

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

Duration: January-February-March-2021

Name of Industry:-



M/s. Hindalco Industries Limited.,

Name of Laboratory:-



QCI-NABET, MoEF & CC (GOI)
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
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Lab. & Consultancy: FP-34, 35, Food Park,
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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-2021 to March-21** 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.

Stamp

Authorized Signatory



Place : Nagpur
Date : April, 2021

	<p style="text-align: center;">Hindalco Industries Limited Samri Mining Environmental Status Report for January -2021 to March -2021</p>	<p style="text-align: center;">Introduction</p>
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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-2021*) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment, Forest and Climate Change (MoEF & CC) 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 Samri Bauxite Mine is 5.0 Lakh Tone/Year.

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

Sl.No.	Particulars	Details
1.	Survey of India Topo sheet No.	64 M /15
2.	Latitude	23° 23' 02"N to 23° 27'05"N
3.	Longitude	83° 53' 50"E to 83° 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 (2146.746 hec.)

Sl. No.	Core zone	Sl. No.	Buffer zone
1	Samri-Gopatu/Near Weigh Bridge	5	Sairaidh Campus
2	Rajendrapur/Near Mining Area	6	Virhorepat 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 PM₁₀, PM_{2.5}, SO₂, 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-2021.

1.5.2 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-2021 to March-2021 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) (November- 18, 2009), and as per consent conditions mentioned in consent letter.

1.5.3 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), 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 PM_{2.5} are collected into the membrane filter paper. The dust fall rate was measured using dust



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fall jar. The jar was exposed for one month in the mining area and (BKB campus) Tatijharia village during January-2021 to March-2021. 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 **(Table3)**.

Table 3

MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

Parameters	Sampling frequency
Suspended Particulate Matter	24 hourly sample twice a week for Three months
Respirable Particulate Matter	24 hourly sample twice a week for Three months
Particulate Matter 2.5	24 hourly sample twice a week for Three months
Sulphur dioxide (So ₂)	24 hourly sample twice a week for Three months
Oxides of Nitrogen (NO _x)	24 hourly sample twice a week for Three months
Pb, Hg, As, Cr	8 hourly samples for 24 hour twice a week for three months

Table 4.0

Measurement Techniques for various pollutants

Sr. No.	Parameter	Technique	Technical Protocol	Minimum Reportable Value($\mu\text{g}/\text{m}^3$)
1.	Suspended Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part - 23)	5
2.	Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part-23)	5
3.	Particulate Matter 2.5	Respirable Dust Sampler (Gravimetric Method)	USEPA-40 (Part-50)	5
4.	Sulphur Dioxide	Modified West and Gaeke	IS-5182 (Part - II)	4
5.	Oxide of Nitrogen	Jacob &Hochheiser Method	IS-5182 (Part - VI)	4
6.	Pb, As, Hg, Cr	Acid Digestion Method	EPA Method	0.1
7.	Dust Full	Gravimetric	IS-5182 (Part-I)	—



1.6 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (January-February-March-2021) indicates that the wind was blowing predominately from ((W and WSW) directions, during study period.

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	0.008929	0.005952	0.000000	0.000000	0.000000	0.000000	0.014881
2	11.25 - 33.75	0.010417	0.013393	0.000000	0.000000	0.000000	0.000000	0.023810
3	33.75 - 56.25	0.008929	0.000000	0.000000	0.000000	0.000000	0.000000	0.008929
4	56.25 - 78.75	0.007440	0.000000	0.000000	0.000000	0.000000	0.000000	0.007440
5	78.75 - 101.25	0.014881	0.000000	0.000000	0.000000	0.000000	0.000000	0.014881
6	101.25 - 123.75	0.023810	0.010417	0.000000	0.000000	0.000000	0.000000	0.033226
7	123.75 - 146.25	0.016369	0.016369	0.011905	0.000000	0.000000	0.000000	0.044643
8	146.25 - 168.75	0.008929	0.017857	0.001488	0.000000	0.000000	0.000000	0.028274
9	168.75 - 191.25	0.025298	0.037202	0.000000	0.000000	0.000000	0.000000	0.062500
10	191.25 - 213.75	0.023810	0.025298	0.007440	0.000000	0.000000	0.000000	0.056548
11	213.75 - 236.25	0.040179	0.053571	0.014881	0.000000	0.000000	0.000000	0.108361
12	236.25 - 258.75	0.056548	0.090774	0.025298	0.000000	0.000000	0.000000	0.172619
13	258.75 - 281.25	0.059524	0.105655	0.022321	0.000000	0.000000	0.000000	0.187500
14	281.25 - 303.75	0.037202	0.101190	0.002976	0.000000	0.000000	0.000000	0.141369
15	303.75 - 326.25	0.028274	0.035714	0.000000	0.000000	0.000000	0.000000	0.063988
16	326.25 - 348.75	0.008929	0.004464	0.000000	0.000000	0.000000	0.000000	0.013393
	Sub-Total	0.379464	0.517857	0.086310	0.000000	0.000000	0.000000	0.983631
	Calms							0.016369
	Missing/Incomplete							0.000000
	Total							1.000000

Summary of Wind Pattern

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
January-February-March-2021	W (18.8%)	WSW (17.3%)	1.64%

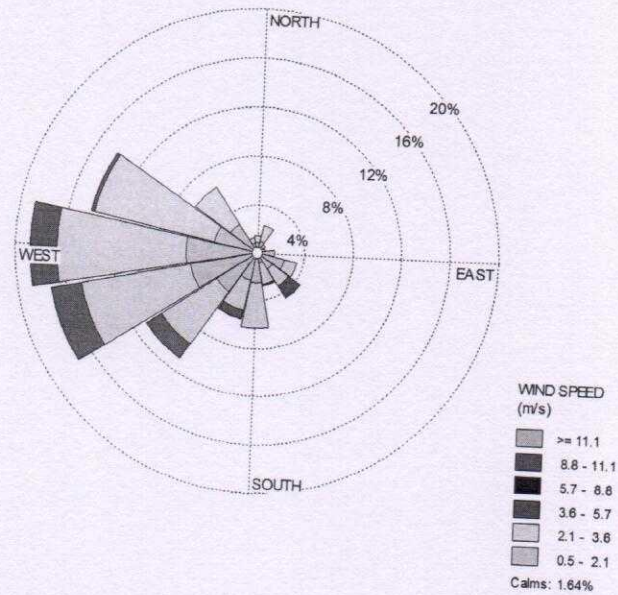


Figure.01: Wind Rose Diagram (January-February-March-2021)

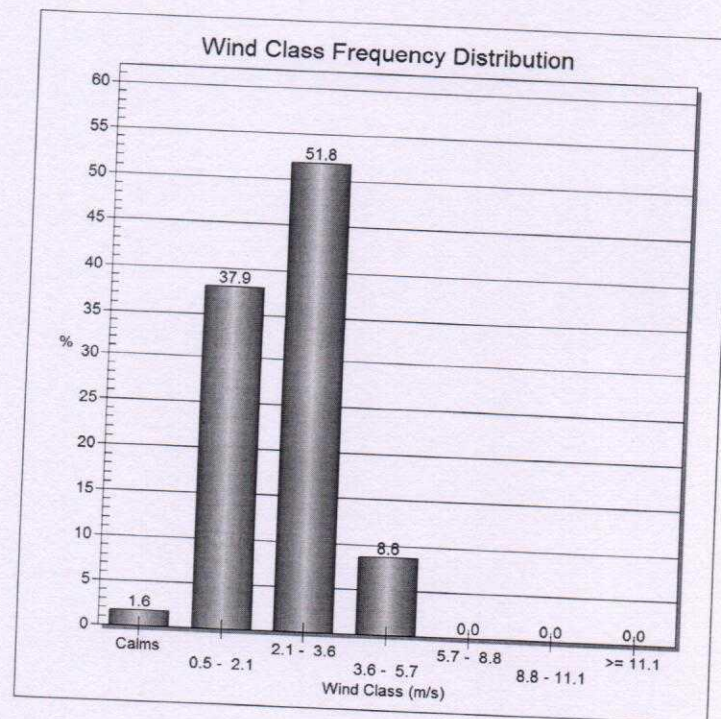


Figure.02: Wind Class Frequency Distribution (January-February-March-2021).



MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

1.6 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), 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 fibre 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-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-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

Sl. 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 Fall	Gravimetric	IS-5182 (Part-I)	—



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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									
Samri-Gopatu/ Nr.weigh bridge	Jan-2021	53.9	16.2	8.1	18.6	0.014	ND	ND	ND
	Feb-2021	56.3	23.8	9.2	18.6	0.018	ND	ND	ND
	March-2021	56.3	23.6	11.4	27.1	0.017	ND	ND	ND
Rajendrapur/ Nr.Mining Area	Jan-2021	57.1	21.6	9.3	21.7	0.018	ND	ND	ND
	Feb-2021	47.6	18.2	7.6	16.4	0.016	ND	ND	ND
	March-2021	63.9	21.8	12.6	24.9	0.019	ND	ND	ND
Kutku Village/ Nr.V.T. Center	Jan-2021	48.3	17.1	6.8	17.3	ND	ND	ND	ND
	Feb-2021	43.8	14.7	6.4	16.2	ND	ND	ND	ND
	March-2021	57.1	18.7	9.3	18.2	0.014	ND	ND	ND
Dumerkholi/Nr. Mining Area	Jan-2021	51.7	16.8	6.4	16.9	0.012	ND	ND	ND
	Feb-2021	51.9	17.3	8.2	17.6	0.008	ND	ND	ND
	March-2021	58.3	24.1	11.1	23.6	0.016	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		43.8	14.7	6.4	16.2	0.000	---	---	---
Maximum		63.9	24.1	12.6	27.1	0.019	---	---	---
Average		53.9	19.5	8.9	19.8	0.013	---	---	---
98% le		62.7	24.0	12.3	26.6	0.019	---	---	---

- The Average Concentration of PM₁₀ within the Core Zone of Samri Lease is 53.9 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Core Zone of Samri Lease is 19.5 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Core Zone of Samri Lease is 8.9 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Core Zone of Samri Lease is 19.8 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Core Zone of Samri Lease is 0.013 $\mu\text{g}/\text{m}^3$.

Conclusion:-The Average Concentration within the Core Zone of Samri Lease during this period (January-February-March-2021). It is within permissible limits as per CPCB Standards.



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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									
Sairaidh Campus	Jan-2021	53.8	16.4	7.3	18.1	ND	ND	ND	ND
	Feb-2021	48.3	17.2	9.4	18.6	ND	ND	ND	ND
	March-2021	54.9	21.6	9.7	17.4	ND	ND	ND	ND
Tatijharia Village/Nr. Weigh Bridge	Jan-2021	57.2	23.6	9.4	21.6	0.021	ND	ND	ND
	Feb-2021	46.2	16.1	7.6	17.9	0.018	ND	ND	ND
	March-2021	48.2	21.6	9.4	23.7	0.017	ND	ND	ND
Piprapat/ Nr. Mining Area	Jan-2021	54.9	16.4	7.3	16.2	0.017	ND	ND	ND
	Feb-2021	56.3	21.7	9.4	18.6	0.021	ND	ND	ND
	March-2021	56.7	24.9	11.8	27.1	0.014	ND	ND	ND
Virhorepat Village	Jan-2021	47.3	14.9	6.2	16.1	0.014	ND	ND	ND
	Feb-2021	48.6	14.6	6.2	16.9	0.016	ND	ND	ND
	March-2021	54.9	18.3	7.3	16.7	0.016	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		46.2	14.6	6.2	16.1	0.000	---	---	---
Maximum		57.2	24.9	11.8	27.1	0.021	---	---	---
Average		52.3	18.9	8.4	19.1	0.013	---	---	---
98% le		57.1	24.6	11.3	26.4	0.021	---	---	---

- The Average Concentration of PM₁₀ within the Buffer Zone of Samri Lease is 52.3 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Buffer Zone of Samri Lease is 18.9 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Buffer Zone of Samri Lease is 8.4 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Buffer Zone of Samri Lease is 19.1 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Buffer Zone of Samri Lease is 0.013 $\mu\text{g}/\text{m}^3$.

Conclusion: - The Average Concentration within the Buffer Zone of Samri Lease during this period (January-February-March-2021). It is within permissible limits as per CPCB Standards.



Month-wise Summary of Statistical Analysis

1.8. 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-February-March-2021. 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.

Presentation of Results:

The summary of Ambient Air Quality monitoring results from January-2021 to March-2021 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 43.8 µg/m³ and 63.9µg/m³ at Kutku Village/ Nr.V.T. Center and Rajendrapur/Nr. Mining Area location respectively. The average concentration of PM₁₀ was 53.9 µg/m³.

B. ParticulateMatter-PM_{2.5}:

The Minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 14.7 µg/m³ & 24.1µg/m³ at Kutku Village/ Nr.V.T. Center and Dumerkholi/Nr. Mining Area location. The average concentration of PM_{2.5} was 19.5µg/m³.

C. Sulphur Dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 6.4µg/m³ and 12.6µg/m³ respectively. The minimum concentration was recorded at Kutku village & Dumerkholi/Nr. Mining Area and maximum concentration was also recorded at Rajendrapur/Nr. Mining Area location. The average concentration of SO₂ was 8.9µg/m³.

D. Nitrogen Oxide (NO_x):

The minimum and maximum for NO_x concentrations were recorded as 16.2µg/m³ and 27.1µg/m³. The minimum concentration was recorded at Kutku village and maximum concentration was also recorded at Samri-Gopatu/Nr. weigh bridge location. The average concentration of NO_x was 19.8µg/m³.



E. Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.019µg/m³ at Rajendrapur/Nr. Mining Area and the minimum lead in PM₁₀ sample was 0.0 µg/m³ 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 PM₁₀ samples as well as PM_{2.5} Samples.

G. Arsenic (As):

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

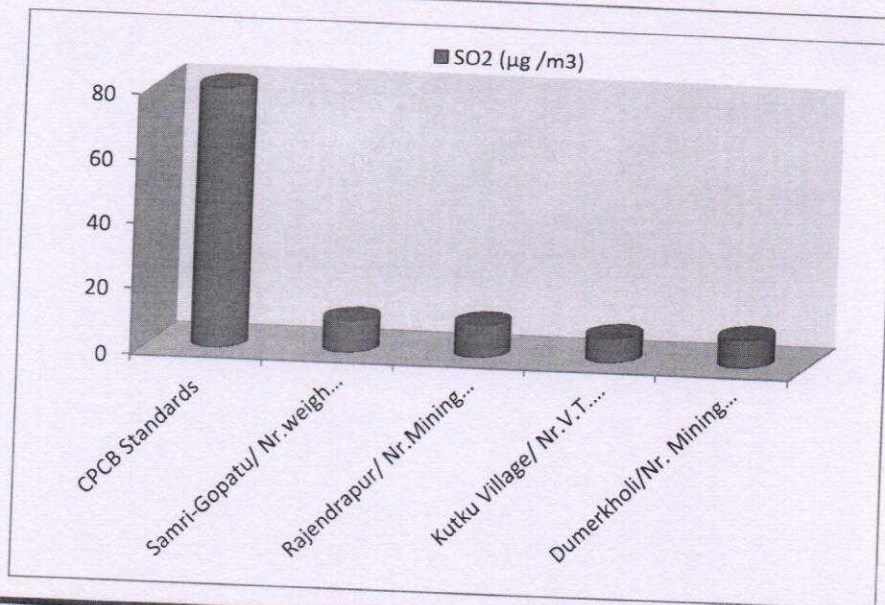
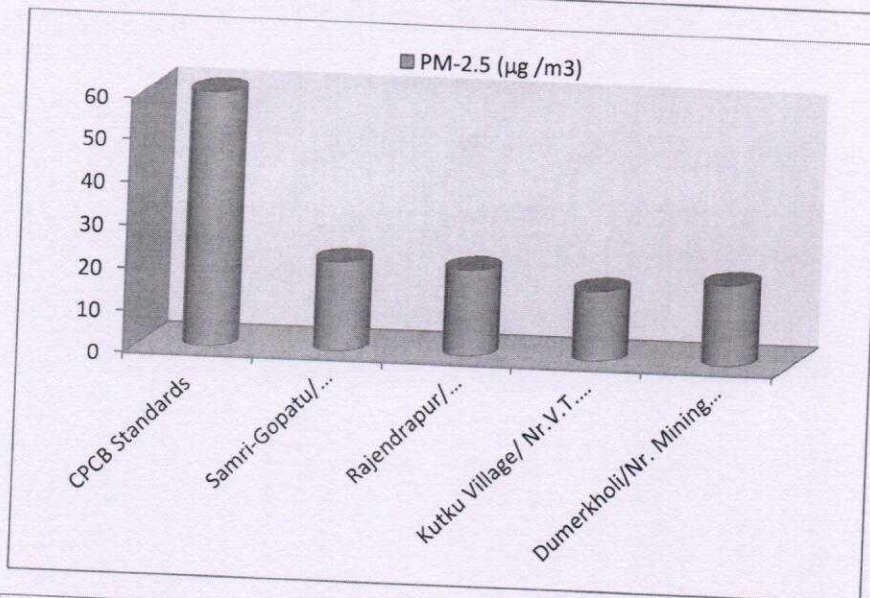
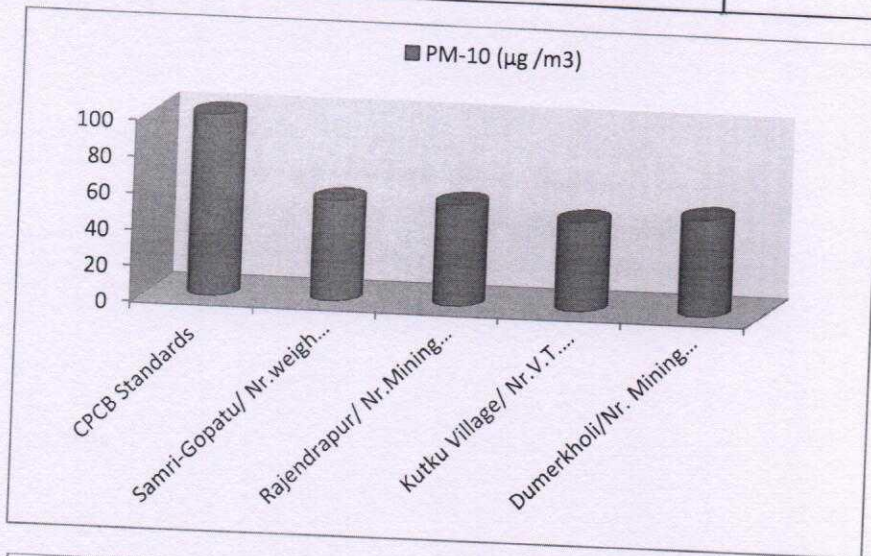
H. Chromium(Cr):

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



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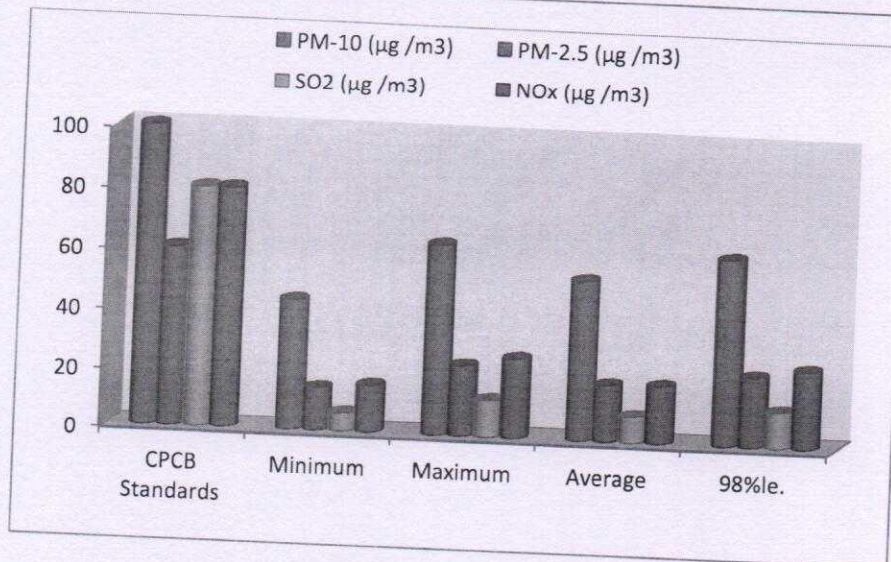
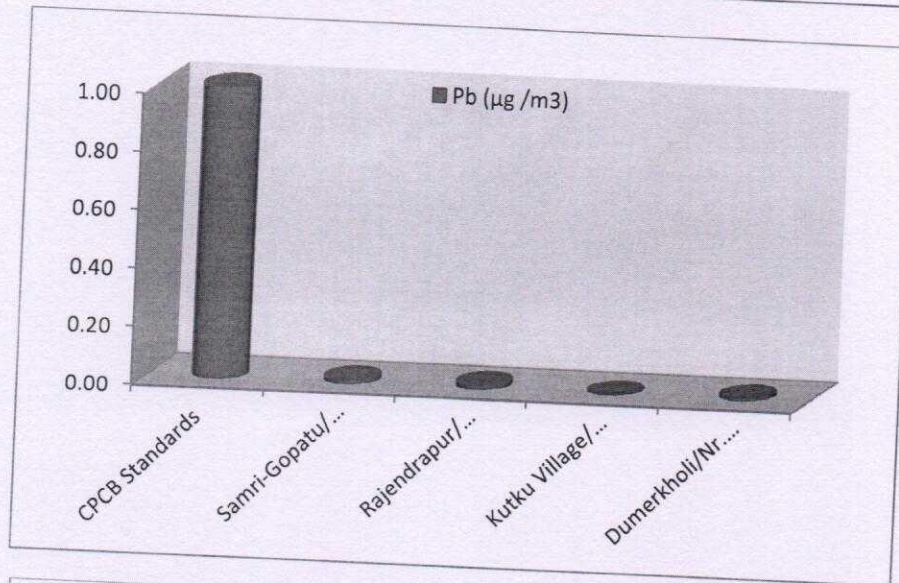
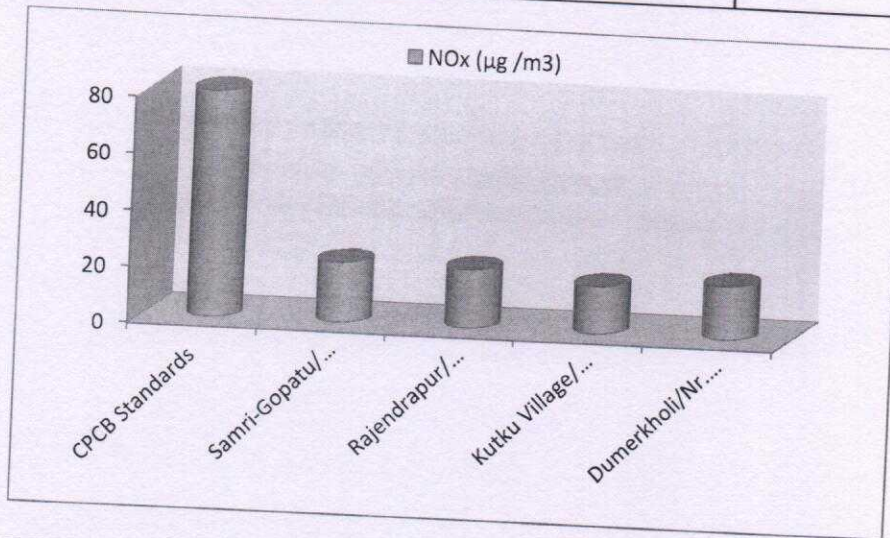
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1.9. Samri Lease (Buffer Zone):-

1.9.1 Ambient Air Quality:

Ambient air quality has been generated as per NAAQS 2009 for the month of January-February-March-2021. 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.

1.9.2 Presentation of Results:

The summary of Ambient Air Quality monitoring results from January- 2021 to March-2021 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, both concentrations for Particulate Matter-PM₁₀ were recorded as 46.2µg/m³ and 57.2µg/m³ at Tatijharia village. The average concentration of PM₁₀ was 52.3µg/m³.

B. Particulate Matter-PM_{2.5}:

The minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 14.6µg/m³ & 24.9µg/m³ at Virhorepat village and Piprapat/Nr. mining area location respectively. The average concentration of PM_{2.5} was 18.9µg/m³.

C. Sulphur Dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 6.2µg/m³ and 11.8µg/m³ respectively. The minimum concentration was recorded at Virhorepat village area and maximum concentration was also recorded at Piprapat/Nr. mining area location. The average concentration of SO₂ was 8.4µg/m³.

D. Nitrogen Oxide (NO_x):

The minimum and maximum for NO_x concentrations were recorded as 16.1µg/m³ and 27.1µg/m³. The minimum concentration was recorded at Virhorepat village area and maximum concentration was also recorded at Piprapat/Nr. mining area location. The average concentration of NO_x was 19.1µg/m³.



E. Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.021 µg/m³ at Tatijharia village & Piprapat/Nr. mining area and No lead detected in PM₁₀ sample at Sairaidh campus. 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 PM₁₀ samples as well as PM_{2.5} Samples.

G. Arsenic (As):

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

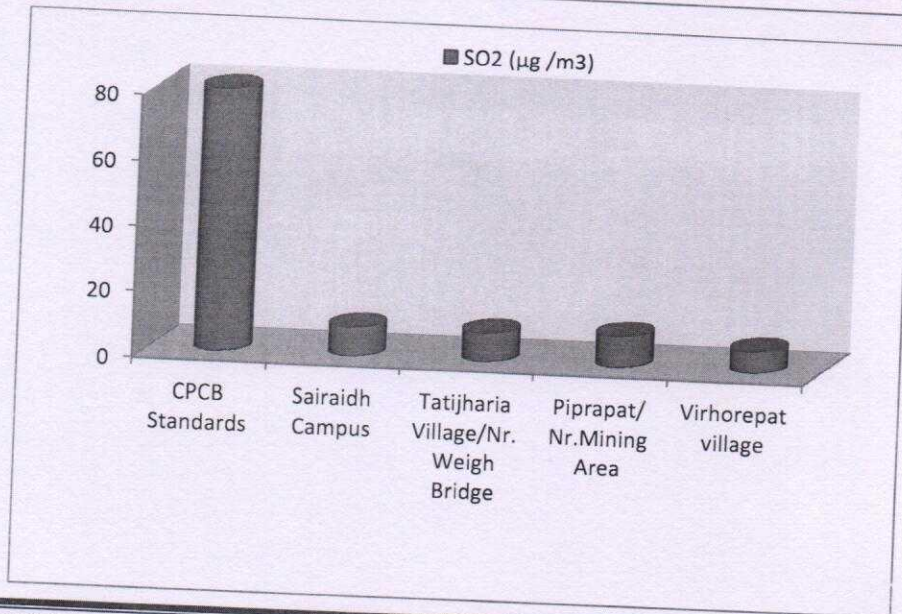
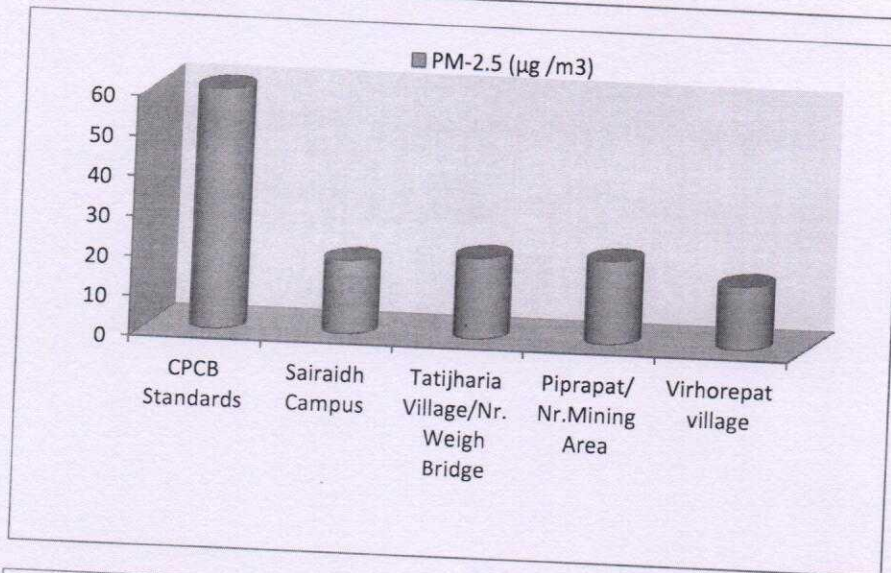
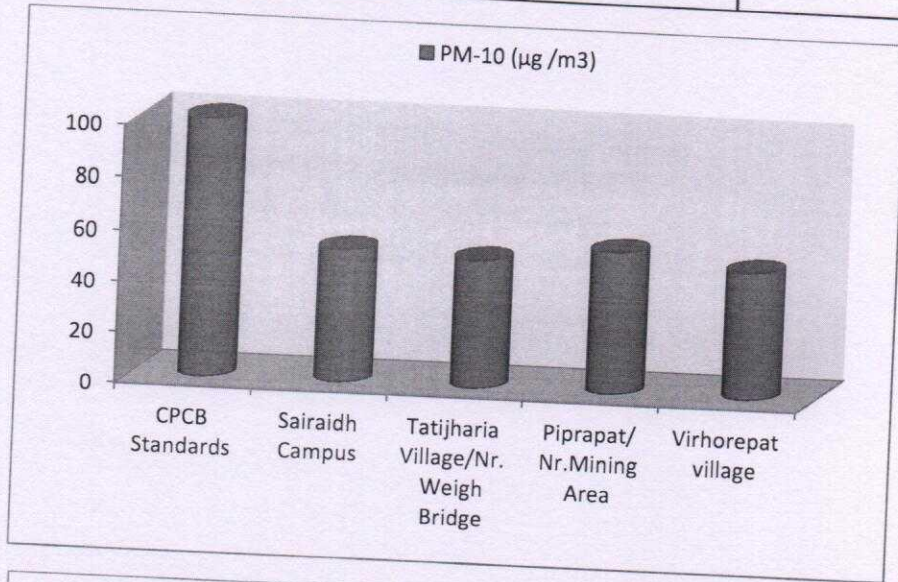
H. Chromium(Cr):

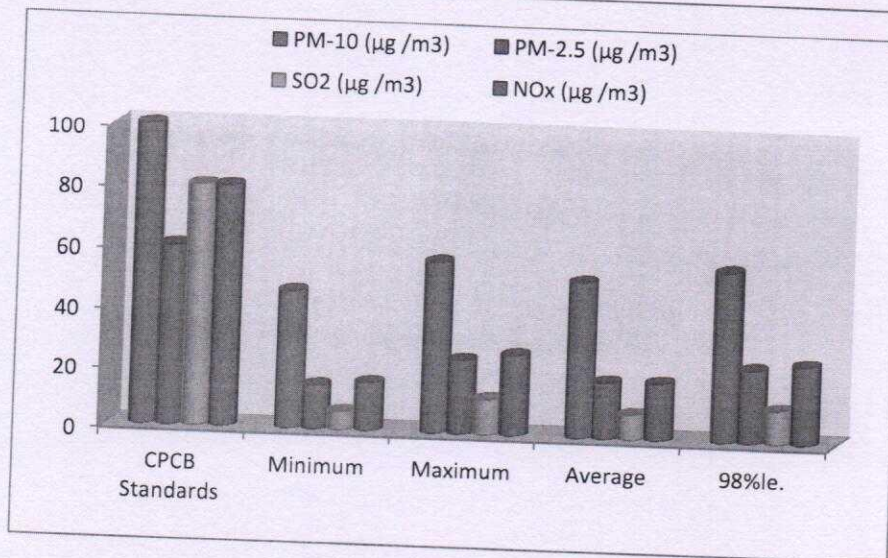
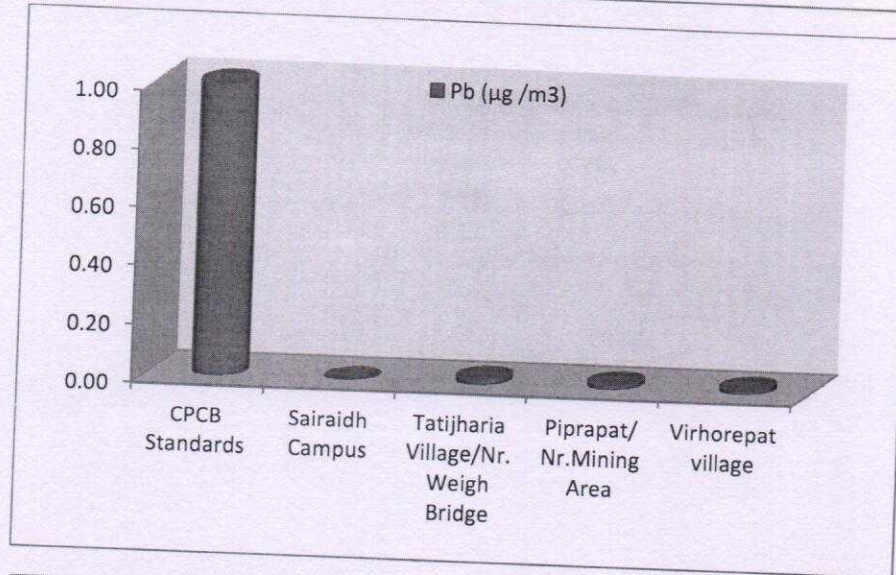
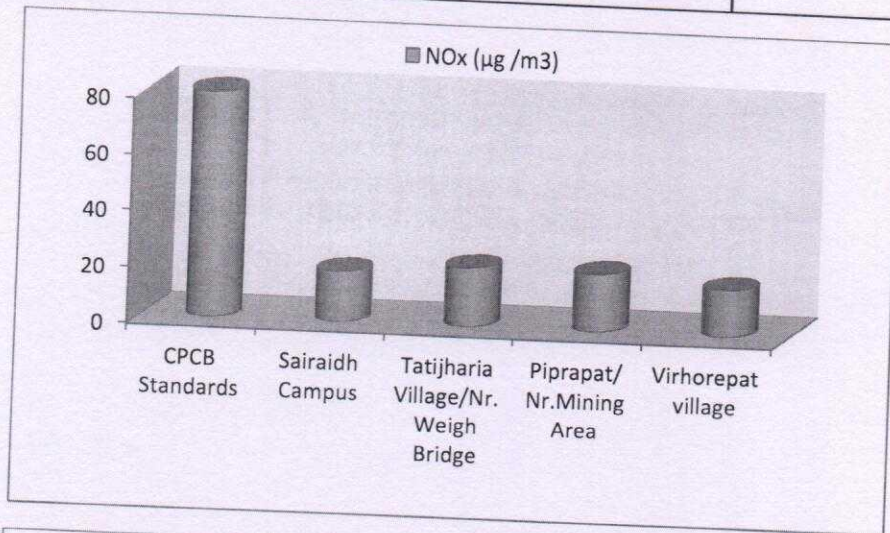
Chromium was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.



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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 **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 24hours.

Instrument used for monitoring

Noise levels were measured using integrated sound level meter 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.


 ADITYA BIRLA HINDALCO	Hindalco Industries Limited Samri Mining Environmental Status Report for January -2021 to March -2021	Details of Salient Features
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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-2021	53.9	43.7
		February-2021	48.3	37.1
		March-2021	54.7	43.6
2.	Rajendrapur/ Nr. Mining Area	January-2021	47.1	37.2
		February-2021	51.6	41.9
		March-2021	46.1	38.3
Buffer Zone				
1.	Tatijharia Village/Nr. Weigh Bridge	January-2021	53.8	41.6
		February-2021	62.9	53.1
		March-2021	46.9	38.2
2.	Piprapat/Nr. Mining Area	January-2021	61.9	56.2
		February-2021	57.1	43.6
		March-2021	53.7	41.6
CPCB Standards				
Industrial Area			75	70
Residential area			55	45

Conclusion: -The Noise Monitoring Results at Samri Lease during this period (January-February-March-2021), it is within permissible limits as per CPCB Standards.

Table 5.1

HEMM Spot Noise Level Monitoring

Sl. No.	Location	Unit: dB(A) Leq					
		January-2021		February-2021		March-2021	
		Min.	Max.	Min.	Max.	Min.	Max.
1.	Samri-Gopatu/ Near Weigh bridge	57.2	68.3	54.9	61.3	53.8	64.9
2.	Near Mining Area	61.4	67.1	57.6	63.8	56.1	69.2



2.0 Water Quality:

The existing status of water quality for groundwater 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 being significant.



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Table 6 Report on Chemical Examination of Ground Water (June-2020)

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

S.N.	Test Parameter	Measurement Unit	Test Method	Requirement as per IS 10500 : 2012 (Drinking Water Specifications) Including Amendment No. 2		Test Result
				Acceptable Limit	Permissible Limit #	
I Biological Testing 1. Water						
1	Total coliform	Per 100 ml	IS 15185 : 2016			
2	<i>Escherichia coli</i>	Per 100 ml	IS 15185 : 2016	Absent	Absent	Absent
II Chemical Testing 1. Water						
3	Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23) : 1986	200	600	101.34
4	Ammonia (as N)	mg/l	IS 3025 (Part 34) : 1988	0.5	No relaxation	BDL (DL - 0.1)
5	Anionic surface active agents (as MBAS)	mg/l	IS 13428 : 2005 Annex K	0.2	1.0	BDL (DL - 0.01)
6	Colour	Hazen units	IS 3025 (Part 4) : 1983	5	15	1
7	Cyanide (as CN)	mg/l	IS 3025 (Part 27) : 1986	0.05	No relaxation	BDL (DL - 0.005)
8	Chloride (as Cl)	mg/l	IS 3025 (Part 32) : 1988	250	1000	32.64
9	Calcium (as Ca)	mg/l	IS 3025 (Part 40) : 1991	75	200	41.52
10	Chloramines (as Cl ₂)	mg/l	IS 3025 (Part 26) : 1986	4.0	No relaxation	BDL (DL - 0.1)
11	Free residual chlorine	mg/l	IS 3025 (Part 26) : 1986	Min. 0.2	1	BDL (DL - 0.1)
12	Fluoride (as F)	mg/l	IS 3025 (Part 60) : 2008	1.0	1.5	0.24
13	Magnesium (as Mg)	mg/l	IS 3025 (Part 46) : 1994	30	100	7.16
14	Nitrate (as NO ₃)	mg/l	APHA 23 rd Edition	45	No relaxation	BDL (DL - 2)
15	Odour	-	IS 3025 (Part 5) : 2018	Agreeable	Agreeable	Agreeable
16	pH	-	IS 3025 (Part 11) : 1983	6.5 to 8.5	No relaxation	7.73 at 25°C
17	Phenolic compounds (as C ₆ H ₅ OH)	mg/l	IS 3025 (Part 43) : 1992	0.001	0.002	BDL (DL - 0.001)
18	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24) : 1986	200	400	16.92
19	Sulphide (as H ₂ S)	mg/l	IS 3025 (Part 29) : 1986	0.05	No relaxation	BDL (DL - 0.03)
20	Taste	-	IS 3025 (Part 8) : 1984	Agreeable	Agreeable	Agreeable
21	Total dissolved solids	mg/l	IS 3025 (Part 16) : 1984	500	2000	188
22	Turbidity	NTU	IS 3025 (Part 10) : 1984	1	5	0.3
23	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21) : 2009	200	600	133.20
24	Mineral Oil	mg/l	ANqr RES-40	0.5	No relaxation	BDL (DL - 0.001)
II Chemical Testing 2. Residues In Water						
25	Arsenic (as As)	mg/l	IS 3025 (Part 37) : 1988	0.01	No relaxation	BDL (DL - 0.01)
26	Aluminium (as Al)	mg/l	IS 3025 (Part 2) : 2019	0.03	0.2	BDL (DL - 0.01)
27	Barium (as Ba)	mg/l	IS 3025 (Part 2) : 2019	0.7	No relaxation	BDL (DL - 0.01)
28	Boron (as B)	mg/l	IS 3025 (Part 2) : 2019	0.5	2.4	BDL (DL - 0.1)
29	Copper (as Cu)	mg/l	IS 3025 (Part 2) : 2019	0.05	1.5	BDL (DL - 0.03)
30	Cadmium (as Cd)	mg/l	IS 3025 (Part 2) : 2019	0.003	No relaxation	BDL (DL - 0.001)
31	Iron (as Fe)	mg/l	IS 3025 (Part 2) : 2019	1.0	No relaxation	BDL (DL - 0.01)
32	Lead (as Pb)	mg/l	IS 3025 (Part 2) : 2019	0.01	No relaxation	BDL (DL - 0.001)
33	Manganese (as Mn)	mg/l	IS 3025 (Part 2) : 2019	0.1	0.3	BDL (DL - 0.05)
34	Mercury (as Hg)	mg/l	IS 3025 (Part 48) : 1994	0.001	No relaxation	BDL (DL - 0.0005)
35	Molybdenum (as Mo)	mg/l	IS 3025 (Part 2) : 2019	0.07	No relaxation	BDL (DL - 0.01)
36	Nickel (as Ni)	mg/l	IS 3025 (Part 2) : 2019	0.02	No relaxation	BDL (DL - 0.01)
37	Selenium (as Se)	mg/l	IS 3025 (Part 56) : 2003	0.01	No relaxation	BDL (DL - 0.001)
38	Silver (as Ag)	mg/l	IS 13428 : 2005	0.1	No relaxation	BDL (DL - 0.001)
39	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2) : 2019	0.05	No relaxation	BDL (DL - 0.001)
40	Zinc (as Zn)	mg/l	IS 3025 (Part 2) : 2019	5	15	BDL (DL - 0.1)



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S.N.	Test Parameter	Measurement Unit	Test Method	Requirement as per IS 10500 : 2012 (Drinking Water Specifications) Including Amendment No. 2		Test Result
				Acceptable Limit	Permissible Limit #	
II	Chemical Testing 2. Residues In Water					
41	Polychlorinated biphenyls					
	2,2',5-trichlorobiphenyl	µg/l	Anqr RES - 31	0.5	No relaxation	BDL (DL - 0.03)
	2,4,4'-trichlorobiphenyl	µg/l	Anqr RES - 31	0.5	No relaxation	BDL (DL - 0.03)
	2,2',5,5'-tetrachlorobiphenyl	µg/l	Anqr RES - 31	0.5	No relaxation	BDL (DL - 0.03)
	2,2',4,5,5'-pentachlorobiphenyl	µg/l	Anqr RES - 31	0.5	No relaxation	BDL (DL - 0.03)
	2,2',3,4,4',5'-hexachlorobiphenyl	µg/l	Anqr RES - 31	0.5	No relaxation	BDL (DL - 0.03)
	2,2',4,4',5,5'-hexachlorobiphenyl	µg/l	Anqr RES - 31	0.5	No relaxation	BDL (DL - 0.03)
	2,2',3,4,4',5,5'-heptachlorobiphenyl	µg/l	Anqr RES - 31	0.5	No relaxation	BDL (DL - 0.03)
42	Polynuclear aromatic hydrocarbons					
	Naphthalene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Acenaphthylene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Acenaphthene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Fluorene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Anthracene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Phenanthrene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Fluoranthene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Pyrene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Benzo(a)anthracene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Chrysene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Benzo(a)pyrene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Benzo(b)fluoranthene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Benzo(k)fluoranthene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Indeno(123,cd)pyrene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Dibenzo(a,h)anthracene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
	Benzo(ghi)perylene	µg/l	ANqr RES - 30	0.1	No relaxation	BDL (DL - 0.03)
43	Trihalomethanes					
i	Bromoform	mg/l	APHA 6232 23 rd Edition	0.1	No relaxation	BDL (DL - 0.05)
ii	Dibromochloromethane	mg/l		0.1	No relaxation	BDL (DL - 0.05)
iii	Bromodichloromethane	mg/l		0.06	No relaxation	BDL (DL - 0.05)
iv	Chloroform	mg/l		0.2	No relaxation	BDL (DL - 0.05)
44	Pesticide Residues Organochlorine					
i	Alpha-HCH	µg/l	ANqr RES-28	0.01	No relaxation	BDL (DL - 0.01)
ii	Beta HCH	µg/l	ANqr RES-28	0.04	No relaxation	BDL (DL - 0.03)
iii	Gamma - HCH (Lindane)	µg/l	ANqr RES-28	2	No relaxation	BDL (DL - 0.03)
iv	Delta- HCH	µg/l	ANqr RES-28	0.04	No relaxation	BDL (DL - 0.03)
v	Alachlor	µg/l	ANqr RES-29	20	No relaxation	BDL (DL - 0.03)
vi	Aldrin	µg/l	ANqr RES-28	0.03	No relaxation	BDL (DL - 0.03)
vii	Dieldrin	µg/l	ANqr RES-28	0.03	No relaxation	BDL (DL - 0.03)
viii	Butachlor	µg/l	ANqr RES-29	125	No relaxation	BDL (DL - 0.03)
ix	p,p'-DDE	µg/l	ANqr RES-28	1	No relaxation	BDL (DL - 0.03)
x	o,p'-DDE	µg/l	ANqr RES-28	1	No relaxation	BDL (DL - 0.03)
xi	p,p'-DDD	µg/l	ANqr RES-28	1	No relaxation	BDL (DL - 0.03)
xii	o,p'-DDD	µg/l	ANqr RES-28	1	No relaxation	BDL (DL - 0.03)
xiii	o,p'- DDT	µg/l	ANqr RES-28	1	No relaxation	BDL (DL - 0.03)
xiv	p,p'- DDT	µg/l	ANqr RES-28	1	No relaxation	BDL (DL - 0.03)
xv	Endosulphan	µg/l	ANqr RES-28	0.4	No relaxation	BDL (DL - 0.03)
	Alpha-Endosulphan	µg/l	ANqr RES-28	0.4	No relaxation	BDL (DL - 0.03)
	Beta-Endosulphan					
	Endosulphan sulphate					

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REMARKS: As requested by the client, sample was tested for above parameters only. Sample complies with IS:10500:2012, for tests conducted, indicating that it is fit for drinking purpose with respect to tested parameters.



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Table 7

Dust fall Rate

Sr.No.	Location	March-2021
		Rate (MT/km ² /Month)
1.	Samri- Gopatu/ Near Weigh bridge	24.93

Table 8

Report on Soil Analysis, Samri
Sampling Date: 25/03/2021
Sample Location: (Rajendrapur/Nr.Mining Area)

TEST RESULTS

(Page 1 of 2)

S.N.	Test Parameter	Measurement Unit	Test Method	Test Result
1	Infiltration rate	mm/hr	ASTMD 3385	21.46
2	Bulk density	g/cm ³	IS 2720 (Part 29)	1.729
3	Water holding capacity	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	24.52
4	Particle size distribution			
	Sand	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	41.68
	Silt	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	27.19
	Clay	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	31.13
5	Texture	-	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	Clay Loam
6	pH (1:2.5 Aq. Extract) at 25°C	-	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	6.82 at 25°C
7	Electrical Conductivity (1:2.5 Aq. Extract)	µs/cm	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	429.17
8	Water soluble Calcium (as Ca)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	216.52
9	Water soluble Magnesium (as Mg)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	173.81
10	Water soluble Sodium (as Na)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	312.68
11	Water soluble Potassium (as K)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	112.59
12	Water soluble Chloride (as Cl)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	146.73
13	Water soluble Sulphate (as SO ₄)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	346.19



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S.N.	Test Parameter	Measurement Unit	Test Method	Test Result
14	Exchangeable Sodium (as Na)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	116.54
15	Exchangeable Potassium (as K)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	57.82
16	Exchangeable Calcium (as Ca)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	121.93
17	Exchangeable Magnesium (as Mg)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	112.54
18	Sodium adsorption ratio	-	By Calculation	17.26
19	Total Organic matter	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	5.19
20	Total Organic Carbon	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	2.82
21	Available Nitrogen (as N)	Kg/hect	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	212.64
22	Available Phosphorous (as P)	Kg/hect	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	12.17
23	Available Potassium (as K)	Kg/hect	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	114.29
24	CEC	meq/100g	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	11
25	Arsenic (As)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	Absent
26	Boron (B)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	0.18
27	Cadmium (Cd)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	Absent
28	Chromium (Cr)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	Absent
29	Copper (Cu)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	3.17
30	Lead (Pb)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	Absent
31	Nickel (Ni)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	Absent
32	Cobalt (Co)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	0.18
33	Iron (Fe)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	7.19
34	Manganese (Mn)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	11.54
35	Zinc (Zn)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	0.27
36	Selenium (Se)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	Absent

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Remarks: As requested by the client, sample was tested for above parameters only.

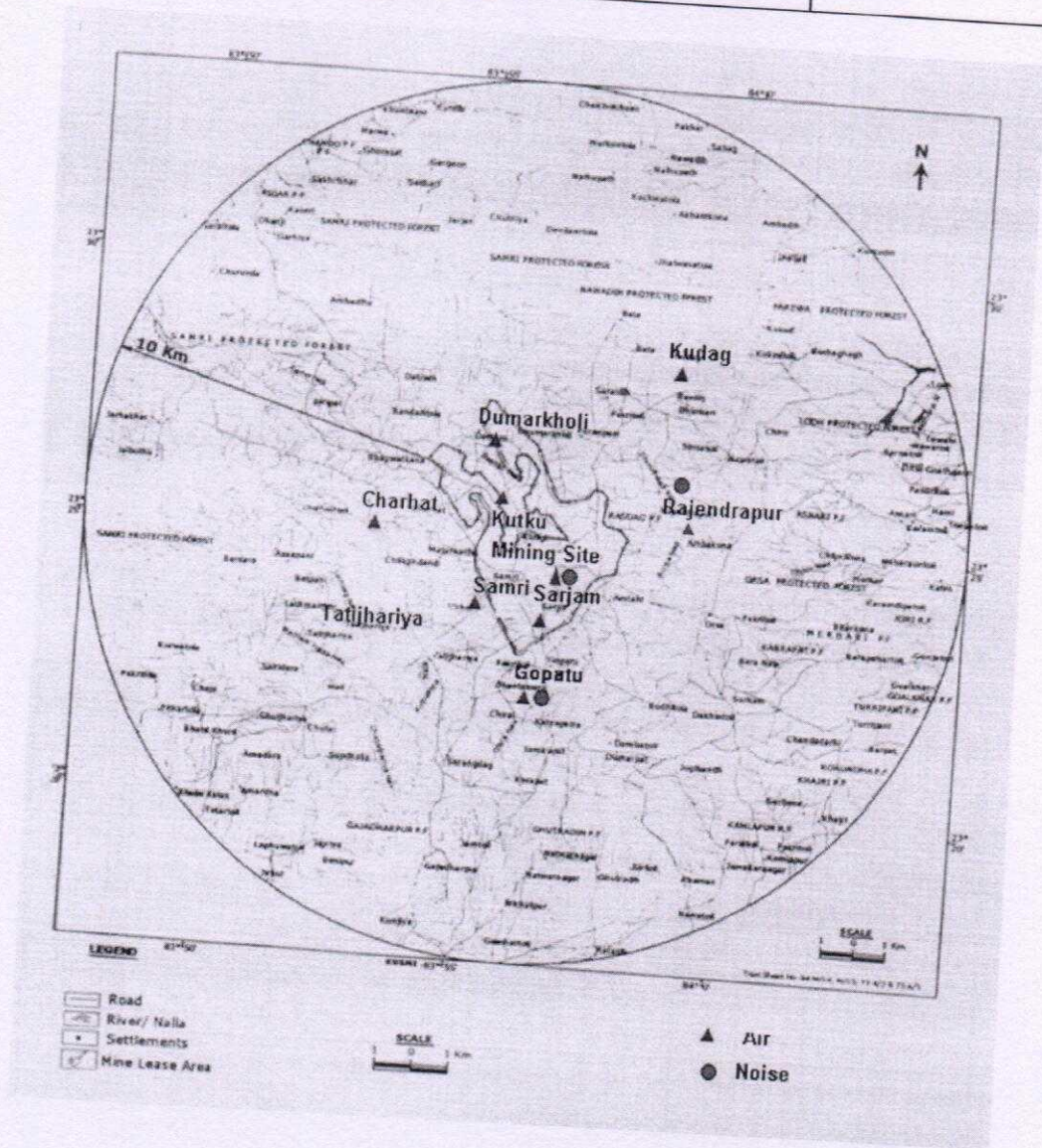


Fig3: Sampling Locations for Air, Noise

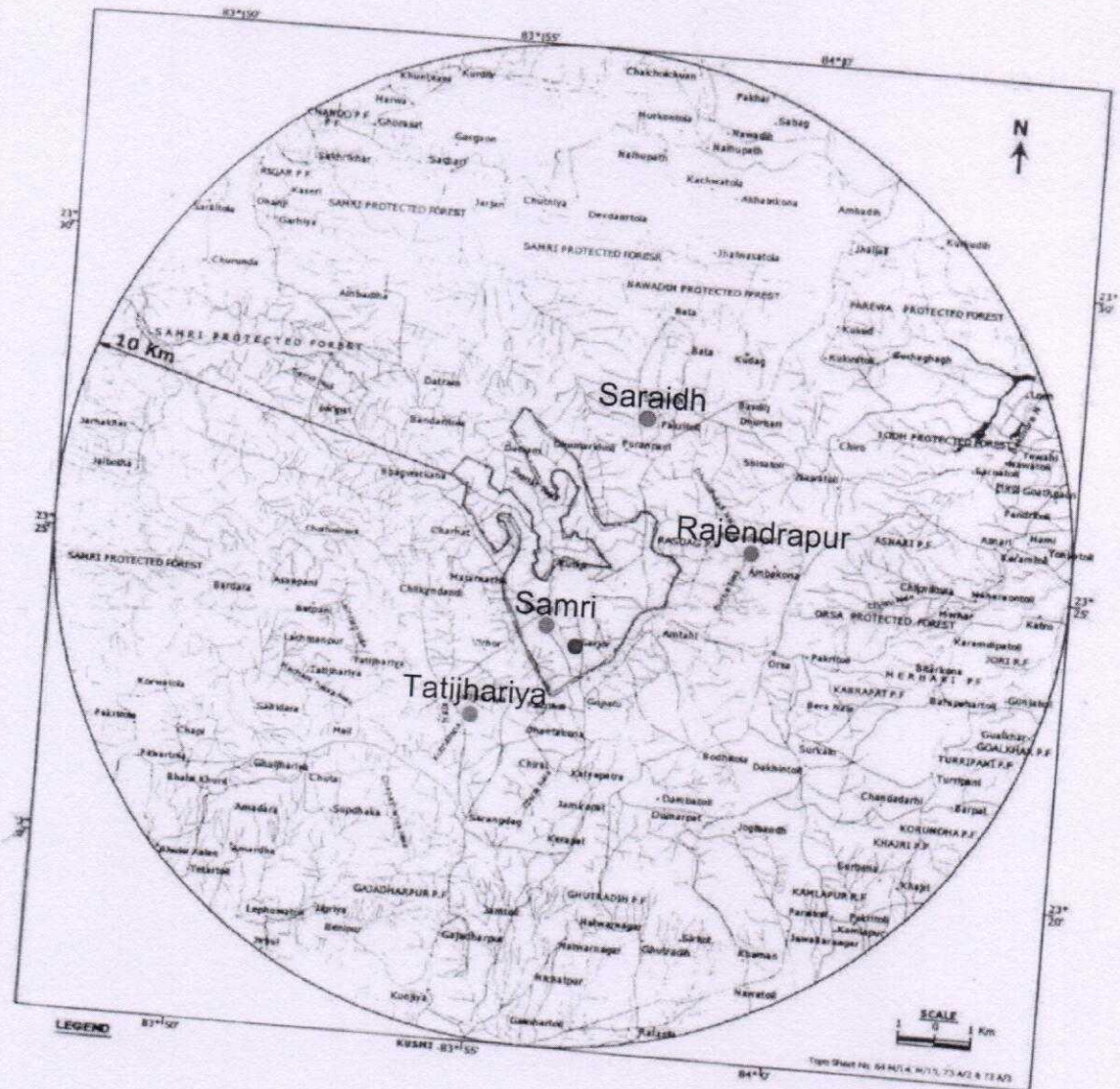


Fig 04: Sampling Locations for Water