Environmental Status Report
For
Samri 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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Lab. & Consultancy: FP-34, 35, Food Park,
MIDC, Butibori, Nagpur – 441122
Ph.: (0712) 2242077, 9373287475
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Agent of Mines
Samri 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

ANACON LABORATORIES PVT. LTD. NAGPUR

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 Aluminium.

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. HINDALCO possesses bauxite mine leases of Kudag, Samri and Tatijharia 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 report (January, February & March-2019) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment, Forest and Climate Change (MoEFCC) for Samri mining leases in Balrampur District, Chhattisgarh State.

1.2 Background Information of Samri Mine

HINDALCO was granted Samri Bauxite mining lease over an area of 2146.746 hec in Samri, Dumarkholi, Gopatu villages in Post Office & Tehsil Samri (Kusmi) of Balrampur district, Chhattisgarh on 24/06/1998 for a period of 20 years. As per the Mines and Mineral (Development and Regulation) Amendment Act, 2015, Samri lease has been extended up to another 30 years i.e 23/06/2048. The mining operations were started on 25/05/1999. The production capacity of Bauxite is 5.0 Lakh Tonnes Per Annum (LTPA).

1.3 Salient Features of Samri Bauxite Mine

The deposits occur in Samri block, Post Office & Tahsil 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**: (Table-1)**

Table 1

Salient Features of Samri Bauxite Mines

S.No.	Particulars	Details
1.	Survey of India Topo sheet No.	64 M /15
2.	Latitude	23^0 23′ 02″N to 23^0 27′ 05″N
3.	Longitude	83^0 53′ 50″E to 83^0 57′ 59″E
4.	Elevation	1140-m above Mean Sea Level
5.	Climatic Conditions (as per IMD, Ambikapur)	Annual maximum temperature : 30.3°C Annual minimum temperature : 17.7°C Average annual rainfall : 1401.1 mm
6.	Mining lease area	2146.746 hec.
7.	Method of mining	Open cast (Semi-Mechanized)
8.	Mode of transportation	Trucks
9.	Land use	Agricultural and Barren land
10.	Nearest Road	Samri to Kusmi (17 km)
11.	Nearest Airport	Ranchi (146.06 km, ESE)
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 Anacon Laboratories Pvt. Ltd., Nagpur has been monitoring at following locations for air, water and Noise on monthly basis during these months **(Table-2)**.

1.5 Air Environment

1.5.1 Ambient Air Quality Monitoring

Ambient Air Quality monitored at 8 locations in the core zone and buffer zone with reference to Samri mine lease area as shown in (**Fig. 1**).

Table 2

Locations of Ambient Air Quality Monitoring (AAQM) & Fugitive Emission (2146.746hec.)

S.No.	Core zone	Sr.No.	Buffer zone
1	Samri-Gopatu/Near Weigh Bridge	5	Sairaidh Campus
2	Rajendrapur/Near Mining Area	6	Jaljali Village
3	Kutku Village/Near V.T.Center	7	Tatijharia Village/Near Weigh Bridge
4	Dumerkholi/Near Mining Area	8	Piprapat/Near Mining Area

The sampling stations are selected at the above mentioned locations, in downwind and upwind directions of the mining site in the core zone and buffer zone. Anacon Laboratories Pvt. Ltd., Nagpur is carrying out regular monitoring for PM_{10}, $PM_{2.5}$, SO_2, NO_x and Pb, Hg, As & Cr at above Ambient Air Quality Monitoring (AAQM) locations. The dust fall rate was measured in the mining area and Samri chowk during January-February-March-2019.

Sampling Duration and Frequency

Ambient air quality monitoring was carried out for the parameters PM_{10}, $PM_{2.5}$, SO_2, NO_x and Pb, Hg, As & Cr from January-February-March-2019 as per CPCB norms.

Data is compared with the present revised standards mentioned in the latest Gazette Notification of the Central Pollution Control Board (CPCB) 18th November, 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%

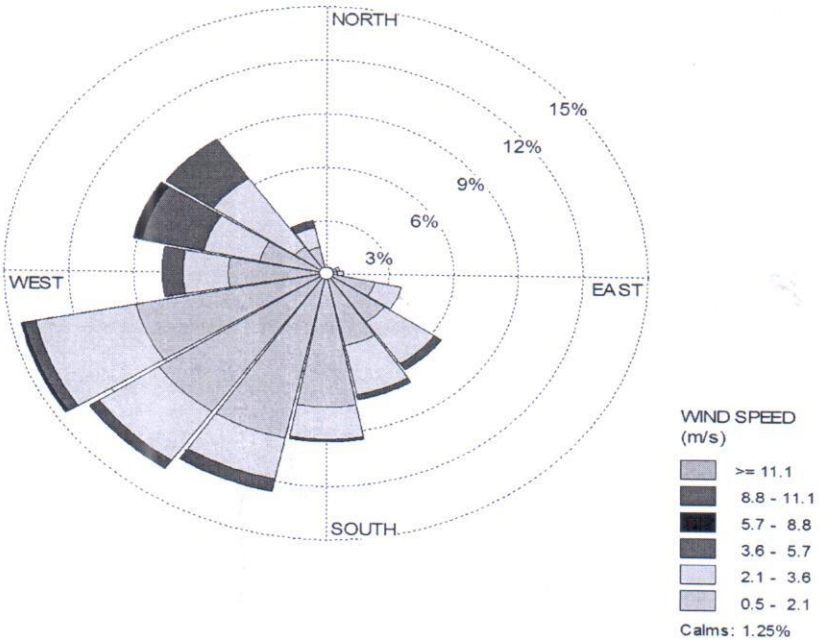


Figure.01: Wind Rose Diagram (Jan-Feb-March-2019)

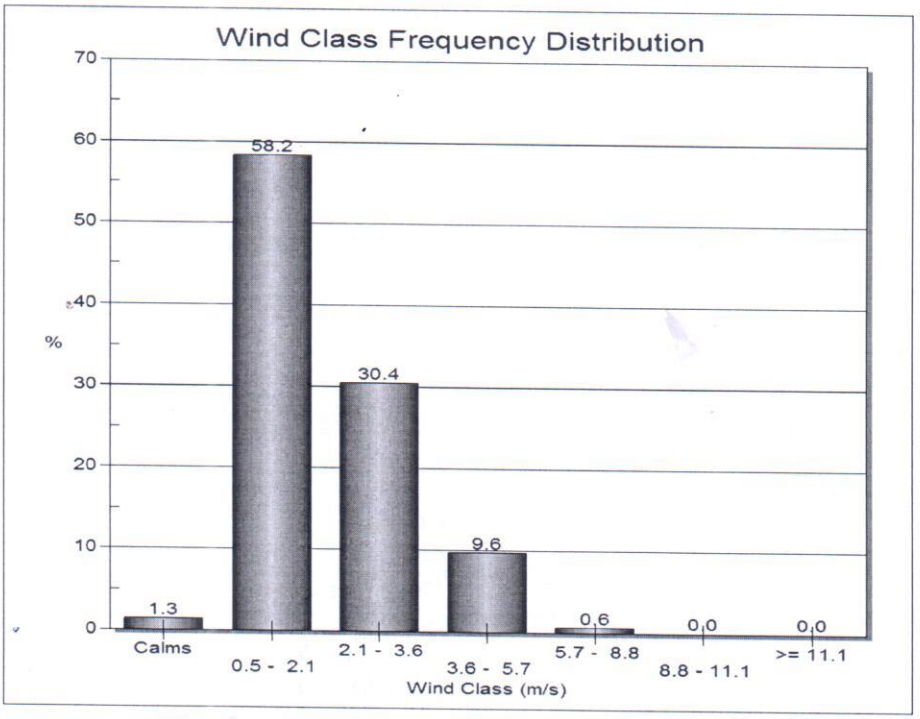


Figure.02: Wind Class Frequency Distribution (Jan-Feb-March-2019).

MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

1.7 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 (PM_{10}), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NO_X) , Pb, Hg, As and Cr were monitored for establishing the baseline status. PM_{10} 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 m^3/min which collects the particles less than 10 µm diameter over glass fibre filter paper. The dust deposited over the filter paper is measured as PM_{10} 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-Gopatu 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-PM_{10}, Particulate Matter-$PM_{2.5}$, SO_2 and NOx 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 (µg/ 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	–

Table 4
Statistical Analysis

Location	Month & Year	PM-10 (µg /m^3)	PM-2.5 (µg /m^3)	SO_2 (µg /m^3)	NO_x (µg /m^3)	Pb (µg /m^3)	Hg (µg /m^3)	As (ng/m^3)	Cr (µg /m^3)
Core Zone									
Samri-Gopatu/ Nr. weigh bridge	January-2019	64.7	28.1	11.6	24.9	0.046	ND	ND	ND
	February-2019	68.3	31.6	12.9	27.4	0.048	ND	ND	ND
	March-2019	61.8	23.6	11.7	26.9	0.041	ND	ND	ND
Rajendrapur/ Nr. Mining Area	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
Kutku Village/ Nr. V.T. Center	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
Dumerkholi/Nr. Mining Area	January-2019	61.3	24.9	8.7	21.6	0.029	ND	ND	ND
	February-2019	64.9	26.4	11.6	24.7	0.029	ND	ND	ND
	March-2019	62.4	24.7	11.3	27.1	0.024	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	7.2	16.8	0.016	---	---	---
Maximum		68.3	31.6	12.9	27.4	0.048	---	---	---
Average		60.4	23.9	9.8	22.3	0.031	---	---	---
98% le		67.6	30.8	12.6	27.3	0.048	---	---	---

- The Average Concentration of PM_{10} within the Core Zone of Samri Lease is 60.4 µg/m^3.
- The Average Concentration of $PM_{2.5}$ within the Core Zone of Samri Lease is 23.9 µg/m^3.
- The Average Concentration of SO_2 within the Core Zone of Samri Lease is 9.8 µg/m^3.
- The Average Concentration of NO_x within the Core Zone of Samri Lease is 22.3 µg/m^3.
- The Average Concentration of Pb within the Core Zone of Samri Lease is 0.031µg/m^3.

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

Location	Month & Year	PM-10 (µg /m^3)	PM-2.5 (µg /m^3)	SO_2 (µg /m^3)	NO_x (µg /m^3)	Pb (µg /m^3)	Hg (µg /m^3)	As (ng/m^3)	Cr (µg /m^3)
Buffer 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
Jaljali Village	January-2019	54.8	23.6	6.9	17.4	< 0.01	ND	ND	ND
	February-2019	68.3	31.6	12.9	27.4	0.048	ND	ND	ND
	March-2019	61.8	23.6	11.7	26.9	0.041	ND	ND	ND
Tatijharia Village/Nr. Weigh Bridge	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
Piprapat/ Nr.Mining Area	January-2019	71.6	28.1	11.9	24.7	0.042	ND	ND	ND
	February-2019	58.3	26.1	8.3	21.9	0.029	ND	ND	ND
	March-2019	67.3	28.1	11.6	26.1	0.037	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**	**23.6**	**6.9**	**17.4**	**0.016**	---	---	---
Maximum		**72.4**	**32.8**	**12.9**	**34.7**	**0.058**	---	---	---
Average		**63.6**	**27.3**	**10.8**	**25.1**	**0.037**	---	---	---
98% le		**72.2**	**32.5**	**12.9**	**33.1**	**0.056**	---	---	---

- The Average Concentration of PM_{10} within the Buffer Zone of Samri Lease is 63.6 µg/m^3.
- The Average Concentration of $PM_{2.5}$ within the Buffer Zone of Samri Lease is 27.3 µg/m^3.
- The Average Concentration of SO_2 within the Buffer Zone of Samri Lease is 10.8 µg/m^3.
- The Average Concentration of NO_x within the Buffer Zone of Samri Lease is 25.1 µg/m^3.
- The Average Concentration of Pb within the Buffer Zone of Samri Lease is 0.037 µg/m^3.

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

Monthwise Summary of Statistical Analysis

1.8.1 Samri Lease (Core Zone):-

1.8.1 Ambient Air Quality:

Ambient air quality has been generated as per NAAQS 2009 for the month of January-2019 to March-2019. PM10, PM2.5, SO_2 & NO_x, The values obtained were then compared vis-a-vis the standards prescribed by CPCB for Industrial/ Rural / Residential uses.

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-PM_{10}:

The Minimum and maximum concentrations for Particulate Matter-PM10 were recorded as 51.9 $\mu g/m^3$ and 68.3 $\mu g/m^3$ at Kutku Village and Samri-Gopatu respectively. The average concentrations 60.4 $\mu g/m^3$.

B. Particulate Matter-$PM_{2.5}$:

The Minimum and maximum concentrations for Particulate Matter-$PM_{2.5}$ were recorded as 16.7$\mu g/m^3$ & 31.6$\mu g/m^3$ at Kutku Village and Samri Gopatu site respectively. The average concentrations 23.9 $\mu g/m^3$.

C. Sulphur Dioxide (SO_2):

The minimum and maximum for SO_2 concentrations were recorded as 7.2$\mu g/m^3$ and 12.9$\mu g/m^3$ respectively. The minimum concentration was recorded at Kutku village The maximum concentration was also recorded at Samri-Gopatu. The average concentrations 9.8 $\mu g/m^3$.

D. **Nitrogen Oxide (NO_X):**

The minimum and maximum for NOx concentrations were recorded as 16.8µg/m^3 and 27.4µg/m^3. The maximum concentration was recorded at Samri-Gopatu and the minimum concentration was recorded at Kutku Village. The average concentrations 22.3µg/m^3.

E. **Lead (Pb):**

Maximum Lead detected in PM_{10} samples was 0.048µg/m^3 Samri-Gopatu location and the minimum lead in PM_{10} sample was 0.016/m^3 detected at Kutku Village location.

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

F. **Mercury (Hg):**

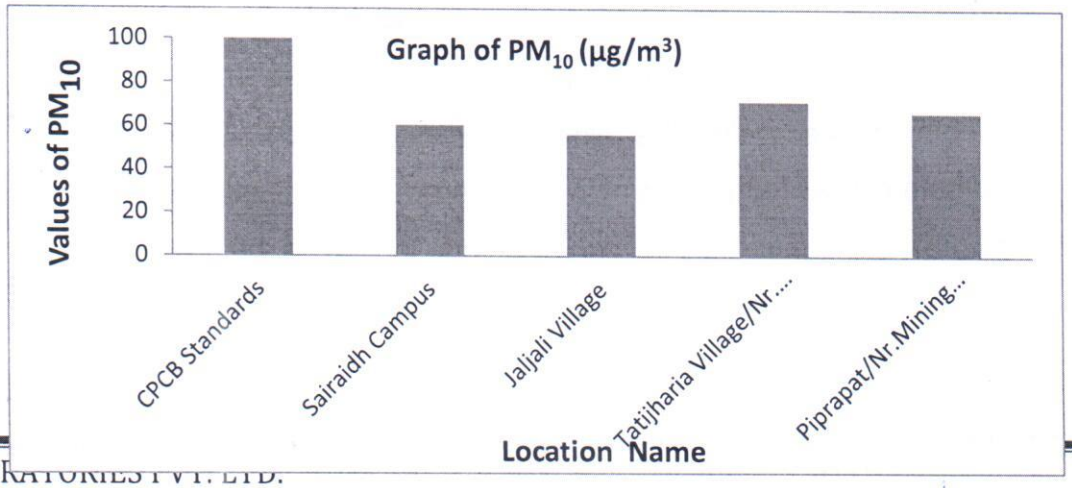
Mercury was not detected at any of the locations in PM_{10} samples as well as $PM_{2.5}$ Samples.

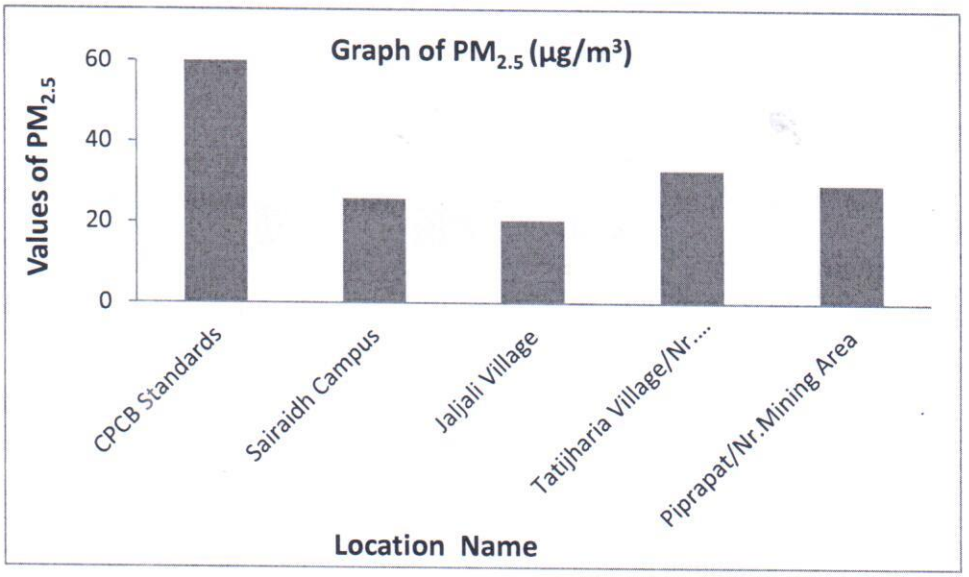
G. **Arsenic (As):**

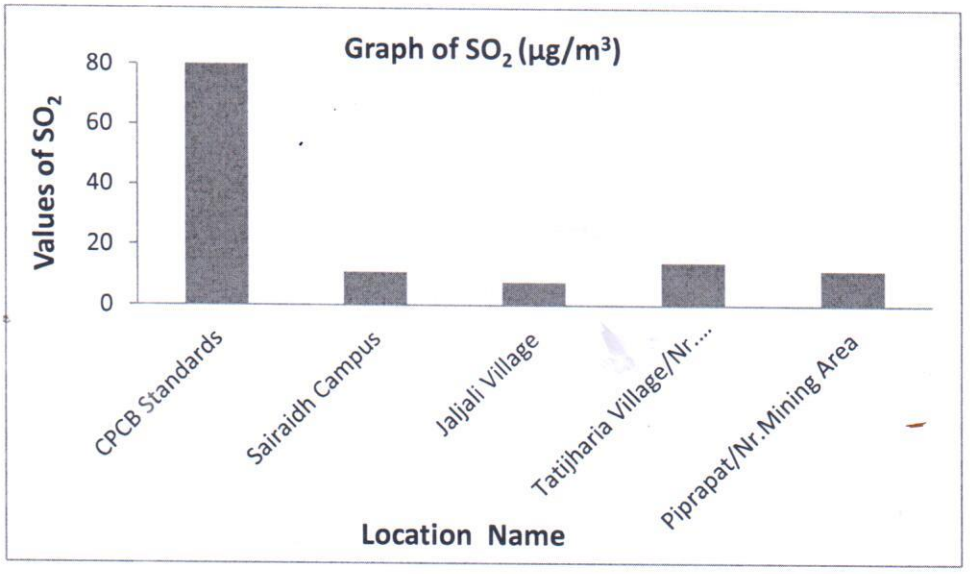
Arsenic was not detected at any of the locations in PM_{10} samples as well as $PM_{2.5}$ Samples.

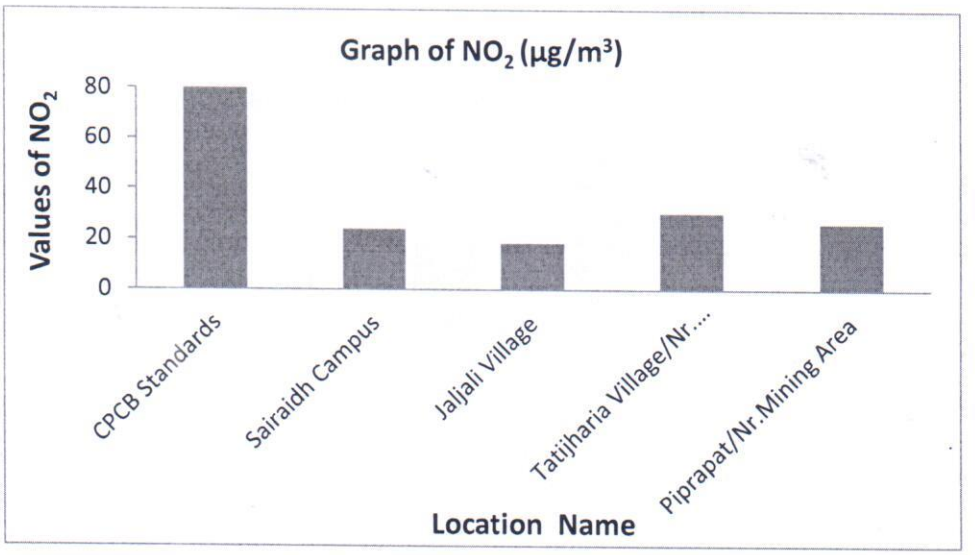
H. **Chromium (Cr):**

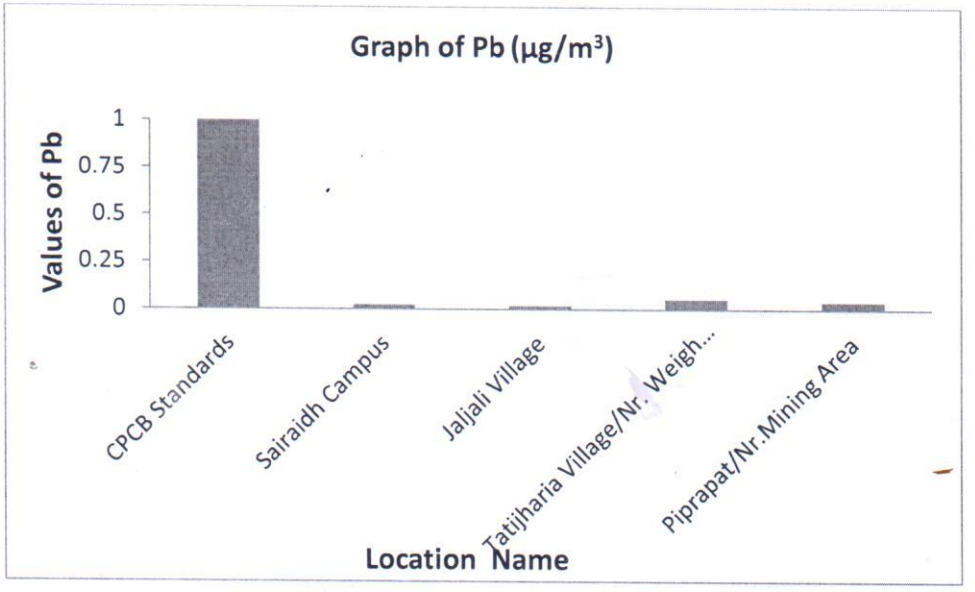
Chromium was not detected at any of the locations in PM_{10} samples as well as $PM_{2.5}$ Samples.

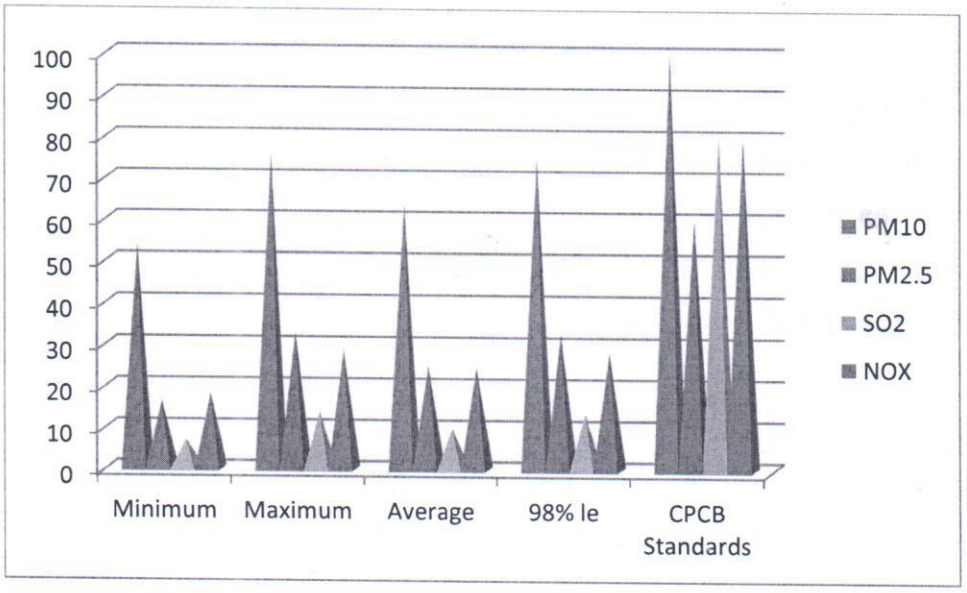



Graph of $PM_{2.5}$ (µg/m³)
Values of $PM_{2.5}$
60
40
20
0
CPCB Standards
Sairaidh Campus
Jaljali Village
Tatijharia Village/Nr....
Piprapat/Nr.Mining Area
Location Name


Graph of SO_2 (µg/m³)
Values of SO_2
80
60
40
20
0
CPCB Standards
Sairaidh Campus
Jaljali Village
Tatijharia Village/Nr....
Piprapat/Nr.Mining Area
Location Name


Graph of NO_2 (µg/m³)
Values of NO_2
80
60
40
20
0
CPCB Standards
Sairaidh Campus
Jaljali Village
Tatijharia Village/Nr....
Piprapat/Nr.Mining Area
Location Name


Graph of Pb (µg/m³)
Values of Pb
1
0.75
0.5
0.25
0
CPCB Standards
Sairaidh Campus
Jaljali Village
Tatijharia Village/Nr. Weigh...
Piprapat/Nr.Mining Area
Location Name



Samri Lease (Buffer Zone):-

1.9 Ambient Air Quality:

Ambient air quality has been generated as per NAAQS 2009 for the month of January-2019 to March-2019. PM10, PM2.5, SO_2 & NO_x, The values obtained were then compared vis-a-vis the standards prescribed by CPCB for Industrial/ Rural / Residential uses.

1.9.1 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.

I. Particulate Matter-PM_{10}:

The Minimum and maximum concentrations for Particulate Matter-PM10 were recorded as 54.8 µg/m^3 and 72.4 µg/m^3 at Jaljali Village and Tatijharia Village/Nr. Weigh Bridge respectively. The average concentrations 63.6 µg/m^3.

J. Particulate Matter-$PM_{2.5}$:

The Minimum and maximum concentrations for Particulate Matter $PM_{2.5}$ were recorded as 23.6µg/m^3 & 32.8µg/m^3 at Jaljali Village and Tatijharia Village/Nr. Weigh Bridge respectively. The average concentrations 27.3 µg/m^3.

K. **Sulphur Dioxide (SO_2):**

The minimum and maximum for SO_2 concentrations were recorded as 6.9µg/m^3 and 12.9µg/m^3 respectively. The minimum concentration was recorded at Jaljali village The maximum concentration was also recorded at Tatijharia Village/Nr. Weigh Bridge. The average concentrations 10.8 µg/m^3.

Nitrogen Oxide (NO_X):

The minimum and maximum for NO_X concentrations were recorded as 17.4µg/m^3 and 34.7µg/m^3. The maximum concentration was recorded at Tatijharia Village/Nr. Weigh Bridge and the minimum concentration was recorded at Jaljali Village. The average concentrations 25.1µg/m^3.

L. **Lead (Pb):**

Maximum Lead detected in PM_{10} samples was 0.058µg/m^3 Tatijharia Village/Nr. Weigh Bridge and the minimum lead in PM_{10} sample was 0.016/m^3 detected at Saraidih Campus location.

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

M. **Mercury (Hg):**

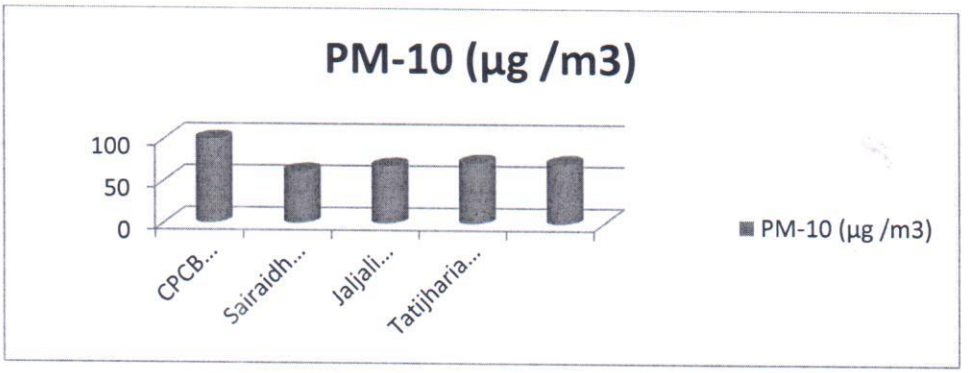
Mercury was not detected at any of the locations in PM_{10} samples as well as $PM_{2.5}$ Samples.

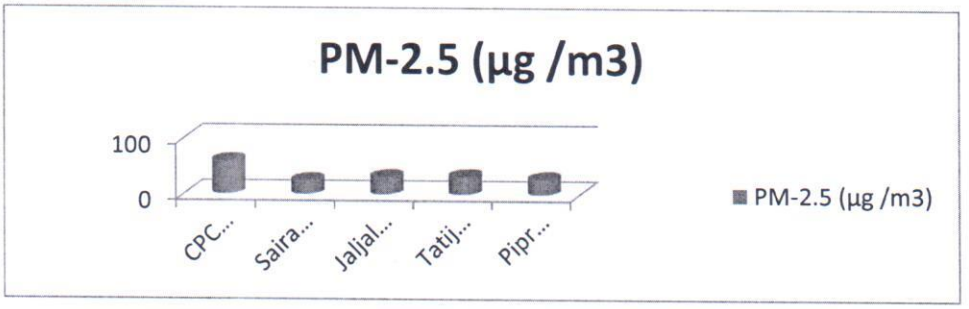
N. **Arsenic (As):**

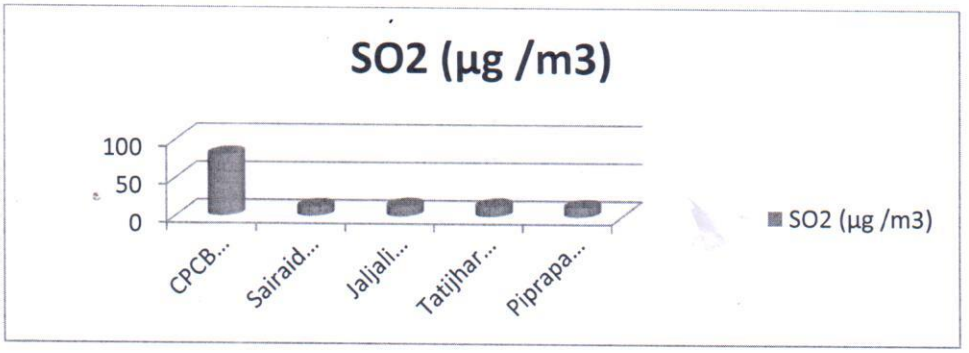
Arsenic was not detected at any of the locations in PM_{10} samples as well as $PM_{2.5}$ Samples.

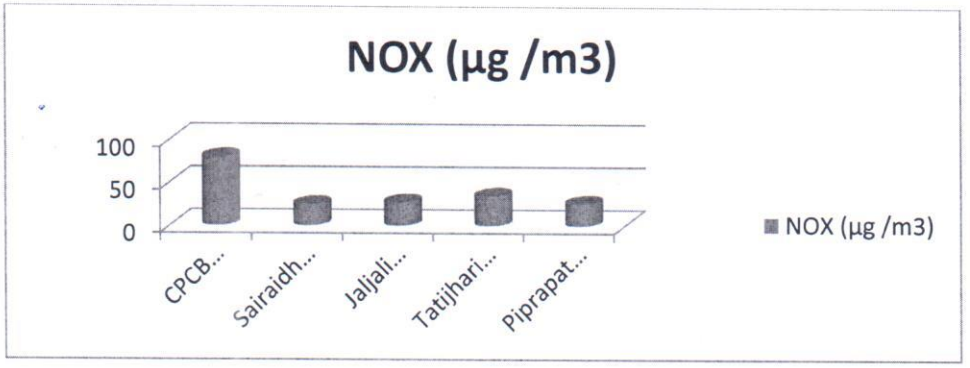
O. **Chromium (Cr):**

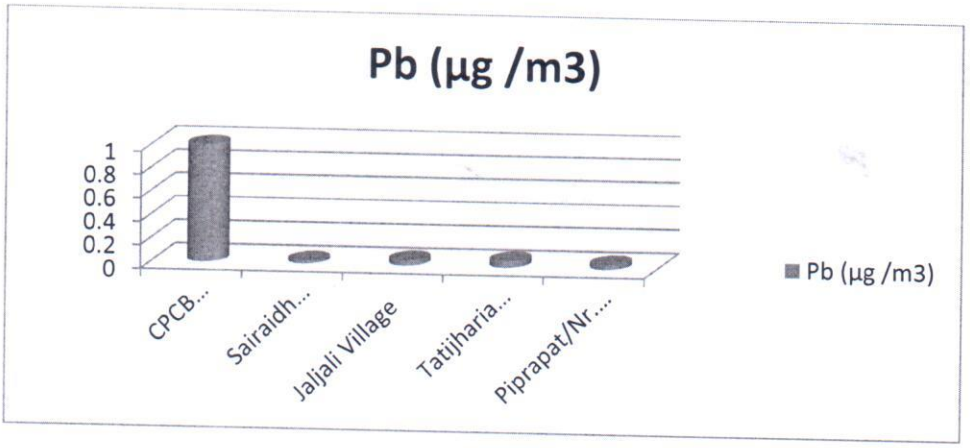
Chromium was not detected at any of the locations in PM_{10} samples as well as $PM_{2.5}$ Samples.

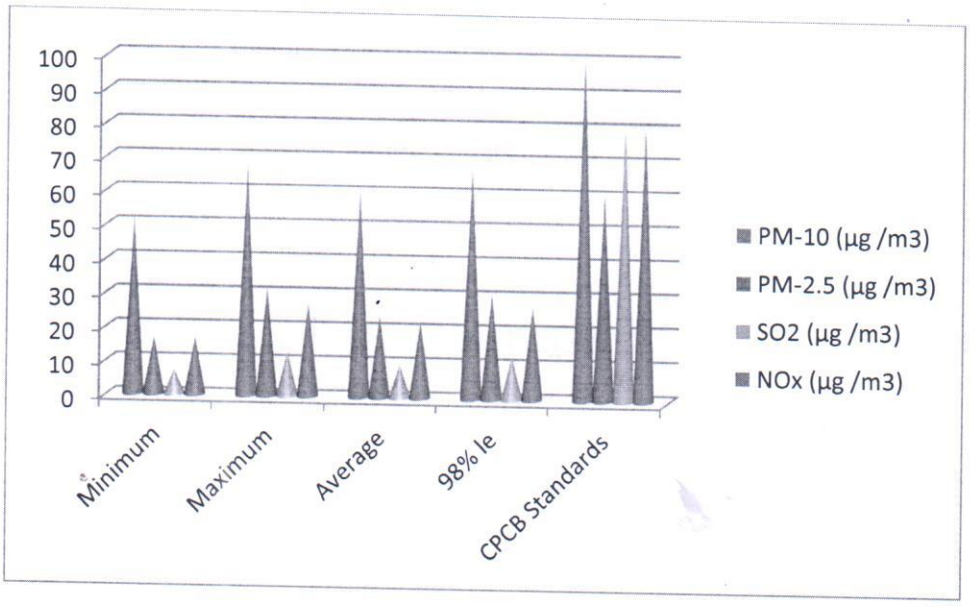

PM-10 (µg /m3)
100
50
0
CPCB...
Sairaidh...
Jaljali...
Tatijharia...
PM-10 (µg /m3)


PM-2.5 (µg /m3)
100
0
CPC...
Saira...
Jaljal...
Tatij...
Pipr...
PM-2.5 (µg /m3)


SO2 (µg /m3)
100
50
0
CPCB...
Sairaid...
Jaljali...
Tatijhar...
Piprapa...
SO2 (µg /m3)


NOX (µg /m3)
100
50
0
CPCB...
Sairaidh...
Jaljali...
Tatijhari...
Piprapat...
NOX (µg /m3)


Pb (µg /m3)
1
0.8
0.6
0.4
0.2
0
CPCB...
Sairaidh...
Jaljali Village
Tatijharia...
Piprapat/Nr....
Pb (µg /m3)


100
90
80
70
60
50
40
30
20
10
0
Minimum
Maximum
Average
98% le
CPCB Standards
PM-10 (µg /m3)
PM-2.5 (µg /m3)
SO2 (µg /m3)
NOx (µg /m3)

2.0 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 and excavation, 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 if machineries have been provided with noise control equipment. Noise monitoring is carried out on monthly basis at three locations in each month are shown in

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.SL-HTC-1352). This instrument is capable of measuring the Sound Pressure Level (SPL), L_{eq}.

Method of Monitoring

Sound Pressure Level (SPL) measurements were monitored at three 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 three 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.

Noise levels monitored during day and night at 3 locations are found to be below the stipulated standard of CPCB for Industrial area as 75dB (A) and 70dB (A) for day and night respectively.

Table 5

Noise Emission Monitoring Report

SR. NO.	LOCATION	Month	Noise-dB(A)	
			Day Time	Night Time
Core Zone				
1.	Samri-Gopatu/ Near Weigh bridge	January-2019	64.9	52.8
		February-2019	64.1	56.3
		March-2019	67.1	56.2
2.	Rajendrapur/Nr. Mining Area	January-2019	71.6	61.3
		February-2019	57.2	48.1
		March-2019	58.3	47.1
3.	Kutku Village/Nr. V.T.Center	January-2019	57.1	43.9
		February-2019	51.6	42.9
		March-2019	53.9	41.6
4.	Dumerkholi/Nr.Mining Area	January-2019	62.7	52.4
		February-2019	61.7	53.8
		March-2019	64.7	52.4
Buffer Zone				
1.	Sairaidh Campus	January-2019	57.2	46.1
		February-2019	57.1	42.9
		March-2019	52.8	41.6
2.	Jaljali Village	January-2019	56.1	41.3
		February-2019	64.9	51.6
		March-2019	59.1	42.7
3.	Tatijharia Village/Nr. Weigh Bridge	January-2019	67.1	54.3
		February-2019	62.9	52.7
		March-2019	73.8	61.4
4.	Piprapat/Nr. Mining Area	January-2019	58.3	42.9
		February-2019	56.3	41.6
		March-2019	67.2	54.1
CPCB Standards				
Industrial Area			**75**	**70**
Residential area			**55**	**45**

Conclusion :- The Noise Monitoring Results Samri Lease during this period (January-February-March-2019) it is within permissible limits as per CPCB Standards.

2.1 Water Quality

The existing status of water quality for ground water and surface water was assessed by collecting the water samples from underground wells from the village Samri, Kudag, Tatijhariya, Saraidih, Rajendrapur and surface water sample from Nallahs nearby Samri mines. The physico-chemical analysis of water samples collected during study period reported as average of three months given in **(Table 6)**. 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. Surface water quality is satisfactory as per IS: 10500-2012. Thus the impacts due to mining activities in each month have been found to be insignificant.

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

Location:	GW1) Samari Weigh Bridge Sample Source:- Borewell Water

TEST RESULTS

(Page 1 of 3)

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	6.87 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.3
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	0.09
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	298
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.26
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	43.8
12.	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23)	200	600	114.7
13.	Total hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21)	200	600	187.01
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	56.29
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	11.27
16.	Sulphate (as SO_4)	mg/l	IS 3025 (Part 24)	200	400	27.43
17.	Nitrate (as NO_3)	mg/l	APHA Method	45	No relaxation	12.58

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	1.1

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_2S)	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_6H_5OH)	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.	*Escherichia coli*	Per 100 ml	IS 15185 : 2016	Absent	Absent	Absent

TEST RESULTS

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)	Test Result
44.	**Pesticides residues**				
	Alpha-HCH	µg/l	USEPA 508	0.01	< 0.01
	Beta HCH	µg/l	USEPA 508	0.04	< 0.03
	Delta- HCH	µg/l	USEPA 508	0.04	< 0.03
	Alachlor	µg/l	USEPA 508	20	< 0.03
	Aldrin / Dieldrin	µg/l	USEPA 508	0.03	< 0.03
	Atrazine	µg/l	USEPA 1657	2	< 0.03
	Butachlor	µg/l	USEPA 508	125	< 0.03
	Chlorpyrifos	µg/l	USEPA 1657	30	< 0.03
	DDT and its Isomers	µg/l	USEPA 508	1	< 0.03
	Gamma - HCH (Lindane)	µg/l	USEPA 508	2	< 0.03
	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30	< 0.03
	Endosulphan	µg/l	USEPA 508	0. 4	< 0.03
	Ethion	µg/l	USEPA 1657	3	< 0.03
	Isoproturon	µg/l	USEPA 1657	9	< 0.03
	Malathion	µg/l	USEPA 1657	190	< 0.03
	Methyl Parathion	µg/l	USEPA 1657	0. 3	< 0.03
	Monocrotophos	µg/l	USEPA 1657	1	< 0.03
	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'.** ● Result for test no. 7 is not relevant.

For ANACON LABORATORIES PVT. LTD.

Verified by

Roshani Thakur
(Chemist)

Authorized Signatory

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

Free Silica :-

Sr. No.	Location	Measurement Unit	January-2019		February-2019		March-2019	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Samri-Gopatu/ Near Weigh bridge	g/100gm	0.26	0.08	0.27	0.16	0.31	0.18
2.	Rajendrapur/Nr. Mining Area	g/100gm	0.24	0.06	0.36	0.21	0.37	0.21
3.	Kutku Village/Nr. V.T.Center	g/100gm	0.18	0.03	0.16	0.08	0.19	0.09
4.	Dumerkholi/Nr.Mining Area	g/100gm	0.023	0.07	0.24	0.13	0.24	0.16

Table 7

Dust fall Rate

Sr. No.	Location	January-2019	February-2019	March-2019	Average
		Rate (MT/km^2/Month)			
1.	Samri-Gopatu/ Near Weigh bridge	18.24	23.58	27.19	**23.00**
2.	Rajendrapur/Nr. Mining Area	16.42	21.52	23.64	**20.53**
3.	Kutku Village/Nr. V.T.Center	12.58	17.24	16.93	**15.58**
4.	Dumerkholi/Nr.Mining Area	18.73	24.76	19.52	**21.00**

Table 8

Monthly Report on Chemical Examination of Surface Water (Nallahs Near by Rajendrapur/Near Mining Area) (Average of Three Months January-February-March-2019)

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	6.62 at 25°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.7
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	1
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.38
6.	Free residual chlorine	mg/l	IS 3025 (Part 26)	Min. 0.2	1	< 0.1
7.	Total dissolved solids	mg/l	IS 3025 (Part 16)	500	2000	473
8.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.52
9.	Cyanide (as CN)	mg/l	IS 3025 (Part 27)	0.05	No relaxation	< 0.005
10.	Chloride (as Cl)	mg/l	IS 3025 (Part 32)	250	1000	152.94
11.	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23)	200	600	131.68
12.	Total hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21)	200	600	187.95
13.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	48.19
14.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	16.43
15.	Sulphate (as SO_4)	mg/l	IS 3025 (Part 24)	200	400	121.58
16.	Nitrate (as NO_3)	mg/l	APHA Method	45	No relaxation	21.43
17.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
18.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	<0.05
19.	Mercury (as Hg)	mg/l	IS : 3025 (Part 48)	0.001	No relaxation	< 0.0005
20.	Cadmium (as Cd)	mg/l	IS : 3025 (Part 41)	0.003	No relaxation	< 0.001
21.	Selenium (as Se)	mg/l	IS : 3025 (Part 56)	0.01	No relaxation	< 0.001
22.	Arsenic (as As)	mg/l	IS : 3025 (Part 37)	0.01	No relaxation	< 0.01
23.	Aluminium (as Al)	mg/l	IS : 15302	0.03	0.2	< 0.005
24.	Lead (as Pb)	mg/l	IS : 3025 (Part 47)	0.01	No relaxation	< 0.001
25.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	1.3

'<' indicates detection limit of the laboratory.

Contd.....

Test Report No. : ALPL/30032019/709-1

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
26	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.01
27.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.03
28.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
29.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.1
30.	Sulphide (as H_2S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.03
31.	Chloramines (as Cl_2)	mg/l	IS 3025 (Part 26)	4.0	No relaxation	< 0.01
32.	Molybdenum (as Mo)	mg/l	IS 3025 (Part 2)	0.07	No relaxation	< 0.001
33.	Silver (as Ag)	mg/l	Annexure J of IS 13428	0.1	No relaxation	< 0.001
34.	Polychlorinated Biphenyls (PCB)	µg/l	USEPA 508	0.5	No relaxation	< 0.03
35.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	2.4	0.17
36.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
37.	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_6H_5OH)	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.	*Escherichia coli*	Per100 ml	IS 1622	Absent	Absent	Present

Contd.....

(Contd.....)

Test Report No. : ALPL/30032019/709-1

Sr. No.	Test Parameter	Measurement Unit	Test Method	Requirement as per IS 10500 : 2012 (Drinking Water Specifications) Including Amendment No. 2	Test Result
44.	**Pesticides residues**				
	Alpha-HCH	µg/l	USEPA 508	0.01	Absent
	Beta HCH	µg/l	USEPA 508	0.04	Absent
	Delta- HCH	µg/l	USEPA 508	0.04	Absent
	Alachlor	µg/l	USEPA 508	20	Absent
	Aldrin / Dieldrin	µg/l	USEPA 508	0.03	Absent
	Atrazine	µg/l	USEPA 1657	2	Absent
	Butachlor	µg/l	USEPA 508	125	Absent
	Chlorpyrifos	µg/l	USEPA 1657	30	Absent
	DDT and its Isomers	µg/l	USEPA 508	1	Absent
	Gamma - HCH (Lindane)	µg/l	USEPA 508	2	Absent
	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30	Absent
	Endosulphan	µg/l	USEPA 508	0. 4	Absent
	Ethion	µg/l	USEPA 1657	3	Absent
	Isoproturon	µg/l	USEPA 1657	9	Absent
	Malathion	µg/l	USEPA 1657	190	Absent
	Methyl Parathion	µg/l	USEPA 1657	0. 3	Absent
	Monocrotophos	µg/l	USEPA 1657	1	Absent
	Phorate	µg/l	USEPA 1657	2	Absent

Note: 1. Results relate to tested sample only.2. Test report should not be reproduced partially. 3. *Permissible limit in the absence of alternate source. 4. 'mg/l' is equivalent to 'ppm' 5. 'µg/l' is equivalent to 'ppb' 6. '<' indicates detection limit of the laboratory. 7. MPN-Most probable number.8. Results for test no. 7 are not applicable.

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

Table 9

Soil Analysis Report

Date of collection: March-2019

Sr. No	Test Parameters	Measurement Unit	Results
			Rajendrapur/Nr.Mining Area
1	pH	-	6.71 at 25^{0}C
2	Electrical Conductivity at 25^{0}C	µS/cm	213.9
3	Texture	-	Silty clay
4	Sand	%	46.17
5	Silt	%	21.43
6	Clay	%	32.4
7	Bulk Density	g/cc	1.32
8	Porosity	%	11.76
9	Water Holding Capacity	%	26.43
10	Exchangeable Calcium as Ca	mg/kg	529.17
11	Exchangeable Magnesium as Mg	mg/kg	117.24
12	Exchangeable Sodium as Na	mg/kg	112.93
13	Available Potassium as K	kg/ha.	364
14	Available Phosphorous as P	kg/ha.	11.47
15	Available Nitrogen as N	kg/ha.	149.29
16	Organic Matter	%	1.18
17	Organic Carbon	%	0.52
18	Water Soluble Chloride as Cl^+	mg/kg	516.24
19	Water Soluble Sulphate as SO_4	mg/kg	352
20	Sodium Absorption Ratio	-	6.94
21	CEC	meq/100 gm	12.58
22	Total Iron	%	5.4
23	Available Manganese	mg/kg	118.38
24	Available Zinc	mg/kg	64.19
25	Available Boron	mg/kg	ND

Method of sampling and analysis: IS: 2720 and methods of soil analysis, part I, 2nd Ed, 1986 of (American society for Agronomy and soil science society of America)

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'.

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

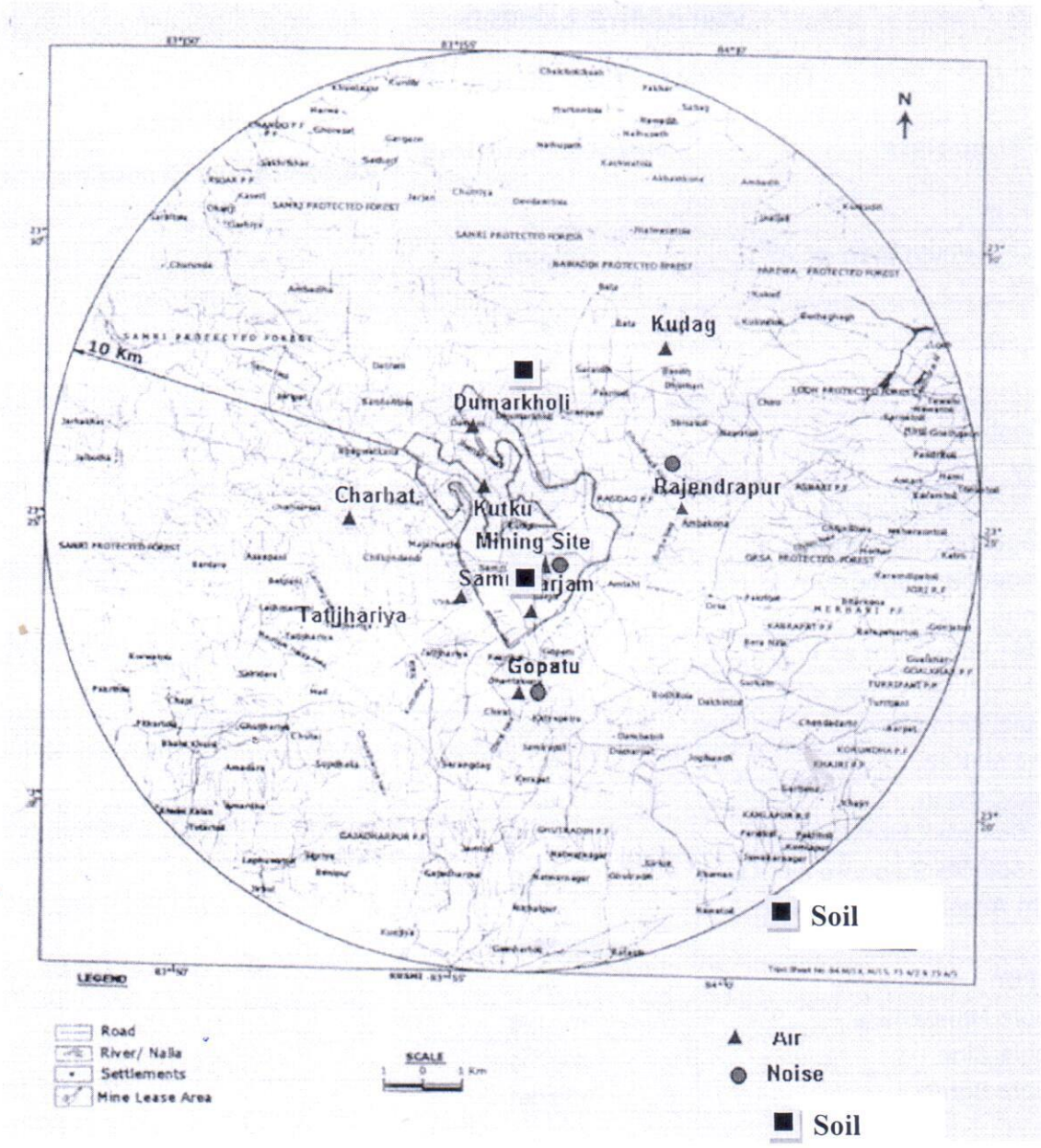


Fig 3: Sampling Locations for Air, Noise

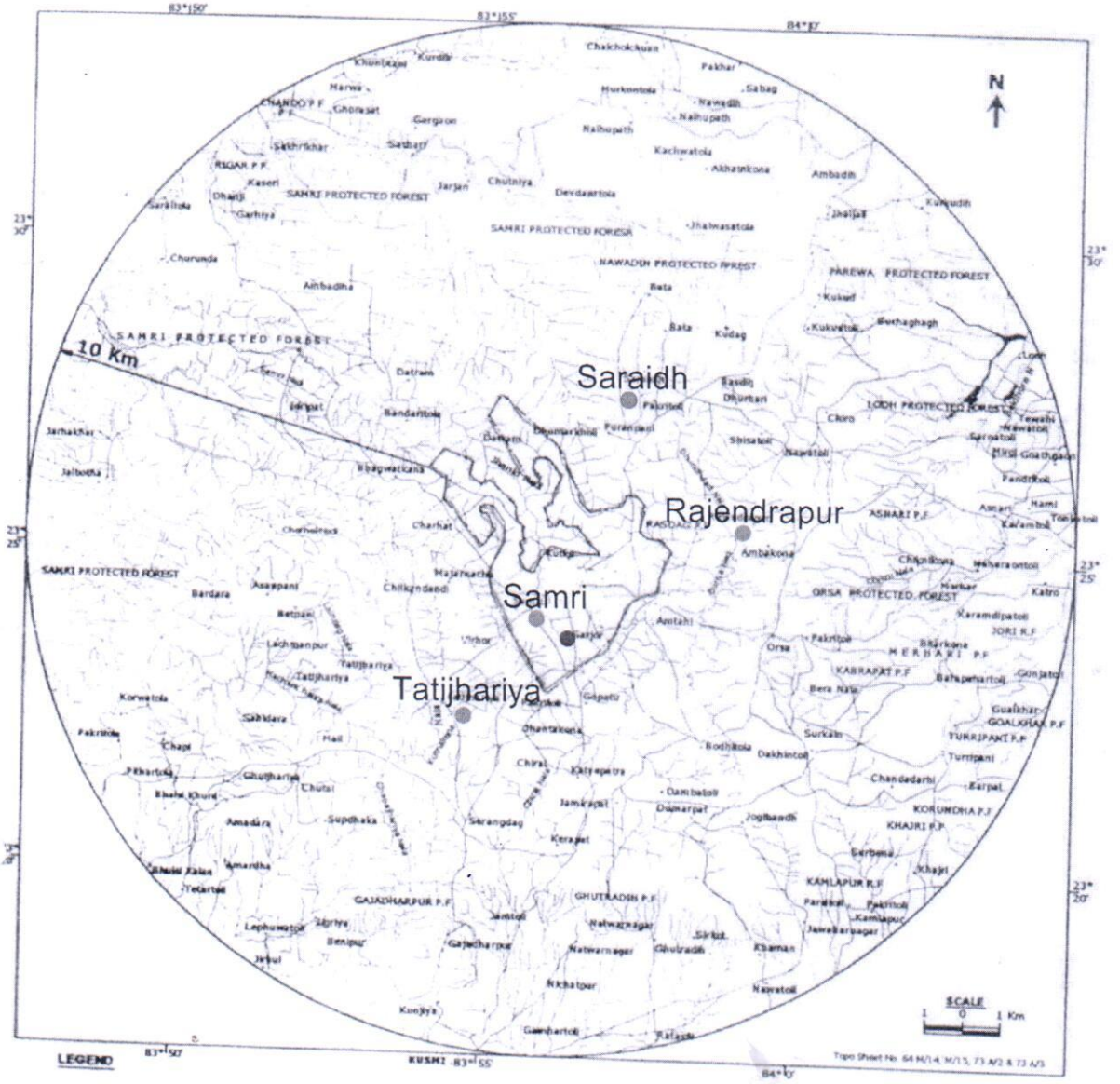


Fig 04: Sampling Locations for Water