

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

**(SUMMER & MONSOON SEASON)  
(APRIL - SEPTEMBER, 2017)**

*Prepared  
for*



**M/s HINDALCO INDUSTRIES LIMITED  
Ranchi-834 002  
Jharkhand**

*Prepared  
by*



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

**(NOVEMBER-2017)**



Ref: HIL/KOCCM/EC/354

Dated: 27.11.2017

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](mailto: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 19<sup>th</sup> June, 2006 and Environment Monitoring Report of Pre -monsoon and monsoon seasons (Apr, 2017 to Sept,2017) for Kathautia Opencast Coal Mine (KOCCM), Hindalco Industries Ltd.**

Ref:

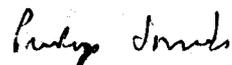
1. Environmental Clearance vide letter no J-11015/61/2006-IA. II(M) dated 19<sup>th</sup> June, 2006
2. Transfer of EC in the name of Hindalco Industries Ltd from Prior Allotte (M/s UML) vide letter no- J-11015/61/2006-IA-II(M) dated 16<sup>th</sup> April, 2015

Dear Sir,

Please find enclosed herewith Half Yearly Compliance Report of Environmental Clearance as well as Environment Monitoring Report of **Pre -monsoon and monsoon seasons (Apr, 2017 to Sept,2017)** as per condition stipulated in EC for Kathautia Opencast Coal Mine (KOCCM) of Hindalco Industries Ltd.

Thanking You,

Yours Sincerely,

  
(Pradeep Samanta), 27.11.17

Mines Manager, KOCCM

Encl:

1. Compliance Report of EC (Annexure-I)
2. Environment Monitoring Report (Annexure-II)

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 19<sup>th</sup> June, 2006**

**A. SPECIFIC CONDITIONS**

Sl. No.	Conditions	Compliance
01	All the conditions stipulated by SPCB shall be effectively implemented	It is being implemented as applicable
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	Will be complied as applicable
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 will be used for reclamation and development of green belt
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 <sup>rd</sup> year in the decoaled 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.	Being complied as applicable.
05	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. 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.	Being complied as applicable.

06	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.	Being complied as applicable
07	No ancillary operations shall as crushing , screening and washing of coal shall be done within the lease	Being complied as applicable
08	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	No CHP is installed
09	Drills should be wet operated only.	Drilling is done with wet operated only
10	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.	Coal and OB is being extracted by drilling & Blasting with shovel dumper combination
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 thr 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. Plantation will be done during monsoon.
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.	Being complied as applicable
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.	Will be complied as applicable.

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.
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.	Being complied as applicable
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.	Being complied as applicable. Drinking water is being supplied to Villagers.
17	ETP should also be provided for workshop and CHP waste water	Installation of ETP is in the process.
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 will be as per Government policy.
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.	Will be complied as required.
20	Consent to operate shall be obtained before starting mining operations	CTO has been obtained from JSPCB, Ranchi.

#### 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.	Being implemented

02	No change in the calendar plan including excavation, quantum of mineral coal and waste should be made.	Being complied as applicable
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 <sub>2</sub> and NO <sub>x</sub> 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.	Being complied and study is being done by CIMFR, Dhanbad
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.	Being complied as advised. Daily Water sprinkling is being done.
05	Data on ambient air quality (SPM, RPM, SO <sub>2</sub> and NO <sub>x</sub> ) 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.	Being complied. study is being done by CIMFR, Dhanbad
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.	Being complied as applicable
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 <sup>th</sup> May 1993 and 31 <sup>st</sup> December 1993 or as amended from time to time before discharge. Oil and grease trap should be installed before discharge of workshop effluents.	Installation of ETP is in the process. Will be complied as applicable
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.	Being complied
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.	Will be complied as applicable
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.	Being complied

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.	Complied
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.	Will be complied as applicable
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. The Regional office has been shifted from Bhubaneswar to Ranchi
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.	Complied
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 at <a href="http://envfor.nic.in">http://envfor.nic.in</a>	Complied

## **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  $24^{\circ} 07' 02''$  N and  $24^{\circ} 08' 52''$  N and longitude  $84^{\circ} 03' 42''$  E &  $84^{\circ} 06' 52''$  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.



### 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. NO<sub>2</sub> 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 SO<sub>2</sub>. 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 <sub>2.5</sub>	IS-5182 (Part 23):2006 Gravimetric Method Beta attenuation Method	Fine Particulate Sampler
PM <sub>10</sub>	IS-5182 (Part 23):2006 Gravimetric Method Beta attenuation Method	Respirable Dust Sampler (RDS)
SO <sub>2</sub>	IS-5182 (Part 2):2001 (Improved West & Gaeke method)	RDS with gaseous attachment
NO <sub>x</sub>	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 Pre-monsoon and monsoon seasons 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
<b>CORE ZONE</b>		
CA <sub>1</sub>	Near Mine Site Office	Mining area, Kachha road, vehicular movement.
CA <sub>2</sub>	Near Haul Road	Mining area and vehicular movement.
CA <sub>3</sub>	Near Stockyard	Mining area and vehicular movement.
<b>BUFFER ZONE</b>		
BA <sub>1</sub>	Kajari Village	Household coal burning and vehicular movement, etc.
BA <sub>2</sub>	Batsara Village	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 <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	
CA <sub>1</sub>	Near Mine Site Office	Summer	18/04/2017	56.0	77.2	20.1	30.0	
			18/05/2017	55.3	76.5	19.5	28.9	
			20/06/2017	54.8	72.6	18.2	35.5	
		Monsoon	22-07-2017	45.1	61.9	12.9	13.8	Raining
			15-08-2017	50.1	63.2	14.2	15.5	Raining
CA <sub>2</sub>	Near Haul Road	Summer	19/04/2017	50.6	79.5	16.5	32.5	
			18/05/2017	55.8	73.3	17.2	24.9	
			20/06/2017	57.5	80.8	19.5	32.0	
		Monsoon	23-07-2017	42.8	54.5	13.5	12.2	Raining
			16-08-2017	52.5	60.2	13.1	15.5	Raining
			22-09-2017	58.5	65.8	19.5	27.5	
CA <sub>3</sub>	Near Stockyard	Summer	19/04/2017	52.5	68.1	18.6	25.2	
			19/05/2017	53.8	75.0	21.3	30.5	
			21/06/2017	51.9	66.8	20.5	31.2	
		Monsoon	23-07-2017	41.1	55.4	12.5	16.9	Raining
			17-08-2017	49.8	58.4	15.7	17.2	
			23-09-2017	51.3	67.2	21.5	23.9	
<b>Standards as per NAAQS-2009</b>				<b>60</b>	<b>100</b>	<b>80</b>	<b>80</b>	

**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 <sub>2.5</sub>	PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>2</sub>	
BA <sub>1</sub>	Kajari Village	Summer	20/04/2017	50.5	61.0	18.8	24.5	
			20/05/2017	48.9	62.1	21.2	22.6	
			21/06/2017	49.2	60.5	19.1	27.5	
		Monsoon	24-07-2017	42.8	50.1	15.2	19.5	Raining
			18-08-2017	44.2	54.5	17.9	23.6	
			24-09-2017	50.5	65.9	19.5	26.6	
BA <sub>2</sub>	Batsara Village	Summer	20/04/2017	47.8	62.8	20.2	25.1	
			20/05/2017	46.5	58.5	19.5	23.2	
			22/06/2017	44.9	59.5	22.9	26.8	
		Monsoon	24-07-2017	41.2	52.4	16.7	17.1	Raining
			18-08-2017	44.3	58.5	19.5	25.1	
			25-09-2017	48.2	61.5	21.5	25.9	
<b>Standards as per NAAQS-2009</b>				<b>60</b>	<b>100</b>	<b>80</b>	<b>80</b>	

### 3.1.4 RESULTS AND DISCUSSIONS

During summer season (April to June), PM<sub>2.5</sub> concentration level at Near Mine Office in core zone varies from 54.8  $\mu\text{g}/\text{m}^3$  to 56.0  $\mu\text{g}/\text{m}^3$  and PM<sub>10</sub> from 72.6  $\mu\text{g}/\text{m}^3$  to 77.2  $\mu\text{g}/\text{m}^3$ . At Haul Road concentration level of PM<sub>2.5</sub> varies from 50.6  $\mu\text{g}/\text{m}^3$  to 57.5  $\mu\text{g}/\text{m}^3$  and PM<sub>10</sub> from 68.1  $\mu\text{g}/\text{m}^3$  to 75.0  $\mu\text{g}/\text{m}^3$ . Near Stockyard concentration level of PM<sub>2.5</sub> varies from 51.9  $\mu\text{g}/\text{m}^3$  to 53.8  $\mu\text{g}/\text{m}^3$  and PM<sub>10</sub> from 66.8  $\mu\text{g}/\text{m}^3$  to 75.0  $\mu\text{g}/\text{m}^3$ . In the core zone the PM<sub>2.5</sub> and PM<sub>10</sub> values are within the threshold value i.e. 60  $\mu\text{g}/\text{m}^3$  for PM<sub>2.5</sub> and 100  $\mu\text{g}/\text{m}^3$  for PM<sub>10</sub> as per the guideline of NAAQS around the entire sampling site. Concentration of SO<sub>2</sub> and NO<sub>2</sub> 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. The PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> in the working zone of the mine are in lower in concentration because the mine is not in operation.

During summer, the PM<sub>2.5</sub> concentration at Kajari Village in buffer zone is in the range of 48.9  $\mu\text{g}/\text{m}^3$  to 50.5  $\mu\text{g}/\text{m}^3$  and the concentration of PM<sub>10</sub> ranges from 60.5  $\mu\text{g}/\text{m}^3$  to 62.1  $\mu\text{g}/\text{m}^3$ . The PM<sub>2.5</sub> concentration at Batsara Village is in the range of 44.9  $\mu\text{g}/\text{m}^3$  to 47.8  $\mu\text{g}/\text{m}^3$  and the concentration of PM<sub>10</sub> ranges from 58.5  $\mu\text{g}/\text{m}^3$  to 62.8  $\mu\text{g}/\text{m}^3$ . In the buffer zone both the values are within the threshold value i.e. 60  $\mu\text{g}/\text{m}^3$  for PM<sub>2.5</sub> & 100  $\mu\text{g}/\text{m}^3$  for PM<sub>10</sub> as per the guideline of NAAQS. Concentration of SO<sub>2</sub> and NO<sub>2</sub> are also

found within the limit  $80 \mu\text{g}/\text{m}^3$  as per the guideline of NAAQS in all the sampling sites of buffer zone of the mine.

During Monsoon season (July to September),  $\text{PM}_{2.5}$  concentration level at Near Mine Office in core zone varies from  $45.1 \mu\text{g}/\text{m}^3$  to  $54.5 \mu\text{g}/\text{m}^3$  and  $\text{PM}_{10}$  from  $61.9 \mu\text{g}/\text{m}^3$  to  $72.1 \mu\text{g}/\text{m}^3$ . At Haul Road concentration level of  $\text{PM}_{2.5}$  varies from  $42.8 \mu\text{g}/\text{m}^3$  to  $58.5 \mu\text{g}/\text{m}^3$  and  $\text{PM}_{10}$  from  $54.5 \mu\text{g}/\text{m}^3$  to  $65.8 \mu\text{g}/\text{m}^3$ . Near Stockyard concentration level of  $\text{PM}_{2.5}$  varies from  $41.1 \mu\text{g}/\text{m}^3$  to  $51.3 \mu\text{g}/\text{m}^3$  and  $\text{PM}_{10}$  from  $55.4 \mu\text{g}/\text{m}^3$  to  $67.2 \mu\text{g}/\text{m}^3$ . In the core zone the  $\text{PM}_{2.5}$  and  $\text{PM}_{10}$  values are within the threshold value i.e.  $60 \mu\text{g}/\text{m}^3$  for  $\text{PM}_{2.5}$  and  $100 \mu\text{g}/\text{m}^3$  for  $\text{PM}_{10}$  as per the guideline of NAAQS. Concentration of  $\text{SO}_2$  and  $\text{NO}_2$  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. The  $\text{PM}_{2.5}$ ,  $\text{PM}_{10}$ ,  $\text{SO}_2$  and  $\text{NO}_2$  in the working zone of the mine are in lower in concentration because the mine is not in operation.

During monsoon season, the  $\text{PM}_{2.5}$  concentration at Kajari Village in buffer zone is in the range of  $42.8 \mu\text{g}/\text{m}^3$  to  $50.5 \mu\text{g}/\text{m}^3$  and the concentration of  $\text{PM}_{10}$  ranges from  $50.1 \mu\text{g}/\text{m}^3$  to  $65.9 \mu\text{g}/\text{m}^3$ . The  $\text{PM}_{2.5}$  concentration at Batsara Village is in the range of  $41.2 \mu\text{g}/\text{m}^3$  to  $48.2 \mu\text{g}/\text{m}^3$  and the concentration of  $\text{PM}_{10}$  ranges from  $52.4 \mu\text{g}/\text{m}^3$  to  $61.5 \mu\text{g}/\text{m}^3$ . In the buffer zone both the values are within the threshold value i.e.  $60 \mu\text{g}/\text{m}^3$  for  $\text{PM}_{2.5}$  &  $100 \mu\text{g}/\text{m}^3$  for  $\text{PM}_{10}$  as per the guideline of NAAQS. Concentration of  $\text{SO}_2$  and  $\text{NO}_2$  are also found within the limit  $80 \mu\text{g}/\text{m}^3$  as per the guideline of NAAQS in all the sampling sites of 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) Microwave Digestion
- g) UV-VIS Spectrophotometer (Simazdo)
- h) Atomic Absorption Spectrophotometer (Varian)
- i) Ion Chromatograph (Dionex)
- j) Flame Photometer
- k) 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 (mine pit water, Effluent water from Settling pond, tube well near mine office, Tube Well Water near Shelter, 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 summer and monsoon seasons. 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 well and tube well show that there is no significant impact of mining on water quality of region. TSS, TDS, Oil & Grease, COD, trace metals and other parameters are found within their respective threshold limits. During summer season the TDS and total alkalinity values in tube well water of mine office and Batsara village are slightly higher than their acceptable limit of 500mg/l and 200mg/l respectively. During monsoon season TDS and total alkalinity values are well the desirable limit in all the collected water samples of mine effluent and Koyal River. The TDS and total alkalinity values are well the acceptable limit of 500mg/l and 200mg/l respectively in the sample at Kajari and Batsara village but below the permission limit in the absence of alternate source of 2000 mg/l and 600mg/l respectively. Mine water quality also does not show any high value as it remains within the pit. As far as Koyal river water is concerned, its quality shows its acceptability as is not affected by Kathautia mine effluents. The level of TSS, TDS and DO in the river water were found within threshold limit. The concentrations of trace elements are below the acceptable limit in the entire analysed sample.

**Table 5: Mine Discharge Water Quality Data**

<b>Area: Core Zone</b>	<b>Season: Summer</b>
<b>Project: Kathuatia OC Mine</b>	<b>Date of Sampling: 19.04.2017</b>
<b>Name of the Sampling Station:</b>	
<b>W<sub>1</sub>- Muneshwar Mine Pit Water</b>	<b>W<sub>2</sub>- Effluent water from Settling Pond;</b>

Sl. No.	Parameters	Station Code		MoEFCC Sch.-VI Standard
		W <sub>1</sub>	W <sub>2</sub>	
1.	Colour, Hazen units, Max	<5	<5	5
2.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
3.	Total suspended solids, mg/l, Max	40	35	100
4.	pH	7.39	7.37	6.5-8.5
5.	Temperature (°C)	25.5	25.6	\$
6.	Oil & Grease, mg/l, Max	2.5	0.5	10
7.	Total Residual Chlorine, mg/l, Max	<0.1	<0.1	1.0
8.	Ammonical Nitrogen, (as N) mg/l, Max	1.518	1.025	50
9.	Total Kjeldahl Nitrogen, (as NH <sub>3</sub> ) mg/l, Max	1.632	1.021	100
10.	Free Ammonia (as NH <sub>3</sub> ) mg/l, Max	0.561	0.115	5.0
11.	BOD (3days at 27°C), mg/l, Max	2.6	5.6	30
12.	COD, mg/l, Max	48.5	32.1	250
13.	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH), mg/l, Max	<0.001	<0.001	1.0
14.	Arsenic (as AS), mg/l, Max	<0.001	<0.001	0.2
15.	Lead (as Pb), mg/l, Max	<0.001	<0.001	0.1
16.	Cadmium (as Cd), mg/l, Max	<0.001	<0.001	2.0
17.	Hexavalent Chromium (as Cr <sup>6+</sup> ), mg/l, Max	<0.001	<0.001	0.1
18.	Total Chromium (as Cr), mg/l, Max	0.002	0.001	2.0
19.	Copper (as Cu), mg/l, Max	<0.001	<0.001	3.0
20.	Zinc (as Zn), mg/l, Max	0.001	0.005	5.0
21.	Selenium (as Se), mg/l, Max	<0.001	<0.001	0.05
22.	Nickel (as Ni), mg/l, Max	0.002	0.008	3.0
23.	Fluorides (as F), mg/l, Max	0.87	1.53	2.0
24.	Dissolved Phosphate (as P), mg/l, Max	<0.1	<0.1	5.0
25.	Sulphide (as S), mg/l, Max	0.22	0.11	2.0
26.	Manganese (as Mn), mg/l, Max	<0.001	<0.001	2.0
27.	Iron (as Fe), mg/l, Max	0.67	1.33	3.0
28.	Nitrate (as N), mg/l, Max	0.12	1.06	10

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

**Table 6: Ground Water Quality Data**

<b>Area: Core Zone/Buffer Zone</b>	<b>Season: Summer</b>
<b>Project: Kathuatia OC Mine</b>	<b>Date of Sampling: 19.04.2017</b>
<b>Name of the Sampling Station:</b>	
<b>W<sub>3</sub>– Hand Pump Water Kajari Village;</b>	<b>W<sub>4</sub>- Tube Well Water Batsara Village;</b>

Sl. No.	Parameters	Station Code		IS: 10500 (Desirable Limit)
		W <sub>3</sub>	W <sub>4</sub>	
1	Colour, Hazen units, Max	<5	<5	5
2	Odour	Unobjectionable	Unobjectionable	Unobjectionable
3	Taste	Agreeable	Agreeable	Agreeable
4	Turbidity, NTU, Max	0.92	1.15	5.0
5	pH	6.85	7.13	6.5-8.5
6	Total Hardness (as CaCO <sub>3</sub> )	105	134	300
7	Iron (as Fe), mg/l, Max	0.124	0.236	0.3
8	Chloride (as Cl <sup>-</sup> ), mg/l, Max	5.9	5.2	250
9	Total Dissolved Solid, mg/l, Max	303	315	500
10	Calcium (as Ca), mg/l, Max	8.9	15.1	75
11	Magnesium (as Mg), mg/l, Max	5.3	6.0	30
12	Manganese (as Mn), mg/l, Max	0.007	0.008	0.10
13	Sulphates (as SO <sub>4</sub> <sup>-</sup> ), mg/l, Max	3.3	3.2	150
14	Nitrate (as NO <sub>3</sub> ), mg/l, Max	8.2	8.9	45
15	Fluorides (as F), mg/l, Max	0.77	0.37	0.06-1.2
16	Boron (as B), mg/l, Max	<0.001	<0.001	0.5
17	Arsenic (as AS), mg/l, Max	<0.001	<0.001	0.05
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	0.05
21	Hexavalent Chromium (as Cr <sup>6+</sup> ), mg/l, Max	0.004	0.008	0.05
22	Selenium (as Se), mg/l, Max	<0.001	<0.001	0.01
23	Silver (as Ag), mg/l, Max	<0.001	<0.001	-
24	Zinc (as Zn), mg/l, Max	0.018	0.016	5
25	Alkalinity, mg/l, Max	132	144	200
26	Mineral Oil, mg/l, Max	<0.001	<0.001	0.001
27	Coliform Organism (MPN/100ml)	Absent	Absent	Absent

**Table 7: Surface Water Quality Data**

<b>Area: Buffer Zone</b>	<b>Season: Summer</b>
<b>Project: Kathautia OC Mine</b>	<b>Date of Sampling: 20.04.2017</b>
<b>Name of the Sampling Station:</b>	
<b>W<sub>5</sub> - Koyal River, U/S of Mine;</b>	<b>W<sub>6</sub> - Koyal River, D/S of Mine;</b>

Sl. No.	Parameters	Station Code		(IS: 2296)# Surface Waters Class "C" Tolerance Limits
		W <sub>5</sub>	W <sub>6</sub>	
1	Colour, Hazen units, Max	<5	<5	300
2	Odour	Unobjectionable	Unobjectionable	Unobjectionable
3	Dissolved Oxygen, mg/l, Min.	6.4	6.3	4
4	pH	7.94	7.95	6.5-8.5
5	BOD (3days at 27°C), mg/l, Max	3.3	3.6	3
6	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH), mg/l, Max	<0.001	<0.001	0.005
7	Total Hardness (as CaCO <sub>3</sub> ), mg/l, Max	109	138	NS
8	Iron (as Fe), mg/l, Max	2.64	0.71	50
9	Chloride (as Cl <sup>-</sup> ), mg/l, Max	148.8	7.7	600
10	Total Dissolved Solid, mg/l, Max	785	304	1500
11	Calcium (as Ca), mg/l, Max	8.4	15.0	NS
12	Magnesium (as Mg), mg/l, Max	4.0	4.5	NS
13	Manganese (as Mn), mg/l, Max	0.009	0.011	NS
14	Sulphates (as SO <sub>4</sub> <sup>-</sup> ), mg/l, Max	340	6.8	400
15	Nitrate (as NO <sub>3</sub> ), mg/l, Max	0.5	2.8	50
16	Fluorides (as F), mg/l, Max	0.66	0.67	1.5
17	Arsenic (as AS), mg/l, Max	0.001	<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	0.004	0.001	1.5
21	Hexavalent Chromium (as Cr <sup>6+</sup> ), mg/l, Max	0.003	<0.001	0.05
22	Selenium (as Se), mg/l, Max	<0.001	<0.001	0.05
23	Zinc (as Zn), mg/l, Max	0.28	0.01	15
24	Coliform Organism (MPN/100ml)	84	61	5000

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

**Table 8: Mine Discharge Water Quality Data**

<b>Area: Core Zone</b>	<b>Season: Monsoon</b>
<b>Project: Kathautia OC Mine</b>	<b>Date of Sampling: 27.07.2017</b>
<b>Name of the Sampling Station:</b>	
<b>W<sub>1</sub>- Muneshwar Mine Pit Water</b>	<b>W<sub>2</sub>- Effluent water from Settling Pond;</b>

Sl. No.	Parameters	Station Code		MoEFCC Sch.-VI Standard
		W <sub>1</sub>	W <sub>2</sub>	
1.	Colour, Hazen units, Max	<5	Sample not available.	5
2.	Odour	Unobjectionable		Unobjectionable
3.	Total suspended solids, mg/l, Max	48		100
4.	pH	7.56		6.5-8.5
5.	Temperature (°C)	21.2		\$
6.	Oil & Grease, mg/l, Max	1.8		10
7.	Total Residual Chlorine, mg/l, Max	<0.1		1.0
8.	Ammonical Nitrogen, (as N) mg/l, Max	0.821		50
9.	Total Kjeldahl Nitrogen, (as NH <sub>3</sub> ) mg/l, Max	0.742		100
10.	Free Ammonia (as NH <sub>3</sub> ) mg/l, Max	0.264		5.0
11.	BOD (3days at 27°C), mg/l, Max	2.8		30
12.	COD, mg/l, Max	31.2		250
13.	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH), mg/l, Max	<0.001		1.0
14.	Arsenic (as AS), mg/l, Max	<0.001		0.2
15.	Lead (as Pb), mg/l, Max	<0.001		0.1
16.	Cadmium (as Cd), mg/l, Max	<0.001		2.0
17.	Hexavalent Chromium (as Cr <sup>6+</sup> ), mg/l, Max	<0.001		0.1
18.	Total Chromium (as Cr), mg/l, Max	0.003		2.0
19.	Copper (as Cu), mg/l, Max	<0.001		3.0
20.	Zinc (as Zn), mg/l, Max	0.002		5.0
21.	Selenium (as Se), mg/l, Max	<0.001		0.05
22.	Nickel (as Ni), mg/l, Max	0.004		3.0
23.	Fluorides (as F), mg/l, Max	0.63		2.0
24.	Dissolved Phosphate (as P), mg/l, Max	<0.1		5.0
25.	Sulphide (as S), mg/l, Max	0.08		2.0
26.	Manganese (as Mn), mg/l, Max	0.001		2.0
27.	Iron (as Fe), mg/l, Max	0.30		3.0
28.	Nitrate (as N), mg/l, Max	1.33		10

**Table 9: Ground Water Quality Data**

<b>Area: Core Zone/Buffer Zone</b>	<b>Season: Monsoon</b>
<b>Project: Kathautia OC Mine</b>	<b>Date of Sampling: 27.07.2017</b>
<b>Name of the Sampling Station:</b>	
<b>W<sub>3</sub> - Tube Well Water Kajari Village;</b>	<b>W<sub>4</sub> - Tube Well Water Batsara Village;</b>

Sl. No.	Parameters	Station Code		IS: 10500 (Desirable Limit)
		W <sub>3</sub>	W <sub>4</sub>	
1.	Colour, Hazen units, Max	<5	<5	5
2.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
3.	Taste	Agreeable	Agreeable	Agreeable
4.	Turbidity, NTU, Max	1.28	1.42	5.0
5.	pH	6.90	6.86	6.5-8.5
6.	Total Hardness (as CaCO <sub>3</sub> )	67	111	300
7.	Iron (as Fe), mg/l, Max	0.582	0.979	0.3
8.	Chloride (as Cl <sup>-</sup> ), mg/l, Max	7.6	50.2	250
9.	Total Dissolved Solid, mg/l, Max	475	693	500
10.	Calcium (as Ca), mg/l, Max	12.8	27.8	75
11.	Magnesium (as Mg), mg/l, Max	8.6	10.1	30
12.	Manganese (as Mn), mg/l, Max	0.043	0.018	0.10
13.	Sulphates (as SO <sub>4</sub> <sup>-</sup> ), mg/l, Max	1.9	22.9	150
14.	Nitrate (as NO <sub>3</sub> ), mg/l, Max	0.04	12.1	45
15.	Fluorides (as F), mg/l, Max	0.86	1.07	0.06-1.2
16.	Boron (as B), mg/l, Max	<0.001	<0.001	0.5
17.	Arsenic (as AS), mg/l, Max	<0.001	<0.001	0.05
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	<0.001	0.002	0.05
21.	Hexavalent Chromium (as Cr <sup>6+</sup> ), mg/l, Max	0.002	0.001	0.05
22.	Selenium (as Se), mg/l, Max	<0.001	<0.001	0.01
23.	Silver (as Ag), mg/l, Max	<0.001	<0.001	-
24.	Zinc (as Zn), mg/l, Max	0.048	0.160	5
25.	Alkalinity, mg/l, Max	332	404	200
26.	Mineral Oil, mg/l, Max	<0.001	<0.001	0.001
27.	Coliform Organism (MPN/100ml)	Absent	Absent	Absent

**Table 10: Surface Water Quality Data**

<b>Area: Buffer Zone</b>	<b>Season: Monsoon</b>
<b>Project: Kathautia OC Mine</b>	<b>Date of Sampling: 27.07.2017</b>
<b>Name of the Sampling Station:</b>	
<b>W<sub>5</sub> - Koyal River, U/S of Mine;</b>	<b>W<sub>6</sub> - Koyal River, D/S of Mine;</b>

Sl. No.	Parameters	Station Code		(IS: 2296)# Surface Waters Class “C” Tolerance Limits
		W <sub>5</sub>	W <sub>6</sub>	
1.	Colour, Hazen units, Max	<5	<5	300
2.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
3.	Dissolved Oxygen, mg/l, Min.	6.4	6.6	4
4.	pH	7.31	7.26	6.5-8.5
5.	BOD (3days at 27°C), mg/l, Max	2.5	2.7	3
6.	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH), mg/l, Max	<0.001	<0.001	0.005
7.	Total Hardness (as CaCO <sub>3</sub> ), mg/l, Max	19	28	NS
8.	Iron (as Fe), mg/l, Max	0.13	0.17	50
9.	Chloride (as Cl <sup>-</sup> ), mg/l, Max	2.2	1.8	600
10.	Total Dissolved Solid, mg/l, Max	58	69	1500
11.	Calcium (as Ca), mg/l, Max	4.2	7.4	NS
12.	Magnesium (as Mg), mg/l, Max	2.1	2.4	NS
13.	Manganese (as Mn), mg/l, Max	0.001	0.002	NS
14.	Sulphates (as SO <sub>4</sub> <sup>-</sup> ), mg/l, Max	5.68	4.03	400
15.	Nitrate (as NO <sub>3</sub> ), mg/l, Max	2.54	1.79	50
16.	Fluorides (as F), mg/l, Max	0.14	0.26	1.5
17.	Arsenic (as AS), mg/l, Max	<0.001	<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	<0.001	0.001	1.5
21.	Hexavalent Chromium (as Cr <sup>6+</sup> ), mg/l, Max	0.002	0.002	0.05
22.	Selenium (as Se), mg/l, Max	<0.001	<0.001	0.05
23.	Zinc (as Zn), mg/l, Max	0.002	0.004	15
24.	Coliform Organism (MPN/100ml)	155	185	5000

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

### **4.3 NOISE ENVIRONNENT**

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.

#### **4.3.1 SOURCES OF NOISE**

Noise produced at different levels by different equipments in the open cast mine are summarized in the **Table 11**.

**Table 11: Noise Generating Mining Equipments**

<b>S. N.</b>	<b>Equipment / Operation</b>	<b>Noise level dB(A)</b>
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.

#### **4.3.2 INSTRUMENTS USED**

Sound level study is carried by using Mip-oy Integrated Sound Level Meter Meeting IEC-179A measuring average peak and Low values in Day and Night time.

### 4.3.3 RESULTS & DISCUSSION

Results are shown from **Tables 12 to 23** for ambient noise levels of core and buffer zones during summer and monsoon seasons. 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 12: Noise Level in Core Zone of the Study Area (April, 2017)**

Date of Sampling:		Noise level dB(A) average					
18.04.2017 to 21.04.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>1</sub>	Near Mine Office	38.9	70.4	62.5	36.7	62.8	50.6
N <sub>2</sub>	Coal Face	37.4	67.6	57.3	34.8	52.6	48.5
N <sub>3</sub>	Near OB dump	36.8	64.0	56.6	34.2	53.2	45.1
N <sub>4</sub>	Stockyard	36.5	68.4	57.7	37.1	54.8	47.0
N <sub>5</sub>	Haul Road	37.8	72.8	60.1	34.6	58.4	51.2
<b>Standards as per CPCB</b>		<b>75</b>			<b>70</b>		

**Table 13: Noise Level in Buffer Zone of the Study Area (April, 2017)**

Date of Sampling:		Noise level dB(A) average					
18.04.2017 to 21.04.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>6</sub>	Kajari Village	36.8	64.2	52.2	34.1	50.4	42.6
N <sub>7</sub>	Batsara Village	37.1	63.4	52.9	35.2	52.3	44.0
<b>Standards as per CPCB</b>		<b>55</b>			<b>45</b>		

**Table 14: Noise Level in Core Zone of the Study Area (May, 2017)**

Date of Sampling:		Noise level dB(A) average					
19.05.2017 to 21.05.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>1</sub>	Near Mine Office	38.5	72.1	61.5	37.0	64.1	51.0
N <sub>2</sub>	Coal Face	37.2	69.0	58.1	35.0	51.9	46.8
N <sub>3</sub>	Near OB dump	37.5	63.5	55.3	34.6	50.2	44.3
N <sub>4</sub>	Stockyard	37.0	65.5	56.2	36.0	53.2	46.8
N <sub>5</sub>	Haul Road	37.4	71.0	61.7	34.8	56.6	49.4
<b>Standards as per CPCB</b>		<b>75</b>			<b>70</b>		

**Table 15: Noise Level in Buffer Zone of the Study Area (May, 2017)**

Date of Sampling:		Noise level dB(A) average					
19.05.2017 to 21.05.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>6</sub>	Kajari Village	37.7	64.0	53.5	34.7	52.2	43.6
N <sub>7</sub>	Batsara Village	36.8	63.6	52.5	35.3	48.0	42.9
<b>Standards as per CPCB</b>		<b>55</b>			<b>45</b>		

**Table 16: Noise Level in Core Zone of the Study Area (June, 2017)**

Date of Sampling:		Noise level dB(A) average					
20.06.2017 to 23.06.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>1</sub>	Near Mine Office	38.0	70.4	58.8	36.2	60.4	46.8
N <sub>2</sub>	Coal Face	36.7	67.0	55.9	34.4	50.5	45.3
N <sub>3</sub>	Near OB dump	36.7	60.2	52.6	34.0	48.8	42.7
N <sub>4</sub>	Stockyard	36.6	62.5	53.1	35.5	54.0	44.6
N <sub>5</sub>	Haul Road	37.7	68.5	60.4	35.2	57.2	48.8

**Table 17: Noise Level in Buffer Zone of the Study Area (June, 2017)**

Date of Sampling:		Noise level dB(A) average					
20.06.2017 to 23.06.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>6</sub>	Kajari Village	36.0	62.1	52.7	32.2	48.8	41.7
N <sub>7</sub>	Batsara Village	35.2	61.5	51.8	34.5	47.5	41.5
<b>Standards as per CPCB</b>		<b>55</b>			<b>45</b>		

**Table 18: Noise Level in Core Zone of the Study Area during Monsoon Season (July, 2017)**

Date of Sampling:		Noise level dB(A) average					
25.07.2017 - 28.07.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>1</sub>	Near Mine Office	37.0	68.8	56.2	34.5	58.4	45.2
N <sub>2</sub>	Coal Face	35.8	60.1	51.2	33.4	51.2	40.6
N <sub>3</sub>	Near OB dump	36.5	59.4	50.1	32.9	46.9	41.2
N <sub>4</sub>	Stockyard	36.4	55.0	45.8	32.2	48.1	40.4
N <sub>5</sub>	Haul Road	36.8	62.4	55.6	34.2	55.2	44.2
<b>Standards as per CPCB</b>		<b>75</b>			<b>70</b>		

**Table 19: Noise Level in Buffer Zone of the Study Area during Monsoon Season (July, 2017)**

Date of Sampling:		Noise level dB(A) average					
25.07.2017 - 28.07.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>6</sub>	Kajari Village	34.8	60.2	51.0	32.0	48.0	42.0
N <sub>7</sub>	Batsara Village	35.5	58.9	50.5	32.6	47.3	41.5
<b>Standards as per CPCB</b>		<b>55</b>			<b>45</b>		

**Table 20: Noise Level in Core Zone of the Study Area during Monsoon Season (August, 2017)**

Date of Sampling:		Noise level dB(A) average					
15.08.2017- 18.08.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>1</sub>	Near Mine Office	37.2	65.5	51.4	35.0	53.2	44.1
N <sub>2</sub>	Coal Face	36.0	60.8	49.2	32.8	45.1	40.3
N <sub>3</sub>	Near OB dump	36.1	61.5	50.1	33.0	46.3	41.1
N <sub>4</sub>	Stockyard	36.0	56.2	46.6	32.5	45.6	40.9
N <sub>5</sub>	Haul Road	37.4	61.5	51.2	33.6	53.0	43.1
Standards as per CPCB		75			70		

**Table 21: Noise Level in Buffer Zone of the Study Area during Monsoon Season (August, 2017)**

Date of Sampling:		Noise level dB(A) average					
15.08.2017- 18.08.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>6</sub>	Kajari Village	34.2	62.5	52.1	32.2	50.0	42.5
N <sub>7</sub>	Batsara Village	36.4	60.4	51.4	32.0	49.5	43.2
Standards as per CPCB		55			45		

**Table 22: Noise Level in Core Zone of the Study Area during Monsoon Season (September, 2017)**

Date of Sampling:		Noise level dB(A) average					
21.09.2017 - 25.09.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>1</sub>	Near Mine Office	38.0	66.3	55.9	33.8	57.4	44.9
N <sub>2</sub>	Coal Face	37.4	58.9	50.4	33.0	50.2	40.9
N <sub>3</sub>	Near OB dump	37.9	62.4	52.4	33.5	47.6	42.8
N <sub>4</sub>	Stockyard	36.2	56.6	46.8	32.8	47.3	41.0
N <sub>5</sub>	Haul Road	36.8	65.6	58.9	35.4	56.4	45.7

**Table 23: Noise Level in Buffer Zone of the Study Area during Monsoon Season (September, 2017)**

Date of Sampling:		Noise level dB(A) average					
21.09.2017 - 25.09.2017		Day Time			Night Time		
Stn. Code	Location	Min.	Max.	Average	Min.	Max.	Average
N <sub>6</sub>	Kajari Village	35.9	64.8	52.2	33.0	52.4	42.2
N <sub>7</sub>	Batsara Village	36.7	65.2	51.9	32.8	53.5	42.9
<b>Standards as per CPCB</b>		<b>55</b>			<b>45</b>		

## 5.0 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.

## 6.0 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.

## **Report**

*On*

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

**Project No.: SSP/229/2017-18**

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