

***ENVIRONMENTAL QUALITY MONITORING, MITIGATIVE
MEASURES AND RELATED ADVICE FOR KATHAUTLA
OPEN CAST COAL MINES, DALTONGANJ, JHRKHAND***

**(POST MONSOON SEASON)
(OCTOBER TO DECEMBER, 2017)**

Prepared

For



**M/s HINDALCO INDUSTRIES LIMITED
Daltonganj-822101
Jharkhand**

Prepared

by



**ENVIRONMENTAL ASSESSMENT AND REMEDIATION
(NREM)
CSIR-CENTRAL INSTITUTE OF MINING & FUEL RESEARCH
BARWA ROAD, DHANBAD - 826 015
(FEBRUARY-2018)**

Report

On

Environmental Quality Monitoring, Mitigative Measures and Related Advice for Kathautia Open Cast Coal Mines, Daltonganj, Jhrkhand

**(POST MONSOON SEASON)
(OCTOBER TO DECEMBER, 2017)**

Project No.: SSP/229/2017-18

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 2. Central Institute of Mining and Fuel Research, Dhanbad reserves the right to publish the results of research for the benefit of the industry.
-

(Gautam Chandra Mondal)
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(K. K. K. Singh)
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HORG (NREM)
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CONTENTS

S.N.	DESCRIPTION	PAGE NO.
1.0	Introduction	1
2.0	Mining Scenario	2
3.0	Environmental Scenario in the mining area	4
3.1	Air Environment	4
3.1.1	Source of Air Pollution	4
3.1.2	Methodology & Instruments Used	4
3.1.3	Air Quality	4
3.1.4	Results and Discussions	6
3.2.	Water Environment	7
3.2.1	Sources of water Pollution	7
3.2.2	Instruments used	7
3.2.3	Water Quality of the Area	8
3.3	Noise Environment	12
3.3.1	Sources of Noise	12
3.3.2	Instruments used	12
3.3.3	Results and Discussions	13
4.0	Conclusion	15
5.0	Recommendations & Follow-up Action	15

LIST OF TABLES

TABLE NO.	DESCRIPTION	PAGE NO.
1.	Methodology and Instrument Used for Air Quality Analysis	4
2.	Details of Sampling Locations	5
3.	Ambient Air Quality Report for Core Zone	5
4.	Ambient Air Quality Report for Buffer Zone	6
5.	Mine Discharge Water Quality Data	9
6.	Ground Water Quality Data	10
7.	Surface Water Quality Data	11
8.	Noise Generating Mining Equipments	12
9.	Noise Level in Core Zone of the Study Area (October, 2017)	13
10.	Noise Level in Buffer Zone of the Study Area (October, 2017)	13
11.	Noise Level in Core Zone of the Study Area (November, 2017)	14
12.	Noise Level in Buffer Zone of the Study Area (November, 2017)	14
13.	Noise Level in Core Zone of the Study Area (December, 2017)	14
14.	Noise Level in Buffer Zone of the Study Area (December, 2017)	15



Ref: HIL/KOCCM/2018/113

Dated: 30th May, 2018

To

The Additional PCCF,
Ministry of Environment, Forest and Climate Change,
Regional Office (ECZ),
Bungalow No – A-2, Shyamali Colony,
Ranchi – 834002,
Tel- 0651-2410007, 2410002
E-mail: ro.ranchi-mef@gov.in

Sub: Submission of Half yearly Compliance Report of Environmental Clearance from MoEFCC vide letter Ref. No: J-11015/61/2006-IA-11(M) dated 19th June, 2006 and Environment Monitoring Report of Post-monsoon and winter (October, 2017 to March, 2018) for Kathautia Opencast Coal Mine (KOCCM), Hindalco Industries Ltd.

Ref:

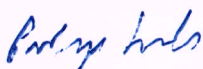
1. Environmental Clearance vide letter no J-11015/61/2006-IA.II(M) dated 19th June, 2006
2. Transfer of EC in the name of Hindalco Industries Ltd from Prior Allotte (M/s UML) vide letter no- J-11015/61/2006-IA-II(M) dated 16th April, 2015

Dear Sir,

Please find enclosed herewith Half Yearly Compliance Report of Environmental Clearance as well as Environment Monitoring Report of Post-monsoon and Winter period (**October, 2017 to March, 2018**) as per condition stipulated in EC for Kathautia Opencast Coal Mine (KOCCM) of Hindalco Industries Ltd.

Thanking You,

Yours' Sincerely,


(Pradeep Samanta),
Mines Manager, KOCCM



Encl:

1. Compliance Report of EC (Annexure-I)
2. Environment Monitoring Report (Annexure-II)
3. Transfer of EC in the name of Hindalco Industries Ltd (Annexure-III)
4. Copy of Environmental Clearance (Annexure-IV)
5. Environment Cell ((Annexure-V)

CC:

1. The Regional Officer,
JSPCB, Qtr. No- E-1, C.T.I Colony,
HEC, Sector-III, Durwa,
Ranchi-834004
2. The Member Secretary, JSPCB,
T.A.Building , Ground Floor,
HEC Complex, Durwa, Ranchi-834004

**CONDITIONS TO BE COMPLIED AS PER ENVIRONMENTAL CLEARANCE
APPROVAL**

KATHAUTIA OPEN CAST COAL MINE, DALTONGANJ

EC . No. J-11015 /61//2006-IA.II(M) dated 19th June, 2006

A. SPECIFIC CONDITIONS

Sl. No.	Conditions	Compliance
01	All the conditions stipulated by SPCB shall be effectively implemented	It is being implemented.
02	The bund/embankment shall be designed taking into account the highest flood level, based on past data, of the drainage of the water bodies in the buffer zone which impact the mining operations so as to guard against mine inundation	Embankment against Durgawati River is of 3m above the HFL of Durgawati River and is of robust construction.
03	Topsoil should be stacked properly with proper slope at earmarked site(s) and should not be kept active and shall be used for reclamation and development of green belt.	Topsoil is being stacked properly with proper slope at earmarked site(s) only. It is being used for reclamation and development of green belt (photographs attached)
04	OB should be stacked at earmarked external OB dumpsite (s) within ML area and shall be a maximum height of 60 m only and consist of benches of 10 m each. The ultimate slope of the dump shall not exceed 28°. Backfilling shall begin at the end of 3 rd year in the de-coaled area. Monitoring and management of existing reclaimed dumpsites should continue until the vegetation becomes self-sustaining. Compliance status should be submitted to the Ministry of Environment & Forests and its Regional Office located at Bhubaneswar on yearly basis.	OB is stacked separately within Mining Lease area. Dump Height is well within 60m from the OGL and OB benches are as per stipulated in EC. Backfilling of de-coaled area is in progress. Reclamation of dump is in progress and plantation on OB dump have self-sustaining. This is being updated to MoEF through this half yearly report. However, we also submitting Environment Statement every year to MoEF.



05	<p>Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected should be utilised for watering the mine area, roads, green belt development, etc. The drains should be regularly desilted and maintained properly.</p> <p>Garland drains (size, gradient and length) and sump capacity should be designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material.</p>	<p>Siltation ponds have been created to arrest the run-off of silt. The water collected from the siltation ponds is used for water spraying and other purposes in the mine. The drains are de-silted and maintained on regularly basis. Garland drains are designed, constructed and maintained keeping safety in view with regard to sudden in rush of water due to heavy rainfall. Sump capacity is of adequate size and regular de-silting is done. (Photographs attached</p>
06	<p>Dimension of the retaining wall at the toe of the dumps and OB benches within the mine to check run-off and siltation should be based on the rainfall data.</p>	<p>Retaining wall at the toe of dump and OB benches is of robust construction and capable of checking sudden run off of rain water.</p>
07	<p>No ancillary operations shall as crushing , screening and washing of coal shall be done within the lease</p>	<p>No such operation is done within ML area.</p>
08	<p>Crushers at the CHP should be operated with high efficiency bag filters, water sprinkling system should be provided to check fugitive emissions from crushing operations, conveyor system, haulage roads, transfer points</p>	<p>No CHP is installed; thus possibility of fugitive emission is ruled out.</p>
09	<p>Drills should be wet operated only.</p>	<p>Drilling is done with wet operated only</p>
10	<p>Surface Miners shall be used for coal and OB extraction. Controlled Blasting should be limited to hard strata only and practiced only during daytime with use of delay detonators. The mitigative measures for control of ground vibration and to arrest the fly rocks and boulders should be implemented.</p>	<p>The ground formation is so hard that surface miner is not applicable and both coal and OB is extracted by shovel and dumper after applying the controlled blasting techniques for minimizing the blast induced ground vibration levels.</p>

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11	Area brought under afforestation shall cover a total area of 802.03 ha and includes reclaimed external OB dump (73.97 ha), reclaimed topsoil dump (4 Ha), backfilled area (683.97 ha), 18.65 ha along excavated area, along ML boundary, along roads (14.80 ha) 6.64 ha along the river and in undisturbed area 1.14 ha) within the lease by planting native species in consultation with the local DFO/Agriculture department. The density of the trees should be around 2500 plants per ha.	Afforestation programme is being undertaken in defined areas and species will be selected in consultation with DFO/ Agriculture department. At the end of mining activity, we shall ensure that total area under afforestation shall be 802.03 ha and shall include reclaimed external OB dump (73.97 ha), reclaimed topsoil dump (4 Ha), backfilled area (683.97 ha), 18.65 ha along excavated area, along ML boundary.
12	A progressive closure Plan shall be implemented by reclamation of quarry area of 683.97 ha shall be backfilled and afforested by planting native plant species in consultation with the local DFO / Agriculture Department. The density of the trees should be around 2500 plants per ha. The balance 3.96 ha of decoaled area shall be converted into a water reservoir, the upper benches of which shall be gently sloped and stabilised and reclaimed with plantation.	A progressive mine closure plan is under implementation and reclamation of quarry area of 683.97 is under progress and afforestation by planting native plant species is being done consultation with the Birsa Agriculture University. The density of the trees in the afforestation area is more than 2500 plants per ha. Also, 8 nos. of water reservoirs have been created measuring 12.5 ha (approx) to maintain the ground water level of the adjoining villages.
13	Conservation Plan for endangered species, found in and around the project area shall be formulated, if required, in consultation with the State Forest and Wildlife Departments.	No endanger species is found in and around the project area. so Conservation Plan is not required.
14	The company shall obtain prior approval of CGWA/CGWB Regional Office for use of groundwater if any, for mining operations.	Already obtained approval from CGWA, New Delhi. Vide letter no : CGWA/NOC/MIN/ORIG/2016/216 8, dated 08/4/2016



15	Regular monitoring of groundwater level and quality should be carried out by establishing a network of existing wells and construction of new peizometers. The monitoring for quantity should be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality in May. Data thus collected should be submitted to the Ministry of Environment & Forests and to the Central Pollution Control Board quarterly within one month of monitoring.	3 nos. peizometers are installed in the bore holes for measuring the ground water level on regular basis. Quality of ground water is maintained by CIMFR (Govt agency appointed for the purpose) 04 times a year – in pre monsoon, monsoon, post monsoon and winter seasons .The data collected is sent to MOEF and CC and also to the SPCB.(Copy attached)
16	The company shall put up artificial groundwater recharge measures for augmentation of groundwater resource. The project authorities should meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine.	Hindalco has set up ground water recharge pits for augmentation of ground water resources in the adjoining villages. Also, 8 nos. of water reservoirs are perennially maintained. So that the water table of the local villages is not lowered. As precautionary measures, water tankers are available to supply the water to the nearby villages in case of any emergency.
17	ETP should also be provided for workshop and CHP waste water	ETP is in working order now. (Photographs attached)
18	R & R shall not be less than the norms laid down by the State Government and National R & R Policy and shall be completed within a specified time-frame.	R& R compensation is paid as per Jharkhand R& R policy and one R & R colony has been constructed about 2 km from the mines premises.
19	A Final Mine Closure Plan along with details of Corpus Fund should be submitted to the Ministry of Environment & Forests for approval 5 years in advance of final mine closure for approval.	Before 5 years of Final Mine Closure, the Final Mine Closure Plan along with the details of fund deposited in the Escrow A/C will be submitted t MOEF and CC.
20	Consent to operate shall be obtained before starting mining operations	CTO was valid up to Sept, 2018. It is under process for next stage.



B. GENERAL CONDITIONS

Sl. No.	Conditions	Compliance
01	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment and Forests.	It is being ensured.
02	No change in the calendar plan including excavation, quantum of mineral coal and waste should be made.	Agreed
03	Four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone, for SPM, RPM, SO ₂ and 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.	04 nos. of monitoring stations have been set up in core zone and buffer zone areas as desired and monitoring is done on regular basis by CIMFR (Govt Agency). (Copy attached)
04	Fugitive dust emissions (SPM and RPM) from all the sources should be controlled regularly monitored and data recorded properly. Water spraying arrangement on haul roads, wagon loading, dump trucks (loading and unloading) points should be provided and properly maintained.	Fugitive dust emissions (SPM and RPM) from all the sources are controlled through dust suppression and other arrangements and water spraying is done on haul road, wagon loading, loading & unloading points.
05	Data on ambient air quality (SPM, RPM, SO ₂ and NO _x) should be regularly submitted to the Ministry including its Regional Office at Bhubaneswar and to the State Pollution Control Board and to the Central Pollution Control Board once in six months.	Ambient air quality data of SPM, RPM, SO ₂ and NO _x which is being monitored by CIMFR (Govt Agency) and the report thereof is submitted to MOEF and CC and to the SPCB in every 6 months.
06	Adequate measures should 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 should be provided with ear plugs/muffs.	Adequate measures have been taken to control of noise levels below 85 dBA in the work environment. All workers engaged in blasting and drilling operations, and also operation of HEMM have been provided with ear plugs/muffs.
07	Industrial wastewater (workshop and wastewater from the mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19 th May 1993 and 31 st December 1993 or as amended from time to time before discharge. Oil and grease trap should be installed before discharge of workshop effluents.	Industrial waste water (workshop and wastewater from the mine) is collected and treated properly so as to conform to the stipulated standards. Oil and grease trap have been installed before discharge of workshop effluents.



08	Vehicular emissions should be kept under control and regularly monitored. Vehicles used for transporting the mineral should be covered with tarpaulins and optimally loaded.	Vehicles used for transporting the coal from the mine to railway siding is optimally loaded and religiously covered with tarpaulins to prevent dust dispersion. Vehicular emissions is under control and regularly monitored..
09	Environmental laboratory should be established with adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board.	Regular monitoring of air, water, noise, and soil pollution is done by CIMFR (Govt Agency).(Copy attached)
10	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance programme of the workers should be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed.	Personnel working in dusty areas are imparted training and information on safety and health aspects and also provided with nose musk (protective respiratory devices). Occupational health surveillance programme of the workers is under taken under PME(Periodical Medical Examination) once in every 3 years to observe any contractions due to exposure to dust so as to take corrective measures, if required.
11	A separate environmental management cell with suitable qualified personnel should be set up under the control of a Senior Executive, who will report directly to the Head of the company.	A separate environmental management cell has been set up which constitutes qualified personnel who report directly to the Head of the company on environment related matters (Copy attached)
12	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year-wise expenditure should be reported to this Ministry and its Regional Office at Bhubaneswar.	The funds earmarked for environmental protection measures as stipulated under the Mine Closure Plan is kept in separately in Escrow A/C opened with IDBI banks, Ranchi with CCO Kolkata as the custodian of the fund. Year-wise expenditure is report is sent to the MOEF and CC
13	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. Full cooperation will be extended to the officials and all data/informations / reporting shall be furnished to them.



14	A copy of the will be marked to concerned Panchayat/Local NGO, if any, from whom any suggestion/representation has been received while processing the proposal.	Complied
15	State Pollution Control board should display a copy of the clearance letter at the regional Office, District Industry Centre and Collector's Office / Tehsildar's Office for 30 days.	Prerogative of the JSPCB
16	The project authorities should 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 .	Agreed.

Handwritten signature



Government of India
Ministry of Environment, Forest & Climate Change

Indira Paryavaran Bhawan
Aliganj, Jor Bagh Road,
New Delhi-110003

No. J-11015/61/2006-IA-II.(M)

Dated : 16th April, 2015

To,

Asst. Vice-President -Corporate-Affairs
M/s Hindalco Industries Limited
Aditya Birla Centre,
3rd Floor, B wing, S.K. Ahire Marg,
Worli, Mumbai-400030
Maharashtra

E-mail: corporateaffairs@adityabirla.com

Subject: Transfer of Environmental Clearance of Kathautia Opencast Coalmine Project (0.80 MTPA) in an ML area of 938.27 ha in villages Kathautia, Kajri, Garikhas, Palhekhurd, Sika, Sakhui and Batsara, Tehsil Daltonganj district Palamau, Jharkhand from M/s Usha Martin Limited to M/s Hindalco Industries Limited, Mumbai, Maharashtra - reg.

The Ministry of Environment, Forest and Climate Change (MoEFCC), in accordance with the Environmental Impact Assessment (EIA) Notification, 2006 and subsequent amendment thereto had accorded Environmental Clearance (EC) to M/s Usha Martin Limited for Kathautia Opencast Coalmine Project (0.80 MTPA) in an ML area of 938.27 ha in villages Kathautia, Kajri, Garikhas, Palhekhurd, Sika, Sakhui and Batsara, Tehsil Daltonganj district Palamau, Jharkhand subject to compliance of terms and conditions stipulated in the EC letter No. J-11015/61/2006-IA.II (M) dated June 19th, 2006.

WHEREAS the Supreme Court of India vide judgment dated 25th August, 2014 read with its order dated 24th September, 2014 has cancelled the allocation of 204 coal blocks and issued directions with regard to such coal blocks wherein the Central Government in pursuance of the said directions has to take immediate action to implement the said order.



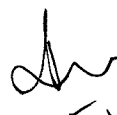
WHEREAS in pursuance of the judgment and order of the Supreme Court, the nominated authority has, in accordance with provisions of the Coal Mines (Special Provisions) Second Ordinance, 2014 and the Coal Mines (Special Provisions) Rules 2014 conducted the auction of the mines.

WHEREAS Ministry of Coal (MOC) vide its O.M. letter no. 43020/20/2014-CPAM dated 16th March, 2015 has informed MoEFCC that MOC has recently approved 23 coal blocks (15 coal blocks from Schedule II and 8 coal blocks from Schedule III of the Ordinance) through bidding to different successful bidders/ companies. MOC has requested this Ministry to facilitate transfer of the Environment Clearance and Forest Clearance of these blocks to the new successful bidders before 31.03.2015.

WHEREAS Ministry of Coal vide Vesting Order under clause (b) of sub-rule (2) of rule 7 and sub-rule (1) of rule 13 and Order no. 104/3/2015/NA dated 23rd March, 2015 has allocated the Kathautia Opencast Coalmine Project (0.80 MTPA) in an ML area of 938.27 ha in villages Kathautia, Kajri, Garikhas, Palhekhurd, Sika, Sakhui and Batsara, Tehsil Daltonganj district Palamau, Jharkhand, to M/s Hindalco Industries Limited, Registered Office at Century Bhavan, 3rd Floor, Dr. Annie Besant Road , Worli, Mumbai-400 030 Maharashtra as the successful bidder.

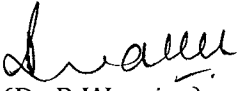
WHEREAS vide Gazette Notification S.O. 811 (E) Notification dated 23.03.2015, MOEFCC has made amendments to paragraph 11 in the Gazette Notification S.O.1533 (E) dated 14th September, 2006. Vide the said amendment; where an allocation of coal block is cancelled in any legal proceeding; or by the Government in accordance with law, the environmental clearance granted in respect of such coal block may be transferred, subject to the same validity period as was initially granted, to any legal person to whom such block is subsequently allocated, and in such case, obtaining of "no objection" from either the holder of environment clearance or from the regulatory authority concerned shall not be necessary and no reference shall be made to the Expert Appraisal Committee or the State Level Expert Appraisal Committee concerned.

WHEREAS pursuant to the MOC vesting Order no. 104/3/2015/NA dated 23rd March, 2015 and MoEFCC Gazette Notification S.O. 811(E) dated 23.03.2015, the EC granted vide letter



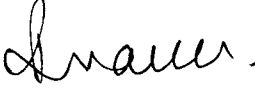
no. J-11015/61/2006-IA.II (M) dated 19th June, 2006 to M/s Usha Martin Limited for Kathautia Opencast Coalmine Project (0.80 MTPA) in an ML area of 938.27 ha in villages Kathautia, Kajri, Garikhas, Palhekhurd, Sika, Sakhui and Batsara, Tehsil Daltonganj district Palamau, Jharkhand is hereby transferred to M/s Hindalco Industries Limited, Registered Office at Century Bhavan, 3rd Floor, Dr. Annie Besant Road, Worli, Mumbai-400 030 Maharashtra subject to the following conditions:

- (i) Any change in scope of work will attract the provisions of Environment Protection Act (EPA), 1986 and Environmental Impact Assessment Notification, 2006 in conjunction with the subsequent amendments / circulars.
- (ii) All conditions stipulated in the EC letter No. J-11015/61/2006-IA.II (M) dated 19th June, 2006 shall remain unchanged.
- (iii) The successful bidder shall be liable, if any, for any act of violation of the EPA 1986 / EIA Notification 2006 /subsequent amendments and circulars which it has inherited during the transfer.
- (iv) Successful bidder shall be liable for compliance of all court directions, if any.


(Dr R Warriier)
Director

Copy to :

1. Secretary, Ministry of Coal, New Delhi.
2. Secretary, Department of Environment & Forest, Government of Orissa, Secretariat, Bhubaneswar.
3. PCCF (WL), Govt. of Orissa in regard to implementation of WL Conservation Plan.
4. Chief Conservator of Forest, Regional Office (EZ), Ministry of Environment & Forest, A-Chadrashekarapur, Bhubaneswar -751023
5. Chairman, Orissa State Pollution Control Board, Parivesh Bhawan, A/118, Nilkanthanagar, Unit VIII, Bhubaneswar-751012.
6. Chairman, Central Pollution Control Board, CBD-cum-Office Complex, East Arjun Nagar, New Delhi
7. Member Secretary, Central Ground Water Authority, Ministry of Water Resources, Curzon Road Barracks, A-2, W-3, Kasturba Gandhi Marg, New Delhi.
8. District Collect, **Palamau**, Government of Orissa.
9. Monitoring File 10. Guard File 11 Record File.


(Dr R Warriier)
Director



Dated: 10.08.2017

OFFICE ORDER

A separate Environmental Management Cell with suitable qualified personnel has been set up under the control of a Senior Executive, who will report directly to the Head of the company. The Environmental Management Cell will ensure compliance of various Environmental Acts, Rules and Regulation at Kathautia Open Cast Coal Mines, Dist-Palamau, Hindalco Industries Ltd. The Environmental Cell consists of the following Personnel:

1. Mr. Basudev Gangopadhyay, GM(Geology & Environment), CONVENOR

MEMBERS:

2. Mr. Pradeep Samanta, AVP, Kathautia Mine
3. Mr. Kala Chand Modak, Dy. Manager, Kathautia Mine
4. Mr. Rajesh Sharma, AGM-Mines, Kathautia Mine
5. Mr. Vivekanand Mishra – Mining Sardar, Kathautia Mine
6. Mr. Arvind Singh, Workmen Inspector, Kathautia Mine
7. Mr. Parmod Kulhar, Dy. Manager, HR, Kathautia Mine

By ORDER

(BIJESH JHA)

HEAD-Jharkhand Mines

Cc to:

All concerned

Notice Board

1.0 INTRODUCTION

Mining is a site specific and ecologically sensitive industry. For sustaining national development, mining of coal and minerals is of paramount importance for developed as well as developing countries. To meet the energy requirements of the country, increased coal production has been possible due to large-scale surface mining activities. Surface mining causes environmental disturbance in the form of land degradation, removal of OB material stress on air and water regime and finally interferes in the balance of the ecosystem. To meet these problems, sound environmental management system for pre-mining, active mining and post mining stages in the form of Environmental Impact Assessment, Environmental Management Practice for concurrent mining and Environmental Audit has been made necessary by the regulating state and central authorities. Regular monitoring of the different components of environment is made necessary for evaluating the requirements of environmental management system and its impact in the society. This report presents such study conducted by CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), Dhanbad for **Kathautia Open Cast Coal Mine** belonging to **M/S Hindalco Industries Ltd.**

i) LOCATION

The lease area of KOCCM covers land in villages: Kathautia, Kajari, Garikhas, Palhekhurd, Sakhui, Sikka and Batsara in Patan and Pandwa Blocks of district Palamau (Jharkhand). Kathautia Open Cast Coal Mines (KOCCM), is located in southern boundary of the block is about 10 KM from Daltonganj. The project area is situated between the latitude 24⁰ 07' 02" N and 24⁰ 08' 52" N and longitude 84⁰ 03' 42" E & 84⁰ 06' 52" E. The site is well connected by road and 15 km away from Daltonganj. The project came into operation in the year 2008.

M/S Hindalco Industries Ltd; approached CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), Dhanbad for doing the following work for one year i.e. 2017-2018.

- Environmental monitoring of Air, Water, Soil, Noise, Flora & fauna of the core and buffer zone.
- The Environmental monitoring will be conducted on seasonal basis.
- Preparation of Environmental Statement as stipulated in consent to operate of JSPCB.

The detailed studies with respect to air, water and noise will be carried on four times in the year 2017-18 while soil and dump samples, for the adjoining mining area, will be collected once in a year and analyzed in the CSIR-CIMFR laboratory.

2.0 (i) MINING SCENARIO

Presently the mine is not in operation. At KOCCM, Pandwa Top & Rajhara B seams have been worked out by opencast mining with shovel and dumper combinations. Shovels of different capacities such as 3.0 cubic meters, 2.7 cubic meters and 2.1 cubic meters are used along with 25 T Volvo Dumpers.

The coal seams in this OCP are as follows:

- | | | | |
|-------|-----------------|----|-----------------------|
| (i) | Rajhara A seam | -> | 0.4 – 2.67 mts thick |
| (ii) | Rajhara B seam | -> | 0.42 – 2.60 mts thick |
| (iii) | Pandwa Top seam | -> | 0.25 – 3.11 mts thick |

The average grade of coal is 'B' & 'D'. The open cast mine is worked by Shovel-Dumper combination with an average stripping ratio of 1:9.66. OB was dumped outside the quarry during initial years. Till the bottom most seams are worked out and quarry benches advance sufficiently, backfilling will be allowed and backfilling of Overburden has already been started.

The working area by opencast method is having the seams Pandwa Top, Rajhara B & Rajhara A. The grades of coal of the seams are mostly found as B & D. The total Block area of this block is approximately 938.27 ha out of which, 687.93 ha is granted for Mining Lease.

(ii) REGIONAL GEOLOGY

The Daltonganj coalfield occupies an elongated area of 250 sq km along a narrow east west trend north of Daltonganj (24⁰ 02' 00"; 84⁰ 04' 00") and falls between latitude 24⁰ 00' 00" and 24⁰ 12' 00" N and longitudes 83⁰ 59' 00" and 84⁰ 15' 00" E. However, the lower Gondwana coal seams underlie only 95 sq km, the Talchir Formation occupying the entire remaining area. Sequence of Karharbari seam is given below:-

SEQUENCE OF KARHARBARI COAL SEAMS, DALTONGANJ COALFIELD

S. N.	Particulars	Thickness range (meters)
1	<i>Major coal seams</i>	
	a) Top cover over Rajhara A seam	10.25 – 44.75
	Rajhara A seam	0.4 – 2.67
	b) Parting cover over Rajhara B seam	4.20 – 15.30
	Rajhara B seam	0.42 – 2.60
	(c) Parting cover over Pandwa Top seam	4.70 – 13.87
	Pandwa Top seam	0.25 – 3.11
2	<i>Gradient of strata (degree)</i>	<i>1 in 22.16 (2⁰ 35' 1.67")</i>
3	Category of excavation :	
	(a) Weathered rock (cat)	
	(b) Overburden rock (cat)	
	(c) Coal (cat)	

3.0 ENVIRONMENTAL SCENARIO IN THE MINING AREA

3.1 AIR ENVIRONMENT

3.1.1 SOURCES OF AIR POLLUTION

Coal transportation, OB removal, drilling, blasting, haul road and movements of mining equipments are the major sources of air pollution in the area. Generally, dust generation is of major concern. NO₂ is liberated in the time of blasting and during the movement of mining machineries. This coal contains very less sulphur and as such the concentration of SO₂. In Indian coal, it is low, except Assam where sulphur content is high.

3.1.2 METHODOLOGY & INSTRUMENTS USED:

The methodology and instruments used for air monitoring and analysis are given in **Table 1** as below:

Table 1: Methodology and Instrument Used for Air Quality Analysis

Parameters	Method	Instrument
PM _{2.5}	IS-5182 (Part 23):2006 Gravimetric Method Beta attenuation Method	Fine Particulate Sampler
PM ₁₀	IS-5182 (Part 23):2006 Gravimetric Method Beta attenuation Method	Respirable Dust Sampler (RDS)
SO ₂	IS-5182 (Part 2):2001 (Improved West & Gaeke method)	RDS with gaseous attachment
NO _x	IS-5182 (Part 6):2006 (Jacob & Hochheiser modified method)	RDS with gaseous attachment

3.1.3 AIR QUALITY

Air quality monitoring in core and buffer zone of the Kathautia Open Cast mine has been carried out in Post-monsoon season for the year 2017 to assess the impact of mining activities on the ambient air quality. During the study, two sampling locations for ambient air quality had been fixed in buffer zone and three in core zone area. Details of sampling stations along with the source of air pollution are given in **Table 2**. The air quality at these locations is presented from **Tables 3-4**. The results show that the

ambient air quality of the villages, in and around the mining site, is least affected as the mine is not in operation during the study period.

Table 2: Details of Sampling Locations

Stn. Code	Location	Source of Air Pollution
CORE ZONE		
CA₁	Near Mine Site Office	Mining area, Kachha road, vehicular movement.
CA₂	Near Haul Road	Mining area and vehicular movement.
CA₃	Near Stockyard	Mining area and vehicular movement.
BUFFER ZONE		
BA₁	R. R. Colony	Household coal burning and vehicular movement, etc.

Table 3: Ambient Air Quality Report for Core Zone

Sampling Code	Sampling Location	Season	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)				Remarks
				PM _{2.5}	PM ₁₀	SO ₂	NO ₂	
CA ₁	Near Mine Site Office	Post	30/10/2017	65.4	86.1	20.9	30.8	
		Monsoon	27/11/2017	71.0	113.2	24.3	32.1	
			26/12/2017	56.2	88.3	29.0	45.1	
CA ₂	Near Haul Road	Post	30/10/2017	62.9	104.8	24.7	37.6	
		Monsoon	26/12/2017	64.0	114.1	32.1	47.8	
CA ₃	Near Stockyard	Post	31/10/2017	66.9	105.2	23.1	35.3	
		Monsoon	28/11/2017	58.4	92.3	26.7	41.5	
			27/12/2017	71.2	112.9	28.2	43.6	
Standards as per NAAQS-2009				60	100	80	80	

Table 4: Ambient Air Quality Report for Buffer Zone

Sampling Code	Sampling Location	Season	Date of Sampling	Parameters ($\mu\text{g}/\text{m}^3$)				Remarks
				PM _{2.5}	PM ₁₀	SO ₂	NO ₂	
BA ₁	R. R. Colony	Post	29/11/2017	43.2	92.8	25.8	24.4	
		Monsoon	28/12/2017	56.0	78.4	26.6	30.8	
Standards as per NAAQS-2009				60	100	80	80	

3.1.4 RESULTS AND DISCUSSIONS

During post monsoon season (October to December), PM_{2.5} concentration level at Near Mine Office in core zone varies from 56.2 $\mu\text{g}/\text{m}^3$ to 71.0 $\mu\text{g}/\text{m}^3$ and PM₁₀ from 86.1 $\mu\text{g}/\text{m}^3$ to 113.2 $\mu\text{g}/\text{m}^3$. At Haul Road concentration level of PM_{2.5} varies from 64.0 $\mu\text{g}/\text{m}^3$ to 62.9 $\mu\text{g}/\text{m}^3$ and PM₁₀ from 104.8 $\mu\text{g}/\text{m}^3$ to 114.1 $\mu\text{g}/\text{m}^3$. Near Stockyard concentration level of PM_{2.5} varies from 58.4 $\mu\text{g}/\text{m}^3$ to 71.2 $\mu\text{g}/\text{m}^3$ and PM₁₀ from 92.3 $\mu\text{g}/\text{m}^3$ to 112.9 $\mu\text{g}/\text{m}^3$. In the core zone the PM_{2.5} and PM₁₀ values are slightly higher than the threshold value i.e. 60 $\mu\text{g}/\text{m}^3$ for PM_{2.5} and 100 $\mu\text{g}/\text{m}^3$ for PM₁₀ as per the guideline of NAAQS around working zone. Concentration of SO₂ and NO₂ are also found within the limit of 80 $\mu\text{g}/\text{m}^3$ as per the guideline of NAAQS in all the sampling sites of core zone of the mine.

During post monsoon season (October to December), the PM_{2.5} concentration at R. R. Colony in buffer zone is in the range of 43.2 $\mu\text{g}/\text{m}^3$ to 56.0 $\mu\text{g}/\text{m}^3$ and the concentration of PM₁₀ ranges from 78.4 $\mu\text{g}/\text{m}^3$ to 92.8 $\mu\text{g}/\text{m}^3$. In the buffer zone both the values are within the threshold value i.e. 60 $\mu\text{g}/\text{m}^3$ for PM_{2.5} & 100 $\mu\text{g}/\text{m}^3$ for PM₁₀ as per the guideline of NAAQS. Concentration of SO₂ and NO₂ are also found well within the limits of 80 $\mu\text{g}/\text{m}^3$ as per the guideline of NAAQS in the buffer zone of the mine.

3.2 WATER ENVIRONMENT

3.2.1. SOURCES OF WATER POLLUTION

Mine Water

No adverse impact on surface water is anticipated as the main surface water regime is not proposed to be disturbed except for the drainage having their catchment within the ML area. The mine water, which is mainly rain water & ground water seepage, is used for industrial purposes after settling in the settling pond and the balance released into Durgawati Nalla by which the downstream consumers are benefited. Since, the water is of good quality after settling, there are no any possibility of water pollution in the area.

Domestic Effluents/Sewage

There are minimum housing facilities within the ML area for essential services comprising about 100 inhabitants. The domestic wastes from these houses are led to septic tanks. As the domestic waste water is minimum, the possibility of pollution is remote/insignificant. However, proper care has been taken up in the shelters area of inhabitants for sewage discharge.

3.2.2 INSTRUMENTS USED

- a) pH and Conductivity meter
- b) Ion Meter,
- c) COD Analyser,
- d) BOD Analyser,
- e) Water Analysis Kit, (Hach, DR - 2000)
- f) Flame Photometer
- g) UV-VIS Spectrophotometer (Simazdo)
- h) Atomic Absorption Spectrophotometer (Varian)
- i) Ion Chromatograph (Dionex)
- j) ICP-MS (Perkin Elmer)

3.2.3 WATER QUALITY OF THE AREA

To assess the water quality of the area mine water, ground water and surface water were collected and analysed. During the lean periods, mine water is used for water spraying on haul roads, plantation and other mining activities. To assess the water quality of the area water samples from eight locations (Munneshwar mine pit water, Bagwania mine pit water, Mistri mine pit water, Effluent water from Settling, tube well water of Kajari village, tube well water of Batsara village and upstream as well as downstream of Koyal river water to the mine site) were collected during post-monsoon season. The effluent from settling pond is not available during sampling period. The analysis was carried out in the field as well as CSIR-CIMFR Laboratory and results are presented from **Table 5 to 7**.

Water quality of nearby tube wells show that there is no significant impact of mining on water quality of region. Total suspended solids (TSS), Total dissolved solids (TDS), Oil & Grease, Chemical oxygen demand (COD), trace metals and other parameters are found within their respective threshold limits. Mine water quality also does not show any high value as it remains within the pit, where the contaminants settle before the mine water discharge. The total dissolved solids of water samples collected in the tube well of Batsara village is above the acceptable limit of 500mg/l but below the permissible limit in the absence of alternate source of 2,000mg/l as per IS-10500:2012. The alkalinity of tube well of Kajari and Batsara village are slightly above the acceptable limit of 200mg/l. The total hardness of these samples are slightly above the acceptable limit of 200mg/l but well below the permissible limit in the absence of alternate source of 600mg/l. The level of TSS, TDS and DO in the river water were found within tolerance limit as per IS: 2296, surface waters class 'C'. As far as river water is concerned, its quality shows its acceptability as is not affected by Kathautia mine effluents. The trace metal concentrations of all the samples in the study area are well below their standard limits.

Table 5: Mine Discharge Water Quality Data

Area: Core Zone	Season: Post-monsoon
Project: Kathautia OC Mine	Date of Sampling: 30.10.2017 and 28.11.2017
Name of the Sampling Station:	
W₁- Munneshwar Mine Pit Water	W₂- Effluent water from Settling Pond No.-2
W₃ - Bagwania Mine Pit Water	W₄ – Mistri Mine Pit Water

Sl. No.	Parameters	Station Code				MoEF Sch.-VI Standard	
		W ₁	W ₂	W ₃	W ₄		
1.	Colour, Hazen units, Max	<5	Sample not available.	<5	<5	5	
2.	Odour	#		#	#	#	
3.	Total suspended solids, mg/l, Max	41					100
4.	pH	8.06			7.67	7.86	6.5-8.5
5.	Temperature (°C)	22.1			21.8	22.0	\$
6.	Oil & Grease, mg/l, Max	2.4			1.8	1.6	10
7.	BOD (3days at 27°C), mg/l, Max	2.8			2.5	2.2	30
8.	COD, mg/l, Max	32.2			22.4	28.9	250
9.	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	<0.001			<0.001	<0.001	1.0
10.	Arsenic (as AS), mg/l, Max	0.084			<0.001	<0.001	0.2
11.	Lead (as Pb), mg/l, Max	<0.001			<0.001	<0.001	0.1
12.	Cadmium (as Cd), mg/l, Max	<0.001			<0.001	<0.001	2.0
13.	Hexavalent Chromium (as Cr ⁶⁺), mg/l, Max	0.002			0.001	0.001	0.1
14.	Total Chromium (as Cr), mg/l, Max	0.003			0.002	0.002	2.0
15.	Copper (as Cu), mg/l, Max	0.009			0.001	<0.001	3.0
16.	Zinc (as Zn), mg/l, Max	0.005			0.007	<0.001	5.0
17.	Selenium (as Se), mg/l, Max	<0.001			<0.001	<0.001	0.05
18.	Nickel (as Ni), mg/l, Max	0.006			0.004	0.004	3.0
19.	Fluorides (as F), mg/l, Max	0.99			0.76	0.77	2.0
20.	Dissolved Phosphate (as P), mg/l, Max	<0.1			<0.1	<0.1	5.0
21.	Manganese (as Mn), mg/l, Max	<0.001			<0.001	0.010	2.0
22.	Iron (as Fe), mg/l, Max	1.24			1.03	0.99	3.0
23.	Nitrate (as N), mg/l, Max	1.43			0.50	0.58	10

Unobjectionable

\$: Temperature shall not exceed 5°C above the receiving water temp.

Table 6: Ground Water Quality Data

Area: Core Zone/Buffer Zone	Season: Post-monsoon
Project: Kathautia OC Mine	Date of Sampling: 27.11.2017
Name of the Sampling Station:	
W₅ - Tube Well Water Kajari Village;	W₆ - Tube Well Water Batsara Village;

Sl. No.	Parameters	Station Code		IS-10500: 2012	
		W ₅	W ₆	Acceptable Limit	Permissible Limit in the Absence of Alternate
1	Colour, Hazen units, Max	<5	<5	5	15
2	Odour	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity, NTU, Max	0.78	1.23	1.0	5.0
5	pH	7.11	7.16	6.5-8.5	No relaxation
6	Total Hardness (as CaCO ₃)	213	288	200	600
7	Iron (as Fe), mg/l, Max	1.766	1.384	0.3	No relaxation
8	Chloride (as Cl ⁻), mg/l, Max	16.0	66.0	250	1000
9	Total Dissolved Solid, mg/l, Max	337	637	500	2000
10	Calcium (as Ca), mg/l, Max	62.7	66.4	75	200
11	Magnesium (as Mg), mg/l, Max	13.8	29.7	30	100
12	Manganese (as Mn), mg/l, Max	0.004	0.071	0.10	0.30
13	Sulphates (as SO ₄ ²⁻), mg/l, Max	6.53	50.01	200	400
14	Nitrate (as NO ₃), mg/l, Max	7.79	1.74	45	No relaxation
15	Fluorides (as F), mg/l, Max	1.38	1.41	1.0	1.5
16	Arsenic (as AS), mg/l, Max	0.048	0.058	0.01	0.05
17	Cadmium (as Cd), mg/l, Max	<0.001	<0.001	0.003	No relaxation
18	Lead (as Pb), mg/l, Max	<0.001	<0.001	0.01	No relaxation
19	Copper (as Cu), mg/l, Max	0.005	0.002	0.05	1.5
20	Hexavalent Chromium (as Cr ⁶⁺), mg/l, Max	<0.001	<0.001	0.05	No relaxation
21	Selenium (as Se), mg/l, Max	<0.001	<0.001	0.01	No relaxation
22	Silver (as Ag), mg/l, Max	<0.001	<0.001	-	-
23	Zinc (as Zn), mg/l, Max	0.016	0.046	5	15
24	Alkalinity, mg/l, Max	260	376	200	
25	Mineral Oil, mg/l, Max	<0.001	<0.001	0.001	

Table 7: Surface Water Quality Data

Area: Buffer Zone	Season: Post-monsoon
Project: Kathautia OC Mine	Date of Sampling: 27.11.2017
Name of the Sampling Station:	
W₇ - Koyal River water, U/S of Mine;	W₈ - Koyal River water, D/S of Mine;

Sl. No.	Parameters	Station Code		(IS: 2296)# Surface Waters Class "C" Tolerance Limits
		W ₇	W ₈	
1	Colour, Hazen units, Max	<5	<5	300
2	Odour	Unobjectionable	Unobjectionable	Unobjectionable
3	Dissolved Oxygen, mg/l, Min.	6.5	6.2	4
4	pH	7.67	7.86	6.5-8.5
5	BOD (3days at 27°C), mg/l, Max	3.8	3.6	3
6	Phenolic compounds (as C ₆ H ₅ OH), mg/l, Max	<0.001	<0.001	0.005
7	Total Hardness (as CaCO ₃), mg/l, Max	76	126	NS
8	Iron (as Fe), mg/l, Max	0.62	0.86	50
9	Chloride (as Cl ⁻), mg/l, Max	10.0	16.0	600
10	Total Dissolved Solid, mg/l, Max	175	241	1500
11	Calcium (as Ca), mg/l, Max	17.9	33.6	NS
12	Magnesium (as Mg), mg/l, Max	7.7	10.2	NS
13	Manganese (as Mn), mg/l, Max	<0.001	<0.001	NS
14	Sulphates (as SO ₄ ⁻), mg/l, Max	12.5	13.2	400
15	Nitrate (as NO ₃), mg/l, Max	3.3	5.3	50
16	Fluorides (as F), mg/l, Max	0.46	0.97	1.5
17	Arsenic (as AS), mg/l, Max	0.002	0.001	0.2
18	Cadmium (as Cd), mg/l, Max	<0.001	<0.001	0.01
19	Lead (as Pb), mg/l, Max	<0.001	<0.001	0.1
20	Copper (as Cu), mg/l, Max	0.002	<0.001	1.5
21	Hexavalent Chromium (as Cr ⁶⁺), mg/l, Max	<0.001	<0.001	0.05
22	Selenium (as Se), mg/l, Max	<0.001	<0.001	0.05
23	Zinc (as Zn), mg/l, Max	0.002	<0.001	15

: Class "C"- Drinking water source with conventional treatment followed by disinfection.
NS: Not Specified

3.3 NOISE ENVIRONMENT

Noise is undesirable and unpleasant sound produced by the vibration of bodies or molecules of the medium and propagates as a pressure perturbation. It disturbs man's work, sleep and communication. It damages hearing and evokes other physiological reactions. Mining is the third largest industry in terms of employment and the recent trends of mechanization has changed the working environment to noisy environment leading to higher sound levels.

3.3.1 SOURCES OF NOISE

Noise produced at different levels by different equipments in the open cast mine are summarized in the **Table 8**.

Table 8: Noise Generating Mining Equipments

S. N.	Equipment / Operation	Noise level dB(A)
1.	Feeder breaker	82-100
2.	Dumpers	100-115
3.	Shovels	80-107
4.	Dozers	84-107
5.	Front End loader	83-101
6.	Electric motors, gear drivers, hoppers, drilling & main pump	85-95
7.	Belt conveyer	90-92
8.	Drill	110-115

Noise level study at Kathautia Open Cast Coal Mine was carried out in buffer as well as core zone. Five noise level monitoring locations in core zone and two noise level monitoring locations in buffer zone were fixed-up and get representative values during Post-monsoon season.

3.3.2 INSTRUMENTS USED

Sound level study is carried by using Mip-oy Integrated Sound Level Meter meeting IEC-179A (1973) measuring average peak and low values in day and night times.

3.3.3 RESULTS & DISCUSSION

Results are shown from **Tables 9 to 14** for ambient noise levels of core and buffer zones during post-monsoon season. The average peak values at the nearby villages are found well below the standard values of 55 & 45 dB (A) for day & night. In core zone maximum noise levels and average noise levels are also well within the prescribed limit of 75 & 70 dB (A) for day & night respectively.

Table 9: Noise Level in Core Zone of the Study Area (October, 2017)

Date of Sampling:		Noise level dB(A) average					
30.10.2017 to 02.11.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N ₁	Near Mine Office	36.6	66.4	62.1	37.4	58.6	50.6
N ₂	Coal Face	39.5	72.9	60.5	35.7	63.5	48.2
N ₃	Near OB dump	37.7	69.4	52.1	35.4	66.9	43.4
N ₄	Stockyard	38.6	66.5	55.2	36.5	69.4	45.8
N ₅	Haul Road	39.2	71.7	54.4	37.4	68.3	45.2
Standards as per CPCB		75			70		

Table 10: Noise Level in Buffer Zone of the Study Area (October, 2017)

Date of Sampling:		Noise level dB(A) average					
30.10.2017 to 02.11.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N ₆	R. R. Colony	38.8	58.7	51.8	40.4	45.7	42.0
N ₇	Batsara Village	39.5	59.6	52.0	37.6	53.7	42.8
Standards as per CPCB		55			45		

Table 11: Noise Level in Core Zone of the Study Area (November, 2017)

Date of Sampling:		Noise level dB(A) average					
27.11.2017 to 30.11.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N ₁	Near Mine Office	38.4	67.5	55.2	34.5	85.1	50.1
N ₂	Coal Face	38.0	75.2	58.9	32.6	75.3	48.1
N ₃	Near OB dump	37.9	74.1	54.4	32.8	69.4	44.1
N ₄	Stockyard	38.2	76.6	56.9	32.5	67.9	48.2
N ₅	Haul Road	38.4	67.7	52.4	33.6	62.1	44.8
Standards as per CPCB		75			70		

Table 12: Noise Level in Buffer Zone of the Study Area (November, 2017)

Date of Sampling:		Noise level dB(A) average					
26.11.2017 to 30.11.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N ₆	R. R. Colony	38.2	70.5	53.5	32.2	60.3	43.6
N ₇	Batsara Village	37.8	69.3	52.1	32.4	59.0	42.1
Standards as per CPCB		55			45		

Table 13: Noise Level in Core Zone of the Study Area (December, 2017)

Date of Sampling:		Noise level dB(A) average					
26.12.2017 to 27.12.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N ₁	Near Mine Office	38.5	52.7	45.6	35.2	56.3	42.8
N ₂	Coal Face	37.8	72.8	54.2	33.6	54.6	40.6
N ₃	Stockyard	36.6	50.0	45.5	34.0	68.3	41.8
N ₄	Haul Road	36.9	65.4	52.1	34.5	65.2	44.0

Table 14: Noise Level in Buffer Zone of the Study Area (December, 2017)

Date of Sampling:		Noise level dB(A) average					
26.12.2017 to 27.12.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N ₆	R. R. Colony	38.5	61.4	54.1	36.5	55.6	44.2
N ₇	Batsara Village	38.3	61.8	53.6	35.4	58.4	43.7
Standards as per CPCB		55			45		

4.0 CONCLUSION

On the basis of the data generated it has been found that the environmental scenario in and around mining area of Kathautia Open Cast Mine with respect to air, water and noise are well within the permissible limits.

5.0 RECOMMENDATIONS & FOLLOW-UP ACTION

The study indicates that air quality around the Kathautia Open Cast Coal Mine is found to be within the threshold limit as per the guideline of NAAQS, 2009. However, the mine is not in working during the monitoring period. Water quality of the surrounding water resources are also not found polluted by mine effluent. For the best practice of coal mining in future, Environmental Management System should always be considered with following measures:

- ✓ Frequency of spraying of water on the haul roads for controlling the dust to its minimum level may be increased.
- ✓ Regular maintenance of the heavy earth moving machines.
- ✓ Mine water collection in settling tank before its discharge.
- ✓ Garland drainage should be made around the dumps.
- ✓ Reclamation and revegetation of overburden dumps should be done to control soil erosion, denudation of agricultural land and nearby riverine system, wetlands and to improves the aesthetics of the area.
- ✓ Dumps brought under biological reclamation should not be made active.
- ✓ The mine management has been implementing, these measures to make mining operation eco-friendly in this coal mine of Hindalco Industries Ltd.