR No.	TC1012224000001054F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	23.09.2024
Project		Murlidih 20/21		Sample Ref. No.	REM/BCCL/2024/07	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)
Date of Sampling		05.07.2024		22.07.2024	Period of Analysis	05.07.2024	20.09.2024	Zone of Station: Core Zone
Sl. No.	Parameter	Method Analysis of	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009
			1st FN	2nd FN				
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	88	110	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100
2	PM _{2.5}	IS -5182(Part 24):2019	36	67	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	23	21	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

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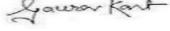
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Test Report for Ambient Air Samples

Month & Year		07/2024	Cluster	Cluster XIII			ULR No.	TC1012224000001054F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	23.09.2024	
Project		Lohapatti		Sample Ref. No.	REM/BCCL/2024/07	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		04.07.2024		19.07.2024	Period of Analysis	04.07.2024	20.09.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	81	85	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	36	44	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	28	26	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,

 ANALYSED BY	 (Gaurav Kant) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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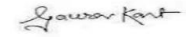
Test Report for Ambient Air Samples

Month & Year		07/2024	Cluster	Cluster XIII			ULR No.	TC1012224000001054F	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	23.09.2024	
Project		Kharkharee		Sample Ref. No.	REM/BCCL/2024/07	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		03.07.2024		18.07.2024	Period of Analysis	03.07.2024	20.09.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	88	95	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	46	47	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	<10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	25	27	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


ANALYSED BY


 (Gaurav Kant)
REVIEWED BY


 (Amit Raj Mishra)
Authorised Signatory

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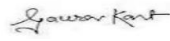
Test Report for Ambient Air Samples

Month & Year		07/2024	Cluster	XIII				ULR No.	TC1012224000001054F
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	23.09.2024
Project		Dumarda		Sample Ref. No.	REM/BCCL/2024/07	Sampling Method		CMPDI/RI-II/LPM 11 , (IS 5182)	
Date of Sampling		08.07.2024		23.07.2024	Period of Analysis	08.07.2024	20.09.2024	Zone of Station:	Buffer Zone
Sl. No.	Parameter	Method of Analysis	Observed Values (in µg/m³)		Range Of Testing	LDL	MoEF Standards Notification dated 25th September,2000 (GSR 742 E)	NAAQS, 2009	
			1st FN	2nd FN					
1	PM ₁₀	IS -5182(Part 23):2006, R-2017	80	86	10 µg/m³ - 1000 µg/m³	10 µg/m³	300	100	
2	PM _{2.5}	IS -5182(Part 24):2019	36	49	10 µg/m³ - 400 µg/m³	10 µg/m³	Not Specified	60	
3	SO ₂	IS-5182(Part-2): 2001 , R-2017	<10	10	10 µg/m³ - 1050 µg/m³	10 µg/m³	120	80	
4	NO ₂	IS-5182 (Part-6): 2006 , R-2017	22	20	06 µg/m³ - 420 µg/m³	06 µg/m³	120	80	

* LDL indicates Lower Detection Limit,

**All units are in $\mu\text{g}/\text{m}^3$, 24 hourly Average,


 ANALYSED BY


 (Gaurav Kant)
 REVIEWED BY


 (Amit Raj Mishra)
 Authorised Signatory

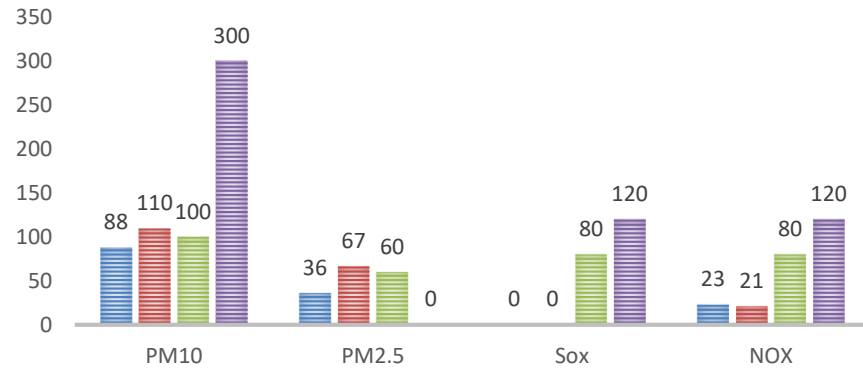
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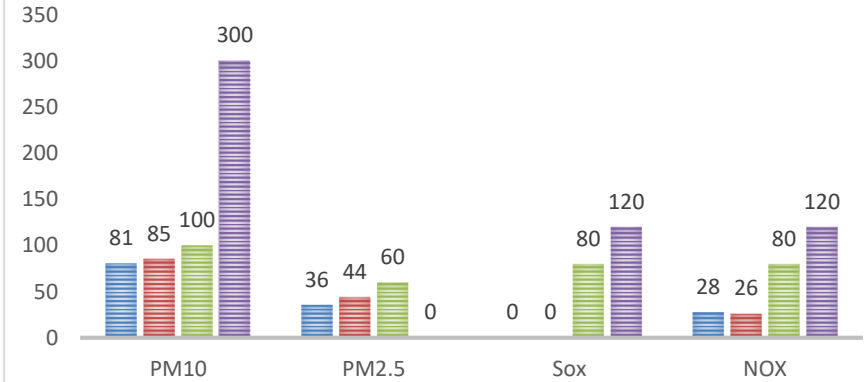
AMBIENT AIR QUALITY AT MURLIDIH 20/21

05.07.2024 22.07.2024 NAAQS GSR Standards



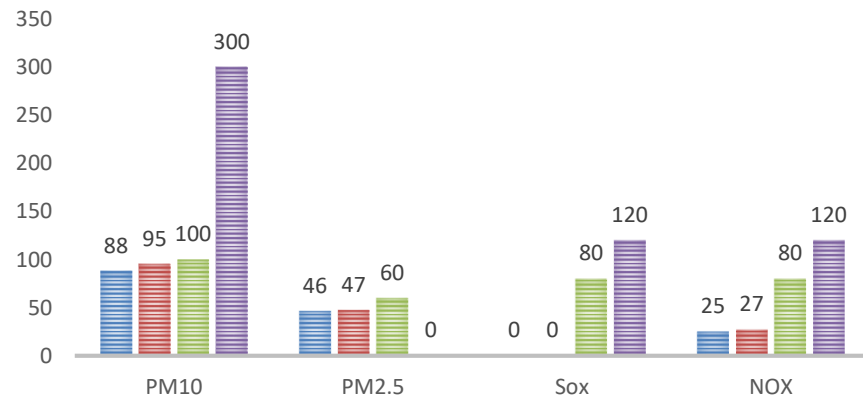
AMBIENT AIR QUALITY AT LOHAPATTI

04.07.2024 19.07.2024 NAAQS GSR Standards



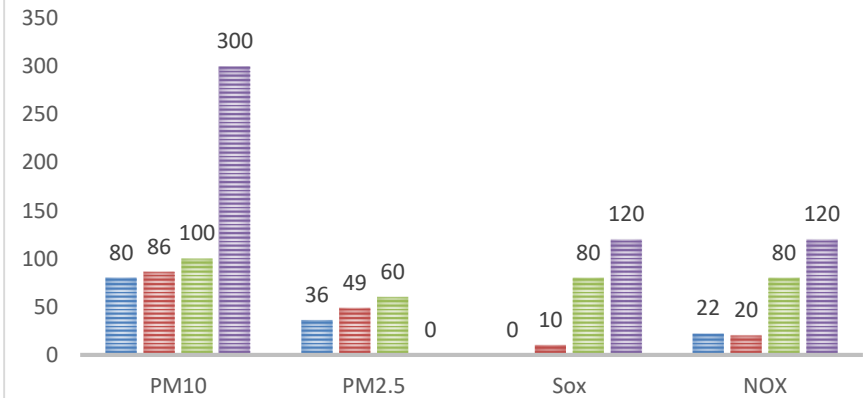
AMBIENT AIR QUALITY AT KHARKHAREE

03.07.2024 18.07.2024 NAAQS GSR Standards



AMBIENT AIR QUALITY AT DUMARDA

08.07.2024 23.07.2024 NAAQS GSR Standards



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.



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT TEST REPORT

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Test Report for Mine Effluent samples

Month & Year	07/2024	Cluster	Cluster XIII		ULR No.		TC1013524000001032P	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)					Date of Issue	23.09.2024	
Project		Sampling Ref. No.	REM/BCCL/2024/07		Sampling Method		IS 3025 (Part-1) CMPDI/RI-II/LPM 13	
Sampling Stations	(i)	Murlidih 20/21	Sample Collected in 2.5 Ltr Jerricane , Color as observed is transparent			Period of Analysis	01.07.2023 to 06.08.2023	
			Date of Sampling		08.07.2024	29.07.2024		
Sl. No.	Parameter	Method of Analysis	Observed Values		STANDARDS FOR COAL MINES (Stipulated by Ministry of Environment and Forests (MoEF), Vide Notification No. GSR 742(E), Dt: 25.09.2000)	LDL		
			First Fortnight	Second Fortnight				
1	Total Suspended Solids	IS 3025/17:1984, R :2017, Gravimetric	43	41	100 (Max)	10		
2	pH	IS-3025/11:1983, R-2017, Electrometric	7.64	7.66	5.5 - 9.0	0.2		
3	Oil & Grease	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	<2.0	10 (Max)	2		
4	COD	APHA 23rd Edition 5220 C Titrimetric Method	40	40	250 (Max)	4		

***Grab sampling carried out for water samples **All units in mg/L unless specified otherwise *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,*

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env), CMPDI, RI-II.

---- End of Report ----

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 during day time & night time. Noise levels were measured for the complete day & night time, the Intergration time taken was one hour or 3600 seconds. 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 & night time and the observed values were compared with standards prescribed by MoEF&CC. The results of Noise levels recorded during day & night 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.



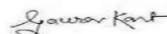
CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	07/2024	Cluster	Cluster XIII					ULR No.	TC1012224000001088F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	23.09.2024
Project			Sample Ref. No.	REM/BCCL/2024/07			Sampling Method	CMPDI/RI-II/LPM 22	
Sampling Stations	i	Murlidih		Date of Sampling	05.07.2024	22.07.2024	Zone Category of Station:	Core Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	51.7	51.6	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	51.8	52					
3		08:00 - 09:00	54	55.1					
4		09:00 - 10:00	53.1	54.2					
5		10:00 - 11:00	56.2	56.2					
6		11:00 - 12:00	56.6	56.3					
7		12:00 - 13:00	58.3	59.4					
8		13:00 - 14:00	58.8	58.9					
9		14:00 - 15:00	59.2	59.4					
10		15:00 - 16:00	59.5	61.5					
11		16:00 - 17:00	59.2	59.7					
12		17:00 - 18:00	57.7	57.7					
13		18:00 - 19:00	54.2	55.1					
14		19:00 - 20:00	53.9	54.2					
15		20:00 - 21:00	52.7	52.7					
16		21:00 - 22:00	52.5	52.4					
		Leq DAY	56.5	57.1					
1	Noise Level dB(A)Leq -Night	22:00-23:00	37.7	37.9	CPCB, Protocol for Ambient Level Noise Monitoring - 2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	33.5	34					
3		00:00- 01:00	33.3	33.7					
4		01:00-02:00	33.2	33.6					
5		02:00-03:00	33.1	33.3					
6		03:00-04:00	37.3	36.8					
7		04:00-05:00	37.5	37.3					
8		05:00-06:00	37.7	37.4					
		Leq Night	34.6	34.5					

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants



(Gaurav Kant)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

---- End of Report ----

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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDI, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	07/2024	Cluster	Cluster XIII				ULR No.	TC1012224000001088F		
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	23.09.2024
Project		Sample Ref. No.	REM/BCCL/2024/07				Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Lohapatti	Date of Sampling		04.07.2024	19.07.2024	Zone Category of Station:		Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards		
			First Fortnight	Second Fortnight				Zones	Limits in dB	
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	38.1	38.7	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50	
2		07:00 - 08:00	49.1	48.3						
3		08:00 - 09:00	43.6	48.8						
4		09:00 - 10:00	40.8	43.3						
5		10:00 - 11:00	43.6	45.1						
6		11:00 - 12:00	42.2	47.5						
7		12:00 - 13:00	43.3	46.1						
8		13:00 - 14:00	44.7	47.7						
9		14:00 - 15:00	44	45.4						
10		15:00 - 16:00	46.7	47.1						
11		16:00 - 17:00	46.8	46.9						
12		17:00 - 18:00	46.6	47.7						
13		18:00 - 19:00	46.6	47.5						
14		19:00 - 20:00	46.1	45.6						
15		20:00 - 21:00	45.9	45.7						
16		21:00 - 22:00	45.7	45.6						
		Leq Day	45.3	46.5						
1	Noise Level dB(A)Leq -Night	22:00-23:00	41.1	41.1	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50	
2		23:00- 00:00	36.9	36.5						
3		00:00- 01:00	36.7	36.6						
4		01:00-02:00	36.3	37						
5		02:00-03:00	36.2	36.5						
6		03:00-04:00	40.2	40.3						
7		04:00-05:00	39.8	40.4						
8		05:00-06:00	40.6	40.8						
		Leq Night	37.5	37.8						

**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit

Sampling Assistants ANALYSED BY (Gaurav Kant) REVIEWED BY	(Amit Raj Mishra) Authorised Signatory
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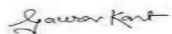
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.

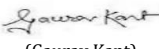
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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
Ambient Noise Level Test Report

CMPDIL, RI-II
 KOYLA BHAWAN COMPLEX
 DHANBAD. -826005
 Phone:0326-223-850
 email: rdri2cmpdi@coalindia.in

Month & Year	07/2024	Cluster	Cluster XIII				ULR No.	TC1012224000001088F	
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	23.09.2024	
Project			Sample Ref. No.	REM/BCCL/2024/07			Sampling Method	CMPDI/RI-II/LPM 22	
Sampling Stations	i	Kharkharee		Date of Sampling	03.07.2024	18.07.2024	Zone Category of Station:	Buffer Zone	
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	45.6	46.5	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	61.7	61.6					
3		08:00 - 09:00	73.4	73.6					
4		09:00 – 10:00	73.3	72.9					
5		10:00 - 11:00	69.5	68.3					
6		11:00 - 12:00	66.5	66					
7		12:00 - 13:00	63.9	65					
8		13:00 - 14:00	62.3	61.5					
9		14:00 - 15:00	59.9	59.2					
10		15:00 - 16:00	58.3	58.7					
11		16:00 - 17:00	58.7	59.3					
12		17:00 - 18:00	58.4	59					
13		18:00 - 19:00	55.7	55.7					
14		19:00 - 20:00	53.9	54					
15		20:00 - 21:00	51.8	52					
16		21:00 - 22:00	51.1	51.6					
		Leq Day	66.2	66.0					
1	Noise Level dB(A)Leq -Night	22:00-23:00	43.7	41.7	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	36.9	37.4					
3		00:00- 01:00	37	37.4					
4		01.00-02.00	35.5	36.6					
5		02.00-03.00	35.2	32.5					
6		03.00-04.00	38.7	40					
7		04.00-05.00	38.5	37.5					
8		05:00-06:00	37.3	36.3					
		Leq Night	36.2	36.5					
**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit									
Sampling Assistants			 (Gaurav Kant)			 (Amit Raj Mishra)			
ANALYSED BY			REVIEWED BY			Authorised Signatory			
Note: The results above relate to the samples tested as received. This report cannot be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.									
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 cmpdi A Mini Ratna Company CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED Environment Laboratory, Regional Institute-II Ambient Noise Level Test Report CMPDIL, RI-II KOYLA BHAWAN COMPLEX DHANBAD. -826005 Phone:0326-223-850 email: rdri2cmpdi@coalindia.in									
Month & Year	07/2024	Cluster	XIII					ULR No.	TC1012224000001088F
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)							Date of Issue	23.09.2024
Project		Sample Ref. No.	REM/BCCL/2024/07			Sampling Method	CMPDI/RI-II/LPM 22		
Sampling Stations	i	Dumarda	Date of Sampling	08.07.2024	23.07.2024	Zone Category of Station:	Buffer Zone		
Sl. No.	Parameter	Hour / Time of day	Observed Values (in Leq dB(A))	Observed Values (in Leq dB(A))	Method of Analysis	Range Of Testing	LDL	NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000 Standards	
			First Fortnight	Second Fortnight				Zones	Limits in dB
1	Noise Level dB(A)Leq - Day	06:00 - 07:00	47.1	47.6	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	75 65 55 50
2		07:00 - 08:00	51.2	52.4					
3		08:00 - 09:00	52.3	53.1					
4		09:00 - 10:00	52.7	53.7					
5		10:00 - 11:00	58.3	55.4					
6		11:00 - 12:00	64.3	63.6					
7		12:00 - 13:00	67.3	66.3					
8		13:00 - 14:00	68.8	67.2					
9		14:00 - 15:00	62.8	61.7					
10		15:00 - 16:00	53.5	53.4					
11		16:00 - 17:00	55.1	53.4					
12		17:00 - 18:00	52.2	52.4					
13		18:00 - 19:00	59.8	61.1					
14		19:00 - 20:00	54.1	58.7					
15		20:00 - 21:00	52.4	58					
16		21:00 - 22:00	47	47.7					
		Leq Day	61.2	60.4					
1	Noise Level dB(A)Leq -Night	22:00-23:00	42.7	43.2	CPCB, Protocol for Ambient Level Noise Monitoring -2015	35 dB-135 dB	35 dB(A)	Industrial Commercial Residential Silence	70 55 45 50
2		23:00- 00:00	38.1	38.7					
3		00:00- 01:00	38	38.5					
4		01:00-02:00	37.9	38.1					
5		02:00-03:00	37.6	38					
6		03:00-04:00	41.3	41.7					
7		04:00-05:00	41	41.3					
8		05:00-06:00	42.7	42.8					
		Leq Night	39.0	39.3					
**All noise measurements are integrated for a 01 hour period, All units in dB(A) *LDL indicates Lower Detection Limit									
Sampling Assistants		 (Gaurav Kant) ANALYSED BY			 (Amit Raj Mishra) REVIEWED BY Authorised Signatory				
Note: The results above relate to the samples tested as received. This report can not be reproduced in part or full without the written permission of the HOD(Env) , CMPDI, RI-II.									
---- End of Report ----									
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Ambient Air Quality Standards for Jharia Coal Field
As per the Environment (Protection) Amendment Rules, 2000 notified vide notification G.S.R.
742(E), dated 25.9.2000.

Category	Pollutant	Time weighted average	Concentration in Ambient Air	Method of Measurement
1	2	3	4	5
III Coal mines located in the coal fields of • Jharia • Raniganj • Bokaro	Suspended Particulate Matter (SPM)	Annual Average * 24 hours **	500 µg/m ³ 700 µg/m ³	- High Volume Sampling (Average flow rate not less than 1.1 m ³ /min)
	Respirable Particulate Matter (size less than 10 µm) (RPM)	Annual Average * 24 hours **	250 µg/m ³ 300 µg/m ³	Respirable Particulate Matter sampling and analysis
	Sulphur Dioxide (SO ₂)	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1.Improvedwest and Gaeke method 2.Ultraviolet fluorescene
	Oxide of Nitrogen as NO ₂	Annual Average * 24 hours **	80 µg/m ³ 120 µg/m ³	1. Jacob & Hochheiser Modified (Na-Arsenic) Method 2. Gas phase Chemilumine-scence

Note:

* Annual Arithmetic mean for the measurements taken in a year, following the guidelines for frequency of sampling laid down in clause 2.

** 24hourly/8hourly values shall be met 92% of the time in a year. However, 8% of the time it may exceed but not on two consecutive days.

NATIONAL AMBIENT AIR QUALITY STANDARDS

New Delhi the 18th November 2009

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

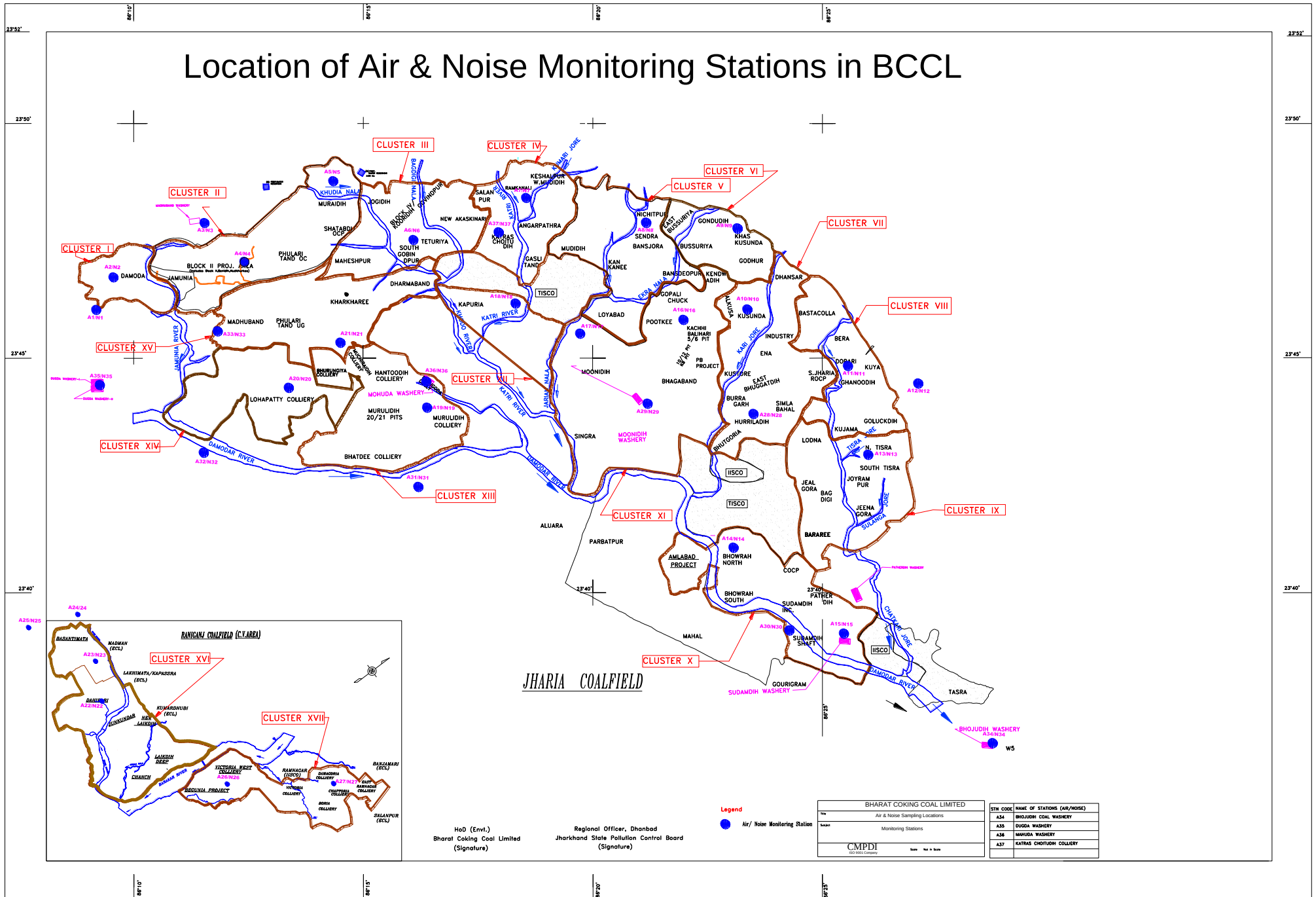
Pollutant	Time Weighted Average	Concentration in Ambient Air		Methods of Measurement
		Industrial, Residential, Rural and other Areas	Ecologically Sensitive Area (Notified by Central Government)	
Sulphur Dioxide (SO₂), µg/m³	Annual * 24 Hours **	50 80	20 80	-Improved West and Gaeke Method -Ultraviolet Fluorescence
Nitrogen dioxide (NO₂), µg/m³	Annual * 24 Hours **	40 80	30 80	-Jacob & Hochheiser modified (NaOH-NaAsO ₂) Method -Gas Phase Chemiluminescence
Particulate Matter (Size less than 10µm) or PM₁₀, µg/m³	Annual * 24 Hours **	60 100	60 100	-Gravimetric -TEOM -Beta attenuation
Particulate Matter (Size less than 2.5µm) or PM_{2.5}, µg/m³	Annual * 24 Hours **	40 60	40 60	-Gravimetric -TEOM -Beta attenuation
Ozone (O₃), µg/m³	8 Hours * 1 Hour **	100 180	100 180	-UV Photometric -Chemiluminescence -Chemical Method
Lead (Pb), µg/m³	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filter
Carbon Monoxide (CO), mg/m³	8 Hours ** 1 Hour **	02 04	02 04	-Non dispersive Infrared (NDIR) Spectroscopy
Ammonia (NH₃), µg/m³	Annual * 24 Hours **	100 400	100 400	-Chemiluminescence -Indophenol blue method
Benzene (C₆H₆), µg/m³	Annual *	05	05	-Gas Chromatography (GC) based continuous analyzer -Adsorption and desorption followed by GC analysis
Benzo(a)Pyrene (BaP) Particulate phase only, ng/m³	Annual *	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic (As), ng/m³	Annual *	06	06	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni), ng/m³	Annual *	20	20	-AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

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

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

NOTE: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category,

Location of Air & Noise Monitoring Stations in BCCL



[illegible]

INDEX						
Cluster	Surface Water (LUS, DS)	Name of River/ Nala/Jore	Miner/ Effluent	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Jamuna River	MW1	Madoda Area	GW1	Chutwaly Village
II	SW3, SW4	Khudia Nala	MW2	Block II OCP	GW2	Joytampur Village
III	SW4, SW5, SW6, SW7	Khudia Nala, Bagdigi Nala	GW3	Govind Colliery	GW3	Jogidih Village
IV	SW8, SW11, SW9, SW10	Kanti River, Kuman Jore	MW4	Chotudih	GW4	Kankane Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Mudidih	GW5	Nichtpur
VI	SW14, SW15	Ekra Nala	MW6	East Bussaria UGP	GW6	Bansinga Borewell
VII	SW16, SW17	Kanti Jore	MW7	Chhatpur UGP	GW7	Humridih
VIII	SW18, SW19	Kashi Jore	MW8	Dobari JGP	GW8	Gharuudih
IX	SW19, SW20	Kashi Jore	MW9	Jeenagora	GW9	Lodna
X	SW21, SW22	Damdodar River	MW10	Shownah North	GW10	Shownah South
XI	SW23, SW24, SW25, SW26	Jarian River	MW11	Shagabadi UGP	GW11	Shagabandh
XII	SW27, SW28	Kanti River	MW12	Kapuria Murudih (2021)	GW12	Kapuria
XIII	SW29, SW30	Damdodar River	MW13	Murudih	GW13	Muridih
XIV	SW31, SW29	Damdodar River	MW14	Lohapatti	GW14	Lohapatti
XV	SW5, SW2	Khudia Nala	MW15	Chhannan UGP	GW15	Chhannaree
XVI	SW33, SW34	Khudia River	MW16	Dharbanga UGP	GW16	Salabari Village
XVII	SW35, SW36	Barak River	MW17	Managana Colliery	GW17	Chaptoria

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**WATER QUALITY REPORT
OF
BHARAT COKING COAL LIMITED,
CLUSTER – XIII**

**(FOR THE Q.E.
JUNE 2024)**

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



CMPDI

ISO 9001 Company
Regional Institute-II
Dhanbad, Jharkhand

CLUSTER - XIII

(FOR THE Q.E. JUNE 2024)

CONTENTS

SL. NO.	CHAPTER	PARTICULARS
1.		EXECUTIVE SUMMARY
2.	CHAPTER - I	INTRODUCTION
3.	CHAPTER-II	WATER SAMPLING & ANALYSIS
4.	Plates: Plate No. - I	SURFACE PLAN SHOWING WATER MONITORING LOCATIONS

EXECUTIVE SUMMARY

1.0 Introduction

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

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

2.0 Sampling location and rationale

2.1 Water sampling stations

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

3.0 Methodology of sampling and analysis

3.1 Water quality

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

4.0 Results and interpretations

4.1 Water quality

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

CHAPTER - I

INTRODUCTION

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

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

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

- 1.1 The Cluster-XIII is in the Northern part of the Jharia coalfield. It includes a group of 7 Mines (viz. Murlidih, Bhurungiya, Mucharadih, Hantoodih, Padugora, Murlidih 20/21 Pits & Bhatdee. The Cluster – XIII is situated about 25 - 30 kms from Dhanbad Railway Station. The mines of this Cluster – XIII are operating since pre nationalization period (prior to 1972-73). It is connected by both Railway and Road. The drainage of the area is governed by Katri River & Damodar River.
- 1.2 The Cluster-XIII is designed to produce 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal.

The Project has Environmental Clearance from Ministry of Environment, Forests and Climate Change (MoEF&CC) for a rated capacity 0.18 MTPA (normative) and 2.34 MTPA (peak) capacity of coal production vide letter no. J-11015/11/2010-IA.II (M) dated 06th June, 2013.

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

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CHAPTER – II

WATER QUALITY MONITORING

2.1 Location of sampling sites (Refer **Plate No. - I**)

- i) Ground Water quality at **Murlidih 20/21 (GW13)**
- iii) Surface Water quality at **U/S of Damodar River (SW29)**
- ii) Surface Water quality at **D/S of Damodar River (SW30)**
- iii) Mine Water Quality at Murlidih(20/21) (**MW13**)

2.2 Methodology of sampling and analysis

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

2.3 Results & Interpretations

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



CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
GROUND WATER ANALYSIS TEST REPORT

CMPDI, RI-II
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Month & Year		QUARTER ENDING JUNE 2024		Name of Cluster		CLUSTERXIII				ULR No.		TC101222400000 0914P		
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)									Date of Issue			
Project		Murlidih				Sample Ref. No.		REM/BCCL/24-25/GW/		Sampling Method		CMPDI/RI-II/LPM 13,(IS 3025:Part -1)		
Sampling Stations		GW13		Date of Sampling		13.05.2024		Sample Collected in 5 Ltr Jerricane , Color as observed is transparent						
						Period of Analysis			13.05.2024		to		07.08.2024	
Sl. No.	Parameter	Method of Analysis		Observed Values							IS 10500: 2012			
				GW13 G0113		Range Of Testing		LDL		Acceptable Limit (Max)*		Permissible Limit in the Absence of Alternate Source (Max)		
1	Colour, Hazen unit	APHA, 24th edition ,2120-c-Spectrophotometric Single Wavelength Method ,2023		2		1-500.0		1		5		15		
2	Calcium, mg/l	IS 3025, (Part 40): 1991 R:2019,AAS-Flame Method & EDTA Method		120		2.0-800.0		2		75		200		
3	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 , Argentometric Method		55		2.0-1500.0		5		250		1000		
4	Fluoride, mg/l	APHA, 24th Edition, SPADNS Method		0.69		0.2-2.00		0.2		1		1.5		
5	Iron, mg/l	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame Method		<0.2		0.2-10		0.2		1		No relaxation		
6	Magnesium	APHA 24th edition, 3500-Mg B: Calculation Method		171		6.0-700		6		30		100		
7	Nitrate , mg/l	APHA, 24th edition, UV-Spectrophotometric Method		48.13		0.5-45.0		0.5		45		No relaxation		
8	Odour	APHA, 24th Edition, , 2150-C		Agreeable		Qualitative		Qualitative		Agreeable		Agreeable		
9	pH value	IS 3025, Part 11 : 1983 R 2023 Electrometric (pH Meter) Method		7.38		1-14		0.1		6.5-8.5		No relaxation		
10	Sulphate, mg/l	APHA -24th edition, 4500 S , Turbidity Method		496		10.0-400.0		10		200		400		
11	Taste	APHA,24th edition, 2160-C		Acceptable		Qualitative		Qualitative		Acceptable		Agreeable		
12	Total Alkalinity (CaCO3), mg/l, Max	IS 3025, Part 23: 1986 R 2019 Titration Method		175		4.0-2000.0		4		200		600		
13	Total Dissolved Solids, mg/l	IS 3025, Part 16: 1984 R 2023 Gravimetric method		1066		25.0-5000.0		25		500		2000		
14	Total Hardness, mg/l	IS 3025, (Part 21): 2019 EDTA Method		1005		4.0-2000.0		4		200		600		
15	Turbidity, NTU	IS 3025, (Part 10):1984, R-2023 Nephelometric/Turbiditmetic Method		2.2		1-800		0.1		1		5		
16	Zinc, mg/l	IS 3025(Part 49) : 1994,R:2019, AAS-Flame Method		<0.1		0.10 – 10.0		0.1		5		15		

***All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,



(Kumar Vaibhav)



(Amit Raj Mishra)

ANALYSED BY

REVIEWED BY

Authorised Signatory

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Environment Laboratory, Regional Institute-II
GROUND WATER ANALYSIS TEST REPORT

CMPDI, RI-II
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Month & Year		QUARTER ENDING JUNE 2024		Name of Cluster		CLUSTER XIII								
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue	16.08.2024			
Project		Murlidih			Sample Ref. No.		REM/BCCL/24-25/GW/		Sampling Method		CMPDI/RI-II/LPM 13,(IS 3025:Part -1)			
Sampling Stations		GW13		Date of Sampling		13.05.2024		Sample Collected in 5 Ltr Jerricane , Color as observed is transparent						
					Period of Analysis			13.05.2024		to	07.08.2024			
Sl. No.	Parameter	Method of Analysis			Observed Values					IS 10500: 2012				
					GW13		Range Of Testing		LDL		Acceptable Limit (Max)*		Permissible Limit in the Absence of Alternate Source (Max)	
1	Boron (as B), mg/l, Max	APHA, 24th edition ,Carmine			<0.2		0.2-10		0.2		0.5		1	
2	Copper (as Cu), mg/l, Max	IS 3025 Part 42 : 1992 R : 2019, AAS-Flame APHA, 24th edition, AAS-GTA			<0.01		0.01-10.0		0.01		0.05		1.5	
3	Free Residual Chlorine, mg/l, Min	APHA, 24th Edition, , 4500-Cl- B. (Iodometric Method-I)			<0.04		0.04-5		0.04		0.2		1	
4	Lead (as Pb), mg/l, Max	IS:3025(Part 47):1994 (Reaffirmed 2019) APHA, 24th edition, AAS-GTA			<0.005		0.005-10		0.005		0.01		No relaxation	
5	Phenolic compounds (as C6H5OH), mg/l, Max	APHA, 24th Edition,4-Amino Autipyrine			<0.001		0.001-10		0.001		0.002		0.002	
6	Selenium, mg/l, Max	APHA 24th edition IS-3025,part 56:2003, R-2019/, AAS-VGA			<0.007		0.007-10		0.007		0.01		No relaxation	
7	Total Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th edition AAS-VGA			<0.006		0.006-10		0.006		0.01		0.05	
8	Total Chromium (as Cr), mg/l, Max	IS-3025 Part 52:2003, R:2019,AAS-Flame APHA, 24th edition, AAS-GTA			<0.01		0.01-10.0		0.01		0.05		No relaxation	
9	Nickel as Ni, mg/l Max	IS 3025 Part 54 : 2003,R : 2019, AAS-Flame APHA, 24th edition, AAS-GTA			<0.005		0.005-10		0.005		0.02		No relaxation	
10	Manganese as Mn, mg/l, Max	APHA, 24 TH Edition:2023 AAS-GTA Method			<0.02		0.02-10.0		0.02		0.1		0.3	

***All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

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REVIEWED BY

(Amit Raj Mishra)

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Month & Year		QUARTE ENDI NG JUNE 2024		Name of Cluster		XIII & XIV			ULR No.		TC1012224000000 947P TC1012224000000 948P				
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)								Date of Issue		16.08.2024			
Project		Sample Ref. No.				REM/BCCL/23-24/SW /			Sampling Method		(IS 3025 , Part-1) CMPDI/RI-II/LPM 13				
Sampling Stations		(i)	Damodar River (upstream wrt clusterXIII, Downstream wrt clusterXIV) (SW29)				Date of Sampling			25.06.2024		Period of Analysis			
		(ii)	Downstream in Damodar River(SW30)				Date of Sampling			03.06.2024		03.06.2024 to 07.08.2024			
Sl. No.	Parameter	Method of Analysis				Observed Values		IS : 2296 INLAND SURFACE WATER [1982] Class 'C		Range of Testing	LDL				
						(i)	(ii)								
1	BOD (3 days 27°C), mg/l	IS 3025 (Part 44) : 1993, R-2019 , 3 day incubation at 27°C				<2.0		<2.0		3		2.00-100.00		2	
2	Colour,Hazen Units	APHA 24th edition , 2120-B-:2023				1		1		10		1-500.0		1	
3	Chlorides, mg/l	IS-3025(Part 32):1988, R-2019 Argentometric Method				24		22		600		2.0-1500.0		5	
4	Copper, mg/l	IS 3025 (Part 42) : 1992 R : 2019, AAS-Flame Method				<0.2		<0.2		1.5		0.2-10.0		0.2	
5	Dissolved Oxygen, mg/L	IS 3025 (Part 38) : 1989, R:2003 Winkler Azide Method				6.8		6.7		4		1.0-10.0		0.1	
6	Fluoride, mg/l	APHA, 24th edition, SPADNS Method				0.64		0.69		1.5		0.2-2.00		0.2	
7	Hexavalent Chromium, mg/l	APHA 24th edition, 1,5-Diphenylcarbohydrazide Method IS 3025 (Part 52) : 2003,R-2019				<0.01		<0.01		0.05		0.01-1.4		0.01	
8	Iron, mg/l	IS 3025 (Part 53):2003,R:2019, AAS-Flame Method				<0.2		0.2		50		0.2-10		0.2	
9	Nitrate , mg/l	APHA, 24th edition, UV-Spectrophotometric Method				17.07		19.29		50		0.5-45.0		0.5	
10	pH value	IS 3025, (Part 11) : 1983 R-2023 Electrometric (Ph Meter) method				7.26		7.29		6.5-8.5		1.0-14.0		2	
11	Sulphate, mg/l	APHA –24th edition,4500- S, Turbidity Method				41		44		400		10.0-400.0		10	
12	Total Dissolved Solids, mg/l	IS 3025, (Part 16): 1984 R-2023 Gravimetric method				224		228		1500		25.0-10000.0		25	
13	Zinc, mg/l	IS 3025(Part 49) : 1994, R : 2019, AAS-Flame Method				<0.1		<0.1		15		0.10 – 10.0		0.1	

****Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit**

*****All units in mg/L unless specified otherwise Sample Collected in 5 Ltr Jerricane , Color as observed is transparent**



(Kumar Vaibhav)



(Amit Raj Mishra)

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Month & Year		QUARTER ENDING JUNE 2024	Name of Cluster		XIII & XIV		Report No.	
Customer		Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)				Date of Issue		16.08.2024
Project		Sample Ref. No.		REM/BCCL/23-24/SW /	Sampling Method	(IS 3025 , Part-1) CMPDI/RI-II/LPM 13		
Sampling Stations		(i)	Damodar River (upstream wrt clusterXIII, Downstream wrt clusterXIV)Downstream of Jarian Nala(SW 01) (SW29)		Date of Sampling	25.06.2024	Period of Analysis	
		(ii)	Downstream in Damodar River(SW30)		Date of Sampling	03.06.2024	03.06.2024 to 07.08.2024	
Sl. No.	Parameter	Method of Analysis	Observed Values		IS : 2296 INLAND SURFACE WATER [1982] Class 'C	Range of Testing	LDL	
			(i)	(ii)				
1	Arsenic (as As), mg/l, Max	IS-3025,Part 37:1988, R-2019/ APHA 24th edition AAS-VGA	<0.006	<0.006	0.2	0.006-10	0.006	
2	Lead (as Pb), mg/l, Max	APHA, 24th edition, AAS-GTA	<0.005	<0.005	0.1	0.005-10	0.005	
3	Phenolic compounds (as C6H5OH), mg/l, Max	APHA, 24th Edition 4-Amino Antipyrine	<0.002	<0.002	0.005	0.002-10	0.002	
4	Selenium, mg/l, Max	IS-3025 ,Part 56:2003, R-2019/ APHA 24th edition, AAS-VGA	<0.007	<0.007	0.05	0.007-10	0.007	

****Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit**

*****All units in mg/L unless specified otherwise Sample Collected in 5 Ltr Jerricane , Color as observed is transparent**

 (Kumar Vaibhav)	 (Amit Raj Mishra)
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Analysed by	REVIEWED BY	Authorised Signatory
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CENTRAL MINE PLANNING AND DESIGN INSTITUTE LIMITED
Environment Laboratory, Regional Institute-II
MINE EFFLUENT ANALYSIS TEST REPORT

CMPDIL, RI-II
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Month & Year	QUARTER ENDING June 2024	Name of Cluster	CLUSTER XIII	ULR No.	TC1013524000000 973P
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)			Date of Issue	16.08.2024
Project	Murlidih 20/21	Sample Ref. No.	REM/BCCL/24-25/MW/	Sampling Method	CMPDI/RI-II/LPM 13,(IS 3025:Part -1)
Sampling Stations	MW13	Date of Sampling	24.06.2024	Sample Collected in 5 Ltr Jerricane , Color as observed is transparent	
		Period of Analysis		24.06.2024	to 07.08.2024

Sl. No.	Parameter	Method of Analysis	MOEF -SCH-VI STANDARDS Class 'A'			
			MW13 M0962	Range Of Testing	LDL	
1	B.O.D (3 days 27°C), mg/l, Max	IS 3025 /44:1993,R:20033 day incubation at 27°C	<2.0	2-10000.0	2	30
2	Colour	APHA,24th edition ,2120-B:-2023	1	1.0-500.0	1	-
3	COD, mg/l, Max	APHA 24th edition 5220 C Titrimetric Method	28	4.0-800.0	4	250
4	Copper (as Cu), mg/l, Max	IS 3025(Part42): 1992 R : 2019, AAS-Flame	<0.2	0.2-10.0	0.2	3
5	Dissolved Phosphate (as P), mg/l, Max	IS 3025/ 31, 1988 R 2019	0.085	0.1-5.0	0.1	5
6	Fluoride (as F) mg/l, Max	APHA, 24th Edition, Page 4-90 to , 4500 – F- D (SPADNS Method)	0.68	0.2-2.0	0.2	2
7	Hexavalent Chromium, mg/l, Max	IS 3025 (Part 52) : 2003,Reaffirmed 2019	<0.01	0.01-1.40	0.01	0.1
8	Iron (as Fe), mg/l, Max	IS 3025 (Part 53) : 2003, R : 2019 , AAS-Flame	<0.2	0.2-10	0.2	3
9	Manganese(as Mn), mg/l, Max	APHA, 24th edition, AAS-Flame	<0.1	0.1-10	0.1	0.1
10	Nickel (as Ni), mg/l, Max	IS-3025(Part 54):2003, R:2019 AAS-Flame	<0.1	0.1-10.0	0.1	3
11	Nitrate Nitrogen, mg/l, Max	APHA, 24th Edition,UV-Spectrophotometric	2.27	0.5-45	0.5	10
12	Oil & Grease, mg/l, Max	IS 3025/39:1991, R : 2019, Partition Gravimetric	<2.0	2.0-1000	2	10
13	pH value	IS-3025/11:1983, R-2023, Electrometric	7.66	1 -14	0.1	5.5 to 9.0
14	Temperature (°C)	IS-3025/09:1984, Thermometric	29	1-100	.	Shall not exceed 5° C above the receiving temp.
15	Total Chromium (as Cr), mg/l, Max	IS-3025(Part 52):2003, R:2019 AAS-Flame	<0.1	0.1-10.0	0.1	2
16	Total Suspended Solids, mg/l, Max	IS 3025/17:1984, R :2023, Gravimetric	42	10-5000	10	100
17	Zinc (as Zn), mg/l, Max	IS 3025 /49 : 1994, R : 2019, AAS-Flame	<0.1	0.1-10.0	0.1	5
18	Odour	APHA, 24th Edition, , 2150-C	Agreeable	Qualitative	Qualitative	Qualitative

***All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

ANALYSED BY

(Kumar Vaibhav)

REVIEWED BY

(Amit Raj Mishra)

Authorised Signatory

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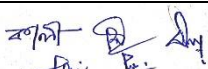
CMPDIL, RI-II
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email: rdri2cmpdi@coalindia.in

Month & Year	QUARTER ENDING June 2024	Name of Cluster		CLUSTER XIII			Report No.			
Customer	Environment Department, Bharat Coking Coal Limited (BCCL), Koyla Bhawan, Dhanbad (E-mail: gmenv.bccl@coalindia.in)						Date of Issue	16.08.2024		
Project	Murlidih 20/21		Sample Ref. No.		REM/BCCL/24-25/MW/		Sampling Method	CMPDI/RI-II/LPM 13,(IS 3025:Part -1)		
Sampling Stations	MW13		Date of Sampling	24.06.2024		Sample Collected in 5 Ltr Jerricane , Color as observed is transparent				
					Period of Analysis		24.06.2024		to	07.08.2024

Sl. No.	Parameter	Method of Analysis	MOEF -SCH-VI STANDARDS Class 'A'			
			MW13	Range Of Testing	LDL	
1	Ammonical Nitrogen, mg/l, Max	IS 3025/34:1988,R : 2009, Nessler's	<0.02	0.02-100	0.02	50
2	Arsenic (as As), mg/l, Max	IS-3025,part 37:1988, R-2019/ APHA 24th edition AAS-VGA	<0.006	0.006-5	0.006	0.2
3	Free Ammonia, mg/l, Max	IS:3025/34:1988, Nessler's	<0.01	0.01-10	0.01	5
4	Lead (as Pb), mg/l, Max	IS-3025(Part 59):2006, R 2023 AAS-GTA/APHA, 24 th Edition, 3111B, AAS-GTA	<0.005	0.005-10	0.005	2
5	Phenolic compounds	APHA, 24th edition 4-Amino Antipyrine	<0.002	0.002-5	0.002	1
6	Selenium, mg/l, Max	IS-3025,part 56:2003, R-2019/ APHA 24th edition, AAS-VGA	<0.007	0.007-5	0.007	0.05
7	Sulphide (as S ²⁻) mg/l Max.	APHA 24th edition Methylene Blue Method	<0.005	0.005-5	0.005	2
8	Total Kjeldahl Nitrogen, mg/l, Max	IS:3025/34:1988, Nessler's	<1	1-200	1	100
9	Total Residual Chlorine, mg/l, Max	APHA, 24th Edition, , 4500-Cl B. (Iodometric Method-I)	<0.04	0.04-5.00	0.04	1

***All units in mg/L unless specified otherwise,

**Grab sampling carried out for water samples. *LDL indicates Lower Detection Limit & BDL indicates Below Detection Limit,

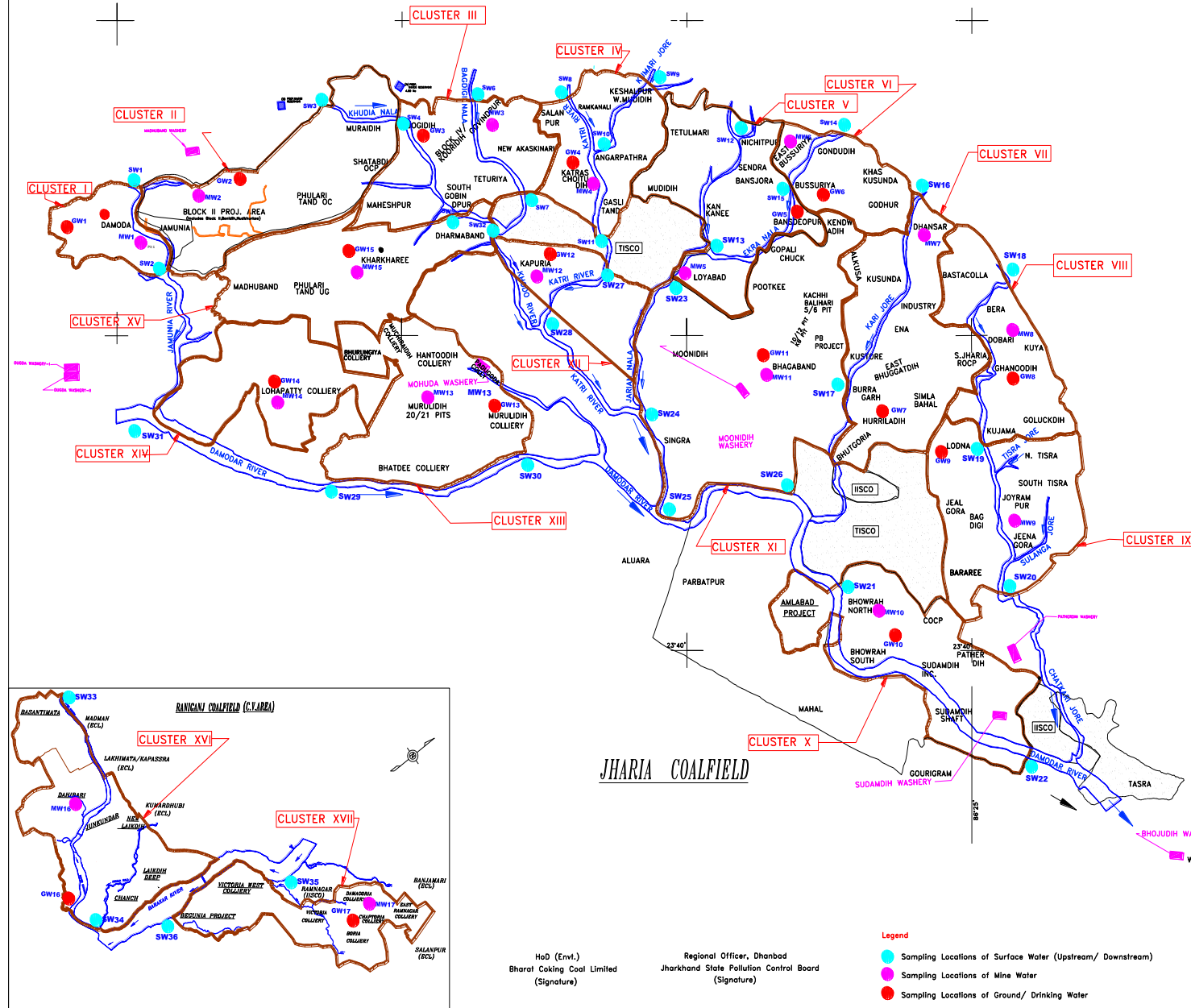
 (Kumar Vaibhav) ANALYSED BY	 (Kumar Vaibhav) REVIEWED BY	 (Amit Raj Mishra) Authorised Signatory
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---- End of Report ----

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Water Sampling Locations in BCCL



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Cluster	Surface Water (JUS, DIS)	Name of River/Nala/Jore	Mine Effluent Water	Sampling Location	Ground Water	Sampling Location
I	SW1, SW2	Damodar River	MW1	Damodar Area	GW1	Shutway Village
II	SW3, SW4	Khudra Nala	MW2	Block II OCP	GW2	Joyrampur Village
III	SW4, SW5, SW6, SW7	Khudra Nala, Bagdigi Nala	MW3	Govindpur Colliery	GW3	Jogdih Village
IV	SW8, SW11, SW9, SW10	Kain River, Kurnari Jore	MW4	Choudhdi	GW4	Kankane Village
V	SW12, SW13, SW15	Jarian Nala, Ekra Nala	MW5	Muddih	GW5	Nichitpur
VI	SW14, SW15	Ekra Nala	MW6	East Bassuria UGP	GW6	Bansjora Borewell
VII	SW16, SW17	Kan Jore	MW7	Dobari UGP	GW7	Humladih
VIII	SW18, SW19	Kachi Jore	MW8	Dobari UGP	GW8	Chanudih
IX	SW19, SW20	Kachi Jore	MW9	Jeena Gora	GW9	Lodna
X	SW21, SW22	Damodar River	MW10	North	GW10	Bhowrah South
XI	SW23, SW24, SW25, SW26	Jarian Nala, Damodar River	MW11	Bhagaband UGP	GW11	Bhagabandh
XII	SW27, SW28	Damodar River	MW12	Kapuria	GW12	Kapuria
XIII	SW29, SW30	Damodar River	MW13	Murkidih (20/21)	GW13	Murkidih
XIV	SW31, SW32	Damodar River	MW14	ohapat	GW14	ohapat
XV	SW5, SW32	Khudra Nala	MW15	Kharkharee UGP	GW15	Kharkharee
XVI	SW33, SW34	Khudra Nala	MW16	Pahban OCP	GW16	Pahban Village
XVII	SW35, SW36	Barakar River	MW17	Damaporia Colliery	GW17	Chaptoria

Legend

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

Company	BHARAT COKING COAL LIMITED
Title	WATER SAMPLING LOCATIONS
Scale	MONITORING STATIONS
Scale	1:10,000