

Environmental Status Report
For
Kudag Bauxite Mine
at
Post & Teh.: Samri, (Kusmi)
Dist: Balrampur-Ramanujganj(C.G.)

Duration: January-February-March-2019

Name of Industry



M/s. Hindalco Industries Limited.,

Name of Laboratory:-



QCI-NABET Accredited EIA Consultant
MoEF&CC (GOI) and NABL Recognized Laboratory
ISO 9001:2008, ISO 14001:2004, OHSAS 18001:2007
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Rupam Bhatnagar
Agent of Mines
Samn Mines Division
Hindalco Industries Ltd

Foreword

The protection of environment plays a crucial role in maintaining the local environment quality for any mining industry. Hence compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding the mine area. Therefore, environment protection is becoming a prerequisite for sustainable development. In line with this requirement, the management of M/s Hindalco Industries Ltd. has adopted a corporate responsibility of environment protection.

In order to comply with the Environment protection act, to fulfill statutory requirement and to be in tune with Environmental Preservation and sustainable development, M/s Hindalco Industries Ltd. has retained ANACON LABORATORIES PVT. LTD., Nagpur as Environment Consultants and for various Environmental issues related to their mines.

This report presents the Environmental Status for the period January-2019 to March-2019 as compliance to the statutory requirements.

The co-operation extended by the Staff and Management of M/s Hindalco Industries Ltd. during the work execution period is gratefully acknowledged.

for ANACON LABORATORIES PVT. LTD.

Place : Nagpur
Date : March, 2019



Raygankar
Authorized Signatory



1.1 Introduction

Hindalco Industries Limited (Hindalco) is one among the flagship companies of the Aditya Birla Group of Industries and is one of the largest corporate groups in India. This group is a leading manufacturer of Aluminum in India, having integrated facilities encompassing bauxite, mining, refining and smelting to achieve Aluminum.

Various processing units of Hindalco are strategically located in different parts of the nation to achieve optimum benefits. Over the past few decades the group has grown multifold in its production capacities, product mix and diversification in mining. The Chhattisgarh Environment Conservation Board (CECB) granted permission for establishing the Bauxite Mine to Hindalco at block Tatijharia, Kudag and Samri mines in Balrampur District of Chhattisgarh State.

HINDALCO INDUSTRIES LTD., awarded the work to M/s ANACON LABORATORIES PVT. LTD. Nagpur (ALPL) for carrying out Environmental monitoring of parameters for assessing pollution levels and preparation of monthly reports (*January-February-March-2019*) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment and Forest (MoEF) for Kudag mining lease in Balrampur District, Chhattisgarh State.

1.2 Background Information of Kudag Mine

Hindalco was granted Kudag Bauxite mining lease over an area of 377.116 hec. in Kudag village in Post office Dumarkholi, Tehsil Samri(Kusmi) of Balrampur district, Chhattisgarh on 24/12/1996 for a period of 20 years. As per the Mines and Mineral (Development and Regulation) Amendment Act, 2015, Kudag lease has been extended up to another 30 years i.e 23/12/2046. The mining operations were started on 02/07/1997. The production capacity of Bauxite is 0.6 Lakh Tonnes Per Annum (LTPA).

1.3 Salient Features of Kudag Bauxite Mine

The deposits occur in Kudag block, Post office Dumarkholi Tehsil Samri(Kusmi) of Balrampur district. This deposit has been identified as one of the resources to cater the raw material requirements of the Hindalco Alumina refinery at Renukoot, Uttar Pradesh. The salient features of the project are presented below : (**Table1**).



Table 1

Salient Features of Kudag Bauxite Mines

S.No.	Particulars	Details
1.	Survey of India Toposheet No.	64 M / 15
2.	Latitude	23 ⁰ 26' 02"N to 23 ⁰ 29' 00"N
3.	Longitude	83 ⁰ 51' 00"E to 83 ⁰ 59' 00"E
4.	Elevation	1145-m above Mean Sea Level
5.	Climatic Conditions (as per IMD, Ambikapur)	Annual maximum temperature : 30.3 ⁰ C Annual minimum temperature : 17.7 ⁰ C Average annual rainfall : 1401.1 mm
6.	Mining lease area	377.116 Hec.
7.	Method of mining	Open cast (Semi-Mechanized)
8.	Mode of transportation	Trucks
9.	Landuse	Agricultural and Barren land
10.	Nearest Road	Samri to Kusmi (17 km)
11.	Nearest Airport	Ranchi Airport (151.09 Km)
12.	Nearest Town	Ambikapur (127 km, SW)

1.4 Environmental Monitoring

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during mining operation. With the knowledge of baseline conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions due to mining operation of the project. Suitable mitigation steps will be taken in time to safeguard the environment based on monitoring reports. Monitoring is important in the control of pollution since the efficiency of control measures can only be determined by monitoring.

In order to find out the impact of mining activity on sensitive receptors, it is necessary to monitor Environmental Quality to know the level of concentrations of pollutants within and around the mining lease area. Accordingly Hindalco Industries through ALPL has been monitoring air, water and noise quality on monthly basis during these months (**Table-2**).



1.5 Air Environment

1.5.1 Ambient Air Quality Monitoring

Ambient Air Quality and Fugitive emission monitored at 8 following locations with reference to Kudag mine lease area shown in (Fig.-1).

Table 2

Locations of Ambient Air Quality Monitoring (AAQM)
(377.116 hec.)

Sr. No.	Core Zone	Sr.	Buffer Zone
1	Sairaidh Campus	5	Jaljali Village
2	New Kudag/Nr. Weigh Bridge	6	Kutku Village
3	Old Kudag/Mining Area	7	Rajendrapur
4	Samri Gopatu/Nr. Weigh Bridge	8	Tatiharia Village

The sampling stations are selected at the above mentioned locations, in downwind and upwind directions of the mining site. ALPL is carrying out regular monitoring for PM₁₀, PM_{2.5}, SO₂, NO_x and Pb, Hg, As and Cr at above Ambient Air Quality Monitoring (AAQM) locations. The dust fall rate was measured in the mining area and Khaskudag during January-February-March-2019. The AAQM sampling sites are selected considering seasonal variation in wind speed and wind direction.

Sampling Duration and Frequency

Ambient air quality monitoring was carried out for the parameters PM₁₀, PM_{2.5}, SO₂, NO_x and Pb, Hg, As and Cr from January-February-March-2019 as per CPCB norms.

Data is compared with the standards mentioned in the Gazette Notification of the Central Pollution Control Board (CPCB) (Nov-18, 2009) and as per consent conditions mentioned in consent letter.



1.6 Meteorology: Wind Pattern

Meteorology: Wind Pattern

The data of wind pattern collected during the study period (Jan-Feb-March 2019) indicates that the wind was blowing predominately from (SSW and SW) directions, during study period, for 0.46% wind was found to be calm.

Wind Frequency Distribution Data

Sr. No.	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total (%)
1	348.75 - 11.25	0.13928	0.00000	0.00000	0.00000	0.00000	0.00000	0.13889
2	11.25 - 33.75	0.13928	0.27855	0.00000	0.00000	0.00000	0.00000	0.41667
3	33.75 - 56.25	0.27855	0.13928	0.00000	0.00000	0.00000	0.00000	0.41667
4	56.25 - 78.75	0.55710	0.13928	0.00000	0.00000	0.00000	0.00000	0.69444
5	78.75 - 101.25	0.55710	0.27855	0.00000	0.00000	0.00000	0.00000	0.83333
6	101.25 - 123.75	2.36769	1.25348	0.00000	0.00000	0.00000	0.00000	3.61111
7	123.75 - 146.25	3.34262	2.78552	0.41783	0.00000	0.00000	0.00000	6.52778
8	146.25 - 168.75	4.17827	2.78552	0.27855	0.00000	0.00000	0.00000	7.22222
9	168.75 - 191.25	7.52089	1.81058	0.13928	0.00000	0.00000	0.00000	9.44444
10	191.25 - 213.75	9.47075	2.36769	0.69638	0.00000	0.00000	0.00000	12.50000
11	213.75 - 236.25	9.47075	3.34262	0.55710	0.00000	0.00000	0.00000	13.33330
12	236.25 - 258.75	9.05292	4.73538	0.55710	0.13928	0.00000	0.00000	14.44440
13	258.75 - 281.25	4.59610	2.08914	0.97493	0.00000	0.00000	0.00000	7.63889
14	281.25 - 303.75	3.20334	2.64624	2.92479	0.41783	0.00000	0.00000	9.16667
15	303.75 - 326.25	1.81058	4.59610	2.64624	0.00000	0.00000	0.00000	9.02778
16	326.25 - 348.75	1.53203	1.11421	0.41783	0.00000	0.00000	0.00000	3.05556
	Sub-Total	58.05560	30.27780	9.58333	0.55556	0.00000	0.00000	98.47220
	Calms							1.25000
	Missing/Incomplete							0.27778
	Total							100.00

Summary of Wind Pattern

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
Jan-Feb-March 2019	WSW (14.4%)	SW (13.3%)	0.278%

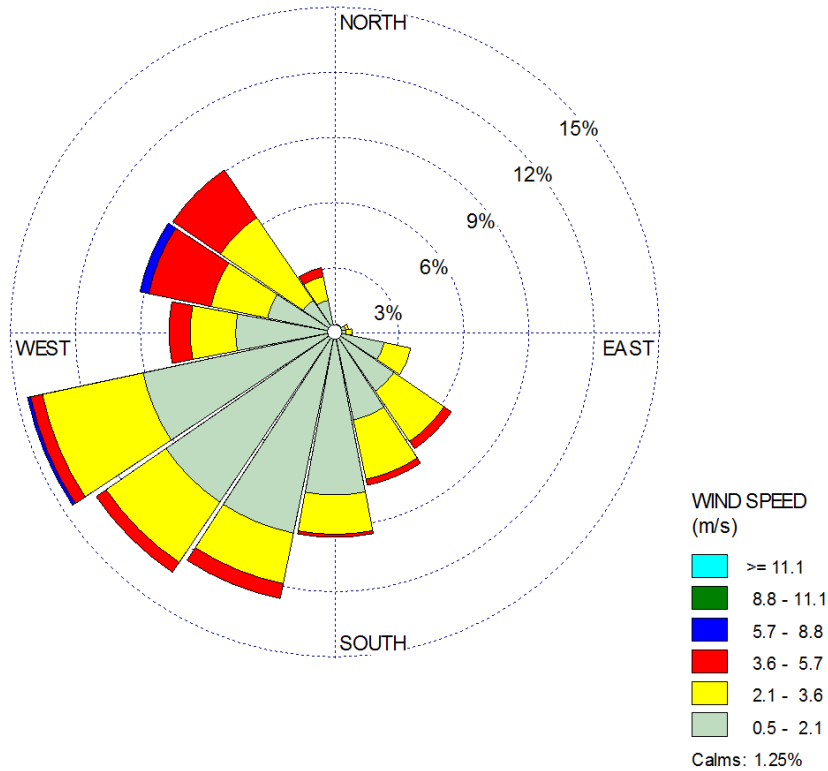


Figure.01: Wind Rose Diagram (Jan-Feb-March-2019)

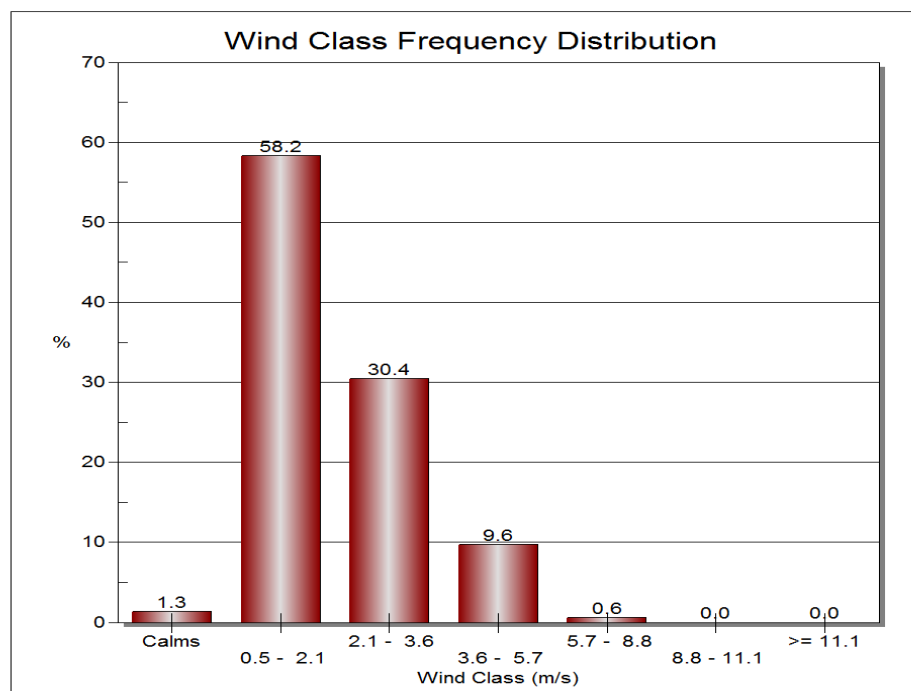


Figure.02: Wind Class Frequency Distribution (Jan-Feb-March-2019).



1.7 MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

Methods and Instruments used for Sampling

The air samples were analyzed as per methods specified by Central Pollution Control Board (CPCB).

The levels of Particulate Matter (PM₁₀), Particulate Matter (PM_{2.5}), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Pb, Hg, As and Cr were monitored for establishing the baseline status. PM₁₀ was collected with the help of Respirable Particulate Sampler operating 24 hours by drawing air which passes through the cyclone at the rate of 1.0 -1.3 m³/min which collects the particles less than 10 µm diameter over glass fiber filter paper. The dust deposited over the filter paper is measured as PM₁₀ and the smaller particulates from 2.5 µm are collected into the Membrane Filter Paper. The dust fall rate was measured using dust fall jar. The jar was exposed for one month in the mining area and Samri Chowk during pre and post monsoon period. The jar was filled with 2 lit of distilled water. The water in the jar is mixed with copper sulphate solution (0.02 N solutions) to prevent any growth of algae. The water level in the jar is constantly maintained in such a way that 2 lit of water is always retained. The measurement techniques used for various pollutants and other details are given in (**Table 3**).

Earmarked samples were collected for Particulate Matter-PM₁₀, Particulate Matter-PM_{2.5}, SO₂ and NO_x for 24 hourly. Collected samples were sent to Laboratories for analysis.



Table 3.0

Measurement Techniques for various pollutants

S.No.	Parameter	Technique	Technical Protocol	Minimum Reportable Value ($\mu\text{g}/\text{m}^3$)
1.	Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part-23)	5
2.	Particulate Matter 2.5	Respirable Dust Sampler (Gravimetric Method)	Gravimetric Method	5
3.	Sulphur Dioxide	Modified West and Gaeke	IS-5182 (Part – II)	4
4.	Oxide of Nitrogen	Jacob & Hochheiser Method	IS-5182 (Part – VI)	4
5.	Pb, As, Hg, Cr	Acid Digestion Method	EPA Method	0.1
6.	Dust Full	Gravimetric	IS-5182 (Part-I)	–

	Hindalco Industries Limited Kudag Mining Environmental Status Report for January-2019 To March-2019	Details of Salient Features
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Table 4
Statistical Analysis

Location	Month & Year	PM-10 ($\mu\text{g}/\text{m}^3$)	PM-2.5 ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	Pb ($\mu\text{g}/\text{m}^3$)	Hg ($\mu\text{g}/\text{m}^3$)	As (ng/m^3)	Cr ($\mu\text{g}/\text{m}^3$)
Core Zone									
Sairaidh Campus	January-2019	57.3	24.9	8.1	23.9	0.016	ND	ND	ND
	February-2019	59.1	24.7	9.3	21.8	0.027	ND	ND	ND
	March-2019	61.7	23.8	11.6	24.9	0.021	ND	ND	ND
New Kudag/Nr. Weigh Bridge	January-2019	62.9	28.1	9.3	24.6	0.019	ND	ND	ND
	February-2019	64.7	28.4	11.7	23.9	0.031	ND	ND	ND
	March-2019	67.3	28.1	12.8	32.7	0.017	ND	ND	ND
Old Kudag/Mining Area	January-2019	58.2	18.7	8.7	28.1	0.021	ND	ND	ND
	February-2019	68.3	31.6	12.1	31.6	0.024	ND	ND	ND
	March-2019	71.6	32.9	12.4	31.4	0.023	ND	ND	ND
Samri Gopatu/ Nr. Weigh Bridge	January-2019	54.8	23.6	6.9	17.4	<0.01	ND	ND	ND
	February-2019	57.1	18.3	9.4	18.3	0.019	ND	ND	ND
	March-2019	59.3	23.8	8.3	19.1	0.019	ND	ND	ND
CPCB Standards		100 (24 hrs)	60 (24 hrs)	80 (24 hrs)	80 (24 hrs)	1.0 (24 hrs)	---	6.0 (annual)	---
Minimum		54.8	18.3	6.9	17.4	0.016	---	---	---
Maximum		71.6	32.9	12.8	32.7	0.031	---	---	---
Average		61.9	25.6	10.1	24.8	0.022	---	---	---
98% le		70.9	32.6	12.7	32.5	0.030	---	---	---

- The Average Concentration of PM₁₀ within the Core Zone of Kudag Lease is 61.9 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Core Zone of Kudag Lease is 25.6 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Core Zone of Kudag Lease is 10.1 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Core Zone of Kudag Lease is 32.5 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Core Zone of Kudag Lease is 0.030 $\mu\text{g}/\text{m}^3$.

Conclusion :- The Average Concentration within the Core Zone of Kudag Lease during this period (January-February-March-2019) it is within permissible limits as per CPCB Standards.

	Hindalco Industries Limited Kudag Mining Environmental Status Report for January-2019 To March-2019	Details of Salient Features
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Location	Month & Year	PM-10 ($\mu\text{g}/\text{m}^3$)	PM-2.5 ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO _x ($\mu\text{g}/\text{m}^3$)	Pb ($\mu\text{g}/\text{m}^3$)	Hg ($\mu\text{g}/\text{m}^3$)	As (ng/m^3)	Cr ($\mu\text{g}/\text{m}^3$)
Buffer Zone									
Jaljali Village	January-2019	54.8	23.6	6.9	17.4	0.016	ND	ND	ND
	February-2019	57.1	18.3	9.4	18.3	0.031	ND	ND	ND
	March-2019	59.3	23.8	8.3	19.1	0.019	ND	ND	ND
Kutku Village	January-2019	51.9	16.7	7.3	16.8	0.018	ND	ND	ND
	February-2019	56.2	21.7	8.3	18.3	0.016	ND	ND	ND
	March-2019	54.7	16.9	7.2	17.3	0.021	ND	ND	ND
Rajendrapur	January-2019	58.2	26.3	8.2	17.3	0.027	ND	ND	ND
	February-2019	61.7	28.1	9.4	23.8	0.037	ND	ND	ND
	March-2019	58.2	17.3	9.4	21.8	0.036	ND	ND	ND
Tatijharia Village	January-2019	67.1	31.6	12.8	27.3	0.058	ND	ND	ND
	February-2019	62.9	28.7	11.6	24.7	0.038	ND	ND	ND
	March-2019	72.4	32.8	12.9	34.7	0.049	ND	ND	ND
CPCB Standards		100 (24 hrs)	60 (24 hrs)	80 (24 hrs)	80 (24 hrs)	1.0 (24 hrs)	---	6.0 (annual)	---
Minimum		51.9	16.7	6.9	16.8	0.016	---	---	---
Maximum		72.4	32.8	12.9	34.7	0.058	---	---	---
Average		59.5	23.8	9.3	21.4	0.031	---	---	---
98% le		71.2	32.5	12.9	33.1	0.056	---	---	---

- The Average Concentration of PM₁₀ within the Buffer Zone of Kudag Lease is 59.5 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Buffer Zone of Kudag Lease is 23.8 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Buffer Zone of Kudag Lease is 9.3 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Buffer Zone of Kudag Lease is 21.4 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Buffer Zone of Kudag Lease is 0.031 $\mu\text{g}/\text{m}^3$.

Conclusion :- The Average Concentration within the Buffer Zone of Kudag Lease during this period (January-February-March-2019) it is within permissible limits as per CPCB Standards.



Monthwise Summary of Statistical Analysis

Kudag Lease (Core Zone):-

3.1 Ambient Air Quality:

Ambient air quality has been generated as per NAAQS 2009 for the month of January-2019 to March-2019. PM₁₀, PM_{2.5}, SO₂ & NO_x, The values obtained were then compared vis-a-vis the standards prescribed by CPCB for Industrial/ Rural / Residential uses.

3.1.1 Presentation of Results:

The summary of Ambient Air Quality monitoring results from January-2019 to March-2019 are presented in detail in Table 4.0. 98th percentile; maximum and minimum values etc. have been computed from the collected raw data for all the AAQ monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQS for residential and rural zone.

A. Particulate Matter-PM₁₀:

The Minimum and maximum concentrations for Particulate Matter-PM₁₀ were recorded as 54.8 µg/m³ and 71.6 µg/m³ at Samri-Gopatu and Old Kudag respectively. The average concentrations 61.9 µg/m³.

B. Particulate Matter-PM_{2.5}:

The Minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 18.3 µg/m³ & 32.9µg/m³ at Samri Gopatu and Old Kudag site respectively. The average concentrations 25.6 µg/m³.

C. Sulphur Dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 6.9µg/m³ and 12.8µg/m³ respectively. The minimum concentration was recorded at Samri Gopatu. The maximum concentration was also recorded at New Kudag. The average concentrations 10.1 µg/m³.

Nitrogen Oxide (NO_x):

The minimum and maximum for NO_x concentrations were recorded as 17.4µg/m³ and 32.7µg/m³. The maximum concentration was recorded at New Kudag/Nr Weigh Bridge and the minimum concentration was recorded at Samri Gopatu. The average concentrations 24.8µg/m³.

D. Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.031µg/m³ New Kudag/Nr. Weigh Bridge location and the minimum lead in PM₁₀ sample was 0.016/m³ detected at Sairaidh Campus location.

No lead could be detected in PM_{2.5} samples at any of the Ambient Air samples at any of the locations.

E. Mercury (Hg):

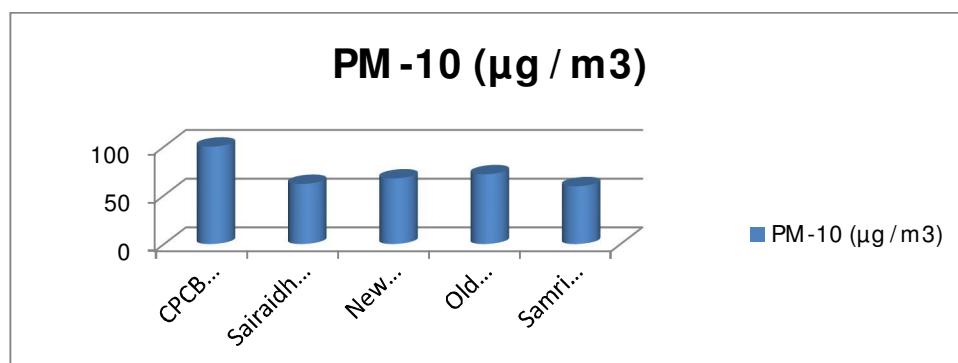
Mercury was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

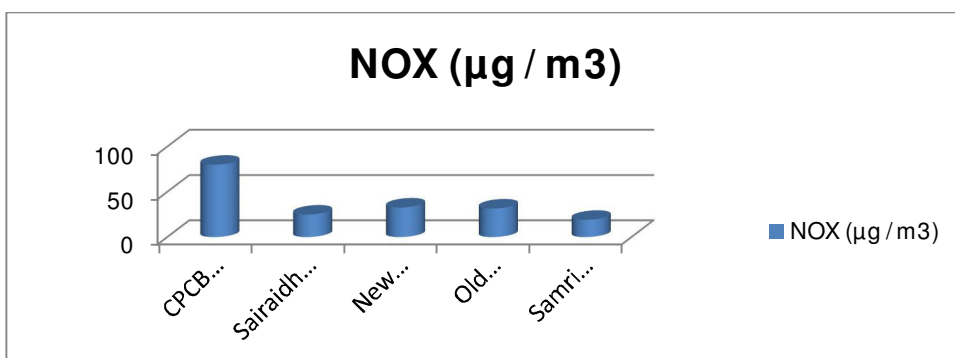
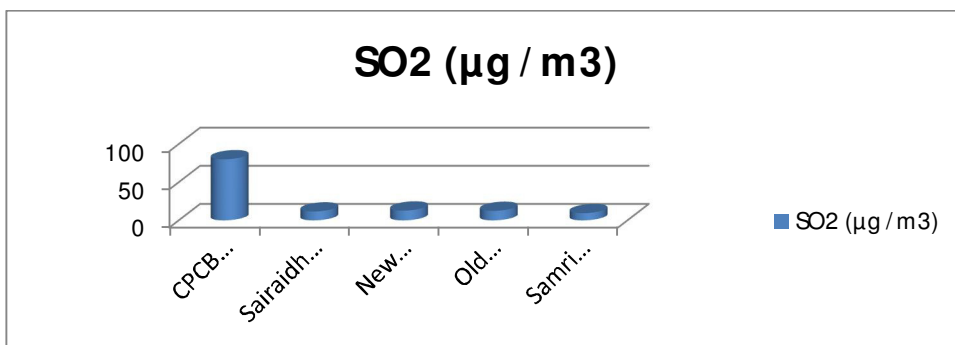
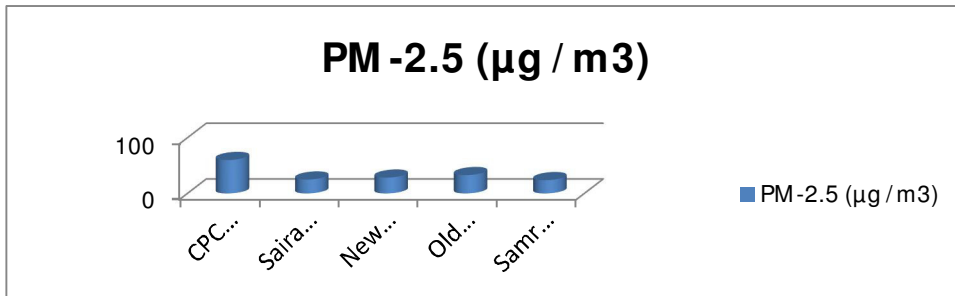
F. Arsenic (As):

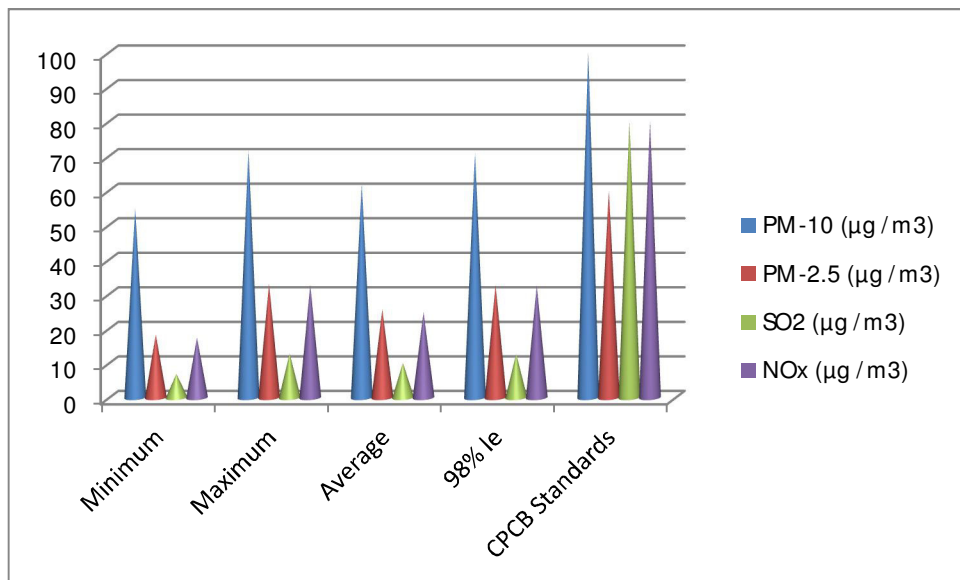
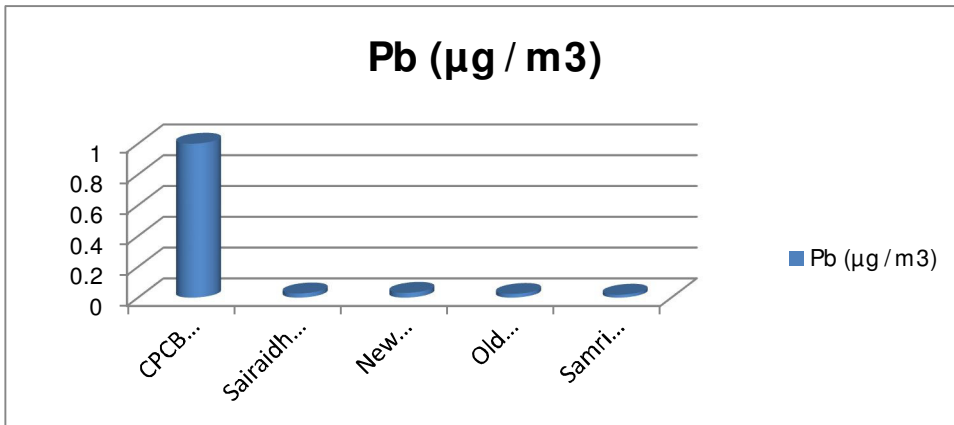
Arsenic was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

G. Chromium (Cr):

Chromium was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.







	Hindalco Industries Limited Kudag Mining Environmental Status Report for January-2019 To March-2019	Details of Salient Features
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Kudag Lease (Buffer Zone):-

3.2 Ambient Air Quality:

Ambient air quality has been generated as per NAAQS 2009 for the month of January-2019 to March-2019. PM₁₀, PM_{2.5}, SO₂ & NO_x, The values obtained were then compared vis-a-vis the standards prescribed by CPCB for Industrial/ Rural / Residential uses.

3.2.1 Presentation of Results:

The summary of Ambient Air Quality monitoring results from January-2019 to March-2019 are presented in detail in Table 4.0. 98th percentile; maximum and minimum values etc. have been computed from the collected raw data for all the AAQ monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQS for residential and rural zone.

H. Particulate Matter-PM₁₀:

The Minimum and maximum concentrations for Particulate Matter-PM₁₀ were recorded as 51.9 µg/m³ and 72.4 µg/m³ at Kudag Village and Tatijharia respectively. The average concentrations 59.5 µg/m³.

I. Particulate Matter-PM_{2.5}:

The Minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 16.7µg/m³ & 32.8µg/m³ at Kutku Village and Tatijharia Village site respectively. The average concentrations 23.8 µg/m³.

J. Sulphur Dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 6.9µg/m³ and 12.9µg/m³ respectively. The minimum concentration was recorded at Jaljali Village. The maximum concentration was also recorded at Tatijharia Village. The average concentrations 9.3 µg/m³.

Nitrogen Oxide (NO_x):

The minimum and maximum for NO_x concentrations were recorded as 16.8µg/m³ and 34.7µg/m³. The maximum concentration was recorded at Tatijharia Village and the minimum concentration was recorded at Kutku Village. The average concentrations 21.4 µg/m³.

K. Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.058µg/m³ Tatijharia Village location and the minimum lead in PM₁₀ sample was 0.016/m³ detected at Jaljali Village location.

No lead could be detected in PM_{2.5} samples at any of the Ambient Air samples at any of the locations.

L. Mercury (Hg):

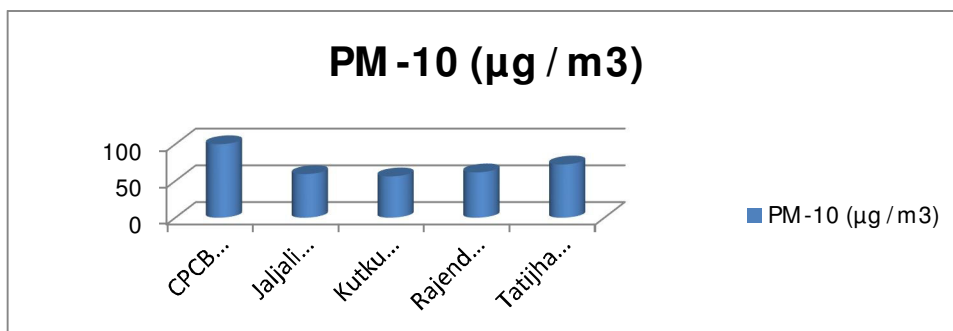
Mercury was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

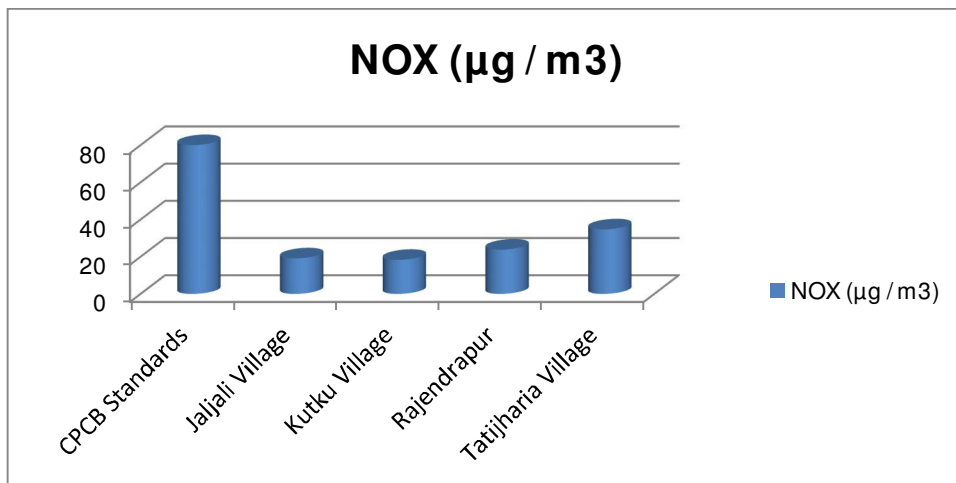
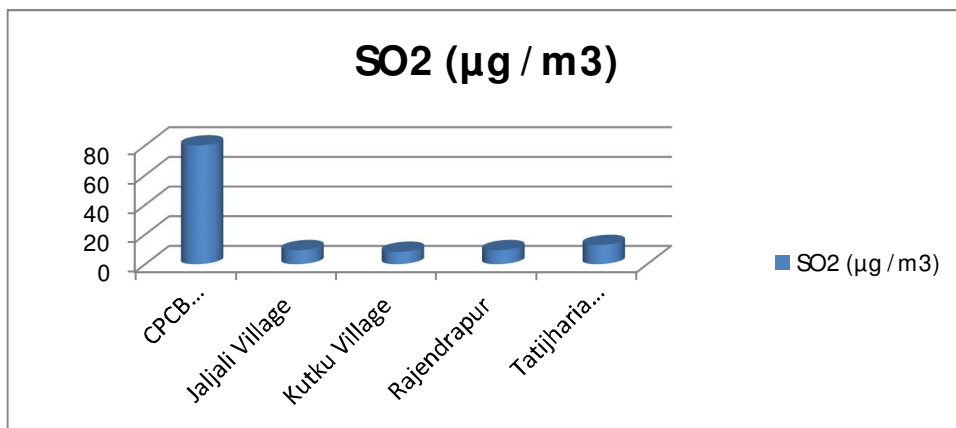
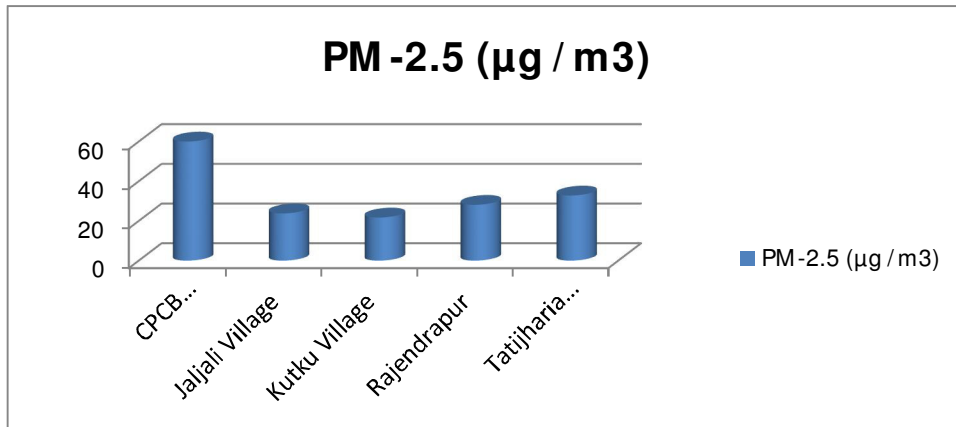
M. Arsenic (As):

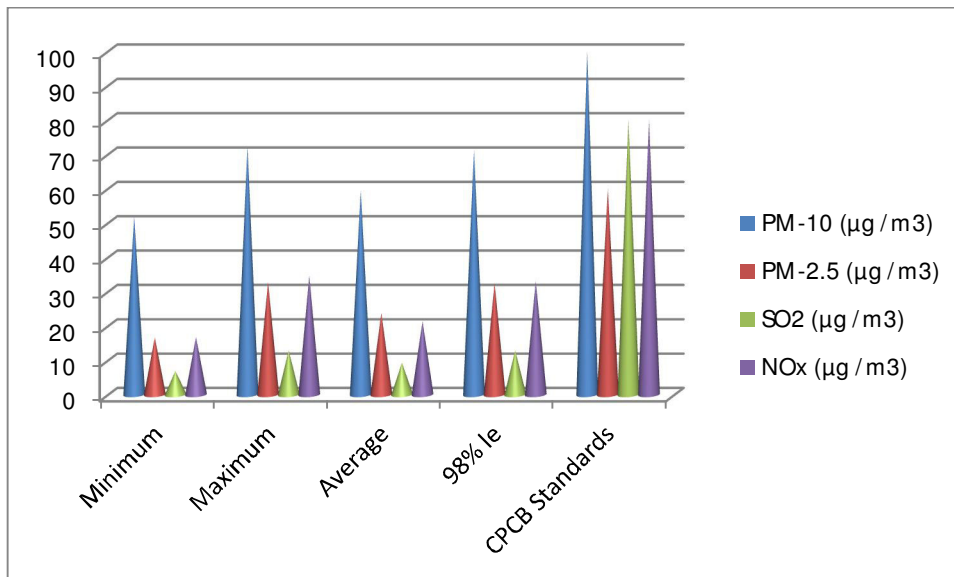
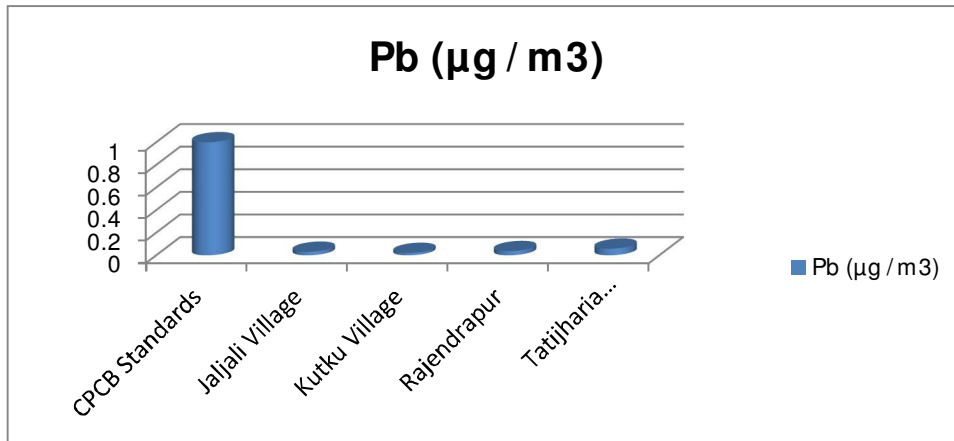
Arsenic was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

N. Chromium (Cr):

Chromium was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.









1.8 Noise Environment

The Director General of Mines Safety in its circular No. DG (Tech)/18 of 1975, has prescribed the noise level in mining occupations (TLV) for workers, in an 8 hour shift period with unprotected ear as 90 dB(A) or less. There will be some noise sources in mines, which produce noise levels above 90 dB(A), however; the workers are not expected to be exposed continuously for 8 hours. In order to maintain this statutory requirement noise monitoring has been carried out in and around the mining lease area.

Work zone noise level in the mining area shall increase due to blasting excavation and transportation. The impacts due to the mining activities on the noise levels shall be negligible, if all the precautions for the elimination of the noise are taken. The mining activities will be undertaken during daytime only. The daytime equivalent noise levels, when all the machineries are in operation, shall be minimized as the machineries have been provided with control equipment. Noise monitoring carried out on monthly basis at mining site; Core Zone and Buffer Zone are as shown in **Fig. 3**.

Identification of sampling locations

Noise at different noise generating sources has been identified based on the activities in the village area and ambient noise due to traffic.

The noise monitoring has been conducted for determination of ambient noise levels in the mining area and villages. The noise levels at each location were recorded for 24 hours.

Instrument used for monitoring

Noise levels were measured using integrated sound level meter manufactured by Envirotech made in India (Model no. HTC-1352). This instrument is capable of measuring the Sound Pressure Level (SPL), Leq.

Method of Monitoring

Sound Pressure Level (SPL) measurements were monitored at eight locations. The readings were taken for every hour for 24 hours. The day noise levels have been monitored during 6 am to 10 pm and night levels during 10 pm to 6 am at eight locations within 10-km radius of the study area.

Noise level monitoring was carried out continuously for 24 hours with one hour interval starting at 06.00 hrs to 06.00 hrs next day.

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Noise levels monitored during day and night at Four locations are found to be below in the Mining Area than the stipulated standard of CPCB for Industrial area as 75dB(A) and 70dB(A) for day and night respectively as given in (**Table 15**).

Table 5
Noise Emission Monitoring Report

SR. NO.	LOCATION	Month	Noise-dB(A)	
			Day Time	Night Time
Core Zone				
1.	Sairaidh Campus	January-2019	57.2	46.1
		February-2019	57.1	42.9
		March-2019	52.8	41.6
2.	New Kudag/Nr. Weigh Bridge	January-2019	61.9	52.8
		February-2019	62.7	58.3
		March-2019	61.7	54.3
3.	Old Kudag/Mining Area	January-2019	63.7	53.7
		February-2019	57.3	46.1
		March-2019	57.3	48.1
4.	Samri Gopatu/Nr. Weigh Bridge	January-2019	56.1	41.3
		February-2019	64.9	51.6
		March-2019	59.1	42.7
Buffer Zone				
1.	Jaljali Village	January-2019	64.9	52.8
		February-2019	64.1	56.3
		March-2019	67.1	56.2
2.	Kutku Village	January-2019	57.1	43.9
		February-2019	51.6	42.9
		March-2019	53.9	41.6
3.	Rajendrapur	January-2019	71.6	61.3
		February-2019	57.2	48.1
		March-2019	58.3	47.1
4.	Tatijharia Village	January-2019	67.1	54.3
		February-2019	62.9	52.7
		March-2019	73.8	61.4
CPCB Standards				
Industrial Area			75	70
Residential area			55	45

Conclusion :- The Noise Monitoring Results Samri Lease during this period (Oct-Nov-Dec-2018) it is within permissible limits as per CPCB Standards.

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Table 15-A

HEMM Spot Noise Level Monitoring

Unit: dB(A) Leq

Sr. No.	Location	January-2019			February-2019			March-2019		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	New Kudag/ Nr.Weigh Bridge	62.8	71.4	67.1	58.3	68.2	63.3	64.9	82.7	73.8

Free Silica :-

Sr. No.	Location	Measurement Unit	January-2019		February-2019		March-2019	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Sairaidh Campus	g/100gm	0.16	0.07	0.26	0.19	0.17	0.09
2.	New Kudag/ Nr. Weigh Bridge	g/100gm	0.21	0.08	0.28	0.17	0.24	0.17
3.	Old Kudag/ Mining Area	g/100gm	0.24	0.07	0.34	0.21	0.31	0.18
4.	Jaljali Village	g/100gm	0.14	0.05	0.16	0.08	0.16	0.06

Table 7

Dust fall Rate

Sr. No.	Location	January-2019	February-2019	March-2019	Average
		Rate (MT/km ² /Month)			
1.	Sairaidh Campus	14.63	19.24	21.58	18.48
2.	New Kudag/ Nr. Weigh Bridge	16.24	14.58	17.24	16.02
3.	Old Kudag/ Mining Area	18.19	21.43	23.19	20.94



2.0 Water Quality Monitoring

The existing status of water quality for ground water and surface water was assessed by collecting the water samples from underground wells from the mining area/old kudag.

The purpose of the study is to assess the water quality characteristics for critical parameters, evaluate the impacts on agricultural productivity, habitat conditions, recreational resources and aesthetics in the vicinity and identification of impact on water quality by this project and related activities.

The physico-chemical analysis of water samples collected during the study period is given in **(Table16 and Fig.5)**. The overall water quality found to be below the stipulated standards of IS 10500-2012 for ground water & found to be fit for drinking purpose for tested parameters. Thus the impacts due to mining activities have been found to be insignificant.

The drinking water is supplied by the tankers from far away sources. Hence, additional care now be taken to chlorinate the tankers before leaving the supply source.

The water sample from Nallahs near Mines Area was collected to know its chemical characteristics in order to find out the use of water for various utilities in the mine area. As per IS : 10500:2012 for surface water results are within the permissible limit so that the water can be used after chlorination.

The drinking water is supplied by the tankers from far away sources. Hence, additional care now be taken to chlorinate the tankers before leaving the supply source.



Table 6
Report on Chemical Examination of Ground Water
(Average of Three Months January-February-March-2019)

Location:	GW1) Saraidih (Hindalco Campus) Sample Source:- Borewell Water
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TEST RESULTS

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	7.17 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.6
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	1
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.18
7.	Free residual chlorine	mg/l	IS 3025 (Part 26)	Min. 0.2	1	< 0.1
8.	Total dissolved solids	mg/l	IS 3025 (Part 16)	500	2000	421
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.24
10.	Cyanide (as CN)	mg/l	IS 3025 (Part 27)	0.05	No relaxation	< 0.005
11.	Chloride (as Cl)	mg/l	IS 3025 (Part 32)	250	1000	32.8
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	116.7
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	166.89
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	48.29
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	11.24
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	26.17
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	9.73
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	< 0.05
20.	Mercury (as Hg)	mg/l	IS : 3025 (Part 48)	0.001	No relaxation	< 0.0005
21.	Cadmium (as Cd)	mg/l	IS : 3025 (Part 41)	0.003	No relaxation	< 0.001
22.	Selenium (as Se)	mg/l	IS : 3025 (Part 56)	0.01	No relaxation	< 0.001
23.	Arsenic (as As)	mg/l	IS : 3025 (Part 37)	0.01	No relaxation	< 0.01
24.	Aluminium (as Al)	mg/l	IS : 15302	0.03	0.2	< 0.005
25.	Lead (as Pb)	mg/l	IS : 3025 (Part 47)	0.01	No relaxation	< 0.001
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	1.4



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Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.01
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.03
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.1
31.	Sulphide (as H ₂ S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.03
32.	Chloramines (as Cl ₂)	mg/l	IS 3025 (Part 26)	4.0	No relaxation	< 0.05
33.	Molybdenum (as Mo)	mg/l	IS 3025 (Part 2)	0.07	No relaxation	< 0.001
34.	Silver (as Ag)	mg/l	Annexure J of IS 13428	0.1	No relaxation	< 0.001
35.	Polychlorinated Biphenyls (PCB)	µg/l	USEPA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	2.4	< 0.1
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform	mg/l	APHA 6232	0.1	No relaxation	Absent
	b. Dibromochloromethane			0.1	No relaxation	Absent
	c. Bromodichloromethane			0.06	No relaxation	Absent
	d. Chloroform			0.2	No relaxation	Absent
39.	Phenolic compounds (as C ₆ H ₅ OH)	mg/l	IS 3025 (Part 43) :1001	0.001	0.002	< 0.001
40.	Anionic detergents (as MBAS)	mg/l	IS 13428:2005 (Annex K)	0.2	1.0	< 0.01
41.	Polynuclear aromatic hydrocarbon (PAH)	µg/l	USEPA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	Per 100 ml	IS 15185	Absent	Absent	Absent
43.	<i>Escherichia coli</i>	Per 100 ml	IS 15185 : 2016	Absent	Absent	Absent



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Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)	Test Result
44.	Pesticides residues				
i.	Alpha-HCH	µg/l	USEPA 508	0.01	< 0.01
ii.	Beta HCH	µg/l	USEPA 508	0.04	< 0.03
iii.	Delta- HCH	µg/l	USEPA 508	0.04	< 0.03
iv.	Alachlor	µg/l	USEPA 508	20	< 0.03
v.	Aldrin /Dieldrin	µg/l	USEPA 508	0.03	< 0.03
vi.	Atrazine	µg/l	USEPA 1657	2	< 0.03
vii.	Butachlor	µg/l	USEPA 508	125	< 0.03
viii.	Chlorpyrifos	µg/l	USEPA 1657	30	< 0.03
ix.	DDT and its Isomers	µg/l	USEPA 508	1	< 0.03
x.	Gamma - HCH (Lindane)	µg/l	USEPA 508	2	< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30	< 0.03
xii.	Endosulphan	µg/l	USEPA 508	0.4	< 0.03
xiii.	Ethion	µg/l	USEPA 1657	3	< 0.03
xiv.	Isoproturon	µg/l	USEPA 1657	9	< 0.03
xv.	Malathion	µg/l	USEPA 1657	190	< 0.03
xvi.	Methyl Parathion	µg/l	USEPA 1657	0.3	< 0.03
xvii.	Monocrotophos	µg/l	USEPA 1657	1	< 0.03
xviii.	Phorate	µg/l	USEPA 1657	2	< 0.03

NOTES: ● Please see watermark "Original Test Report" to confirm the authenticity of this report. ● Results shall be referred to tested sample(s) and applicable to tested parameters only. ● Test report shall not be reproduced except in full without prior written approval of Anacon Labs. ● Liability of Anacon Labs is limited to invoiced amount only. ● Non-perishable and perishable sample(s) shall be disposed off after 30 days and 15 days respectively from the date of issue of Test Report, unless specified otherwise. ● #Permissible limit in absence of an alternate source for drinking water. ● MPN indicates most probable number. ● 'mg/l' is equivalent to 'ppm'. ● 'µg/l' is equivalent to 'ppb'. ● '<' indicates detection limit of instrument/method and shall be considered as 'absent'. ● ND-Not detected ● Result for test no. 7 is not relevant.

REMARKS: Based upon request of the party, sample was tested for above mentioned parameters only. Sample complies with IS:10500:2012, for test conducted, indicating that it is fit for drinking purpose with respect to tested parameters.

For ANACON LABORATORIES PVT. LTD.

Verified by

Authorized Signatory

Ms. Roshani Thakur
(Chemist)

Dr. (Mrs.) S.D. Garway
(Director - Labs)



Table 8

Monthly Report on Chemical Examination of Surface Water
(Average of Three Months January-February-March-2019)
(Nalahs near Mining Area)

TEST RESULTS

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	6.72 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	1.6
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	4
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.28
7.	Free residual chlorine	mg/l	IS 3025 (Part 26)	Min. 0.2	1	< 0.1
8.	Total dissolved solids	mg/l	IS 3025 (Part 16)	500	2000	387
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.34
10.	Cyanide (as CN)	mg/l	IS 3025 (Part 27)	0.05	No relaxation	< 0.005
11.	Chloride (as Cl)	mg/l	IS 3025 (Part 32)	250	1000	132.58
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	116.54
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	253.99
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	74.92
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	16.24
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	31.58
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	12.19
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	< 0.05
20.	Mercury (as Hg)	mg/l	IS : 3025 (Part 48)	0.001	No relaxation	< 0.0005
21.	Cadmium (as Cd)	mg/l	IS : 3025 (Part 41)	0.003	No relaxation	< 0.001
22.	Selenium (as Se)	mg/l	IS : 3025 (Part 56)	0.01	No relaxation	< 0.001
23.	Arsenic (as As)	mg/l	IS : 3025 (Part 37)	0.01	No relaxation	< 0.01
24.	Aluminium (as Al)	mg/l	IS : 15302	0.03	0.2	< 0.005
25.	Lead (as Pb)	mg/l	IS : 3025 (Part 47)	0.01	No relaxation	< 0.001
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	1.6



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Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.01
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.03
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.1
31.	Sulphide (as H ₂ S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.03
32.	Chloramines (as Cl ₂)	mg/l	APHA 4500-Cl ₂ G	4.0	No relaxation	< 0.05
33.	Molybdenum (as Mo)	mg/l	IS 3025 (Part 2)	0.07	No relaxation	< 0.001
34.	Silver (as Ag)	mg/l	Annexure J of IS 13428	0.1	No relaxation	< 0.001
35.	Polychlorinated Biphenyls (PCB)	µg/l	USEPA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	2.4	< 0.1
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform	mg/l	APHA 6232	0.1	No relaxation	Absent
	b. Dibromochloromethane			0.1	No relaxation	Absent
	c. Bromodichloromethane			0.06	No relaxation	Absent
	d. Chloroform			0.2	No relaxation	Absent
39.	Phenolic compounds (as C ₆ H ₅ OH)	mg/l	IS 3025 (Part 43) :1001	0.001	0.002	< 0.001
40.	Anionic detergents (as MBAS)	mg/l	IS 13428:2005 (Annex K)	0.2	1.0	< 0.01
41.	Polynuclear aromatic hydrocarbon (PAH)	µg/l	USEPA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	Per 100 ml	IS 15185	Absent	Absent	1600
43.	<i>Escherichia coli</i>	Per 100 ml	IS 15185 : 2016	Absent	Absent	Absent



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Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)	Test Result
44.	Pesticides residues				
i.	Alpha-HCH	µg/l	USEPA 508	0.01	< 0.01
ii.	Beta HCH	µg/l	USEPA 508	0.04	< 0.03
iii.	Delta- HCH	µg/l	USEPA 508	0.04	< 0.03
iv.	Alachlor	µg/l	USEPA 508	20	< 0.03
v.	Aldrin /Dieldrin	µg/l	USEPA 508	0.03	< 0.03
vi.	Atrazine	µg/l	USEPA 1657	2	< 0.03
vii.	Butachlor	µg/l	USEPA 508	125	< 0.03
viii.	Chlorpyrifos	µg/l	USEPA 1657	30	< 0.03
ix.	DDT and its Isomers	µg/l	USEPA 508	1	< 0.03
x.	Gamma - HCH (Lindane)	µg/l	USEPA 508	2	< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30	< 0.03
xii.	Endosulphan	µg/l	USEPA 508	0.4	< 0.03
xiii.	Ethion	µg/l	USEPA 1657	3	< 0.03
xiv.	Isoproturon	µg/l	USEPA 1657	9	< 0.03
xv.	Malathion	µg/l	USEPA 1657	190	< 0.03
xvi.	Methyl Parathion	µg/l	USEPA 1657	0.3	< 0.03
xvii.	Monocrotophos	µg/l	USEPA 1657	1	< 0.03
xviii.	Phorate	µg/l	USEPA 1657	2	< 0.03

NOTES: ● Please see watermark "Original Test Report" to confirm the authenticity of this report. ● Results shall be referred to tested sample(s) and applicable to tested parameters only. ● Test report shall not be reproduced except in full without prior written approval of Anacon Labs. ● Liability of Anacon Labs is limited to invoiced amount only. ● Non-perishable and perishable sample(s) shall be disposed off after 30 days and 15 days respectively from the date of issue of Test Report, unless specified otherwise. ● #Permissible limit in absence of an alternate source for drinking water. ● MPN indicates most probable number. ● 'mg/l' is equivalent to 'ppm'. ● 'µg/l' is equivalent to 'ppb'. ● '<' indicates detection limit of instrument/method and shall be considered as 'absent'. ● ND-Not detected ● Result for test no. 7 is not relevant.

REMARKS: Based upon request of the party, sample was tested for above mentioned parameters only.



Table 18
Report on Soil Analysis, Kudag
Date of collection: March-2019
Sample Location: (Old Kudag/ Mining Area)

Sr. No.	Test Parameter	Measurement Unit	S1 Old Kudag/ Mining Area
1.	PH (1:5 water extract)	-	6.64 at 25°C
2.	Electrical Conductivity at 25°C (1:5 water extract)	µs/cm	216.4
3.	Texture	-	Silty Clay
4.	Sand	%	31.59
5.	Slit	%	27.43
6.	Clay	%	40.98
7.	Water Holding Capacity	%	26.43
8.	Bulk Density	g/cc	1.34
9.	Porosity	%	12.58
10.	Exchangeable Calcium (as Ca)	mg/Kg	492.17
11.	Exchangeable Magnesium (as Mg)	mg/Kg	116.52
12.	Exchangeable Manganese (as Mn)	mg/Kg	73.82
13.	Exchangeable Zinc (as Zn)	mg/Kg	38.43
14.	Available Boron (as B)	mg/Kg	ND
15.	Water Soluble Chloride (as Cl ⁺)	mg/Kg	416.52
16.	Water Soluble Sulphate (as SO ₄)	mg/Kg	371.69
17.	Available Potassium (as K)	mg/Kg	415.28
18.	Available Phosphorous (as P)	Kg/hect	13.31
19.	Available Nitrogen (as N)	Kg/hect	121.59
20.	Cadmium (as Cd)	mg/Kg	ND
21.	Chromium (as Cr)	mg/Kg	ND
22.	Copper (as Cu)	mg/Kg	0.07
23.	Lead (as Pb)	mg/Kg	ND
24.	Total Iron	mg/Kg	12.68
25.	Organic Matter	%	1.41
26.	Organic Carbon	%	0.38
27.	CEC	meq/100g	11.59

Note: 1. Results relate to tested sample only. 2. Test report should not be reproduced partially. 3. 'mg/Kg' is equivalent to 'ppm'. 4. 'g/100g' is equivalent to '%w/w'. 5. All parameters are in 1:5 water extract.

REMARKS: Based upon request of party, sample was tested for above mentioned parameter only.

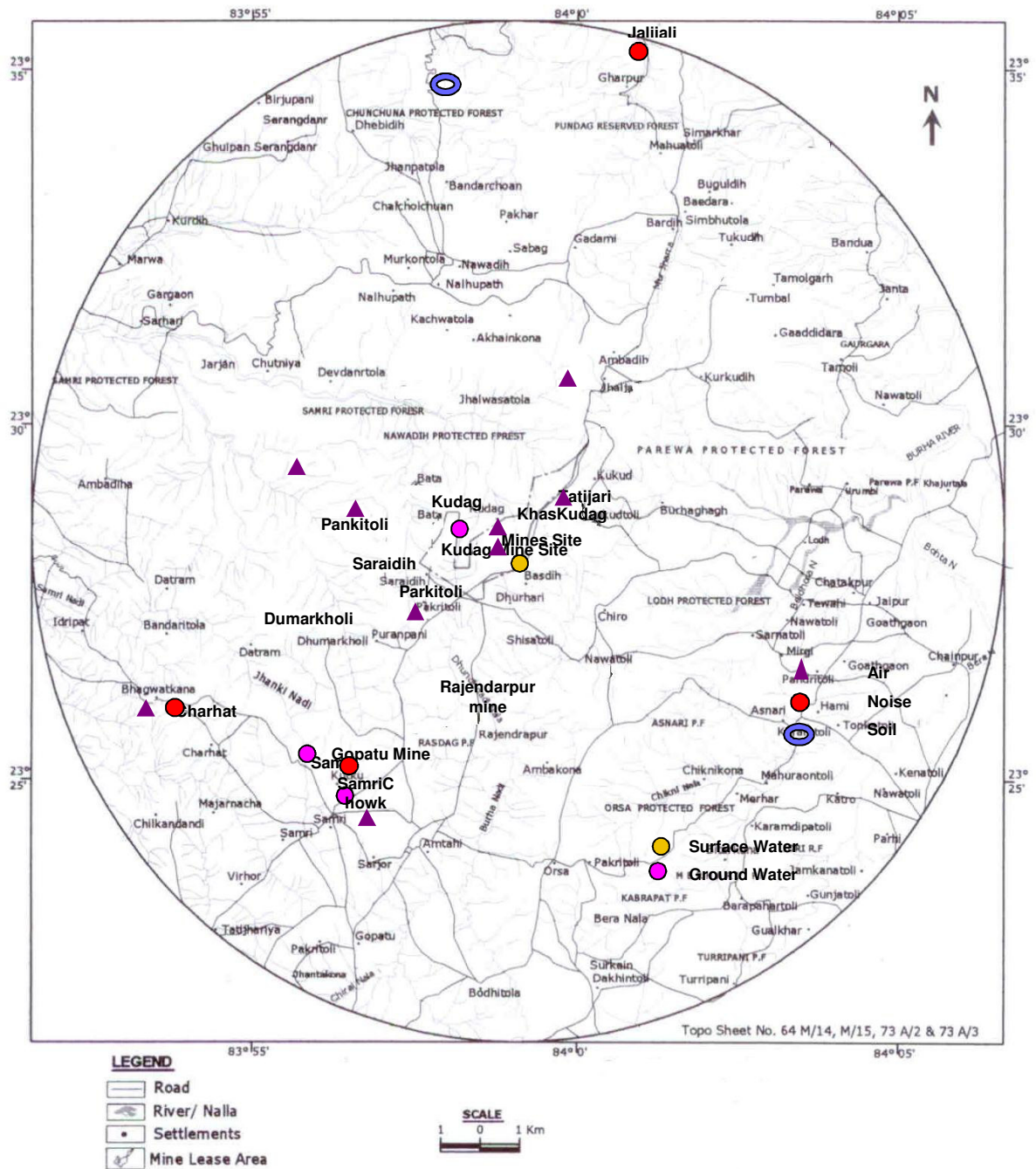


Fig 5: Sampling Locations for Water