

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

Duration: July-August-September-2020

Name of Industry:-



M/s. Hindalco Industries Limited.,

Name of Laboratory:-



QCI-NABET, MoEF & CC (GOI)
ISO 9001:2015, ISO 14001:2015, OHSAS 18001:2007
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Rupam Bhatia

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 **July-2020 to September-2020** 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 : September, 2020



A handwritten signature in blue ink, appearing to read "D. G. Sawant".

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 (*July-August-September-2020*) 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**).

	<p align="center">Hindalco Industries Limited Samri Mining Environmental Status Report for July -2020 to September -2020</p>	<p align="center">Details of Salient Features</p>
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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 July-August- September-2020.

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 July-2020 to September-2020 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 fall jar. The jar was exposed for one month in the mining area and (BKB campus) Tatijharia village during July-2020 to September- 2020. 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 (So2)	24 hourly sample twice a week for Three months
Oxides of Nitrogen (NOx)	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 (July-August-September-2020) indicates that the wind was blowing predominately from (SW and SSW) 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	0.002721	0.004082	0.000000	0.000000	0.000000	0.000000	0.006803
2	11.25 - 33.75	0.005442	0.000000	0.001361	0.000000	0.000000	0.000000	0.006803
3	33.75 - 56.25	0.008163	0.010884	0.002721	0.002721	0.000000	0.000000	0.024490
4	56.25 - 78.75	0.021769	0.013605	0.017687	0.002721	0.000000	0.000000	0.055782
5	78.75 - 101.25	0.013605	0.010884	0.012245	0.001361	0.000000	0.000000	0.038095
6	101.25 - 123.75	0.023129	0.008163	0.006803	0.001361	0.000000	0.000000	0.039456
7	123.75 - 146.25	0.035374	0.014966	0.008163	0.004082	0.000000	0.000000	0.062585
8	146.25 - 168.75	0.036735	0.023129	0.004082	0.001361	0.000000	0.000000	0.065306
9	168.75 - 191.25	0.065306	0.021769	0.001361	0.000000	0.000000	0.000000	0.088435
10	191.25 - 213.75	0.111565	0.035374	0.004082	0.000000	0.000000	0.000000	0.151020
11	213.75 - 236.25	0.100680	0.036735	0.016327	0.000000	0.000000	0.000000	0.153741
12	236.25 - 258.75	0.039456	0.031293	0.014966	0.000000	0.000000	0.000000	0.085714
13	258.75 - 281.25	0.046259	0.031293	0.023129	0.004082	0.000000	0.000000	0.104762
14	281.25 - 303.75	0.023129	0.031293	0.009524	0.002721	0.000000	0.000000	0.066667
15	303.75 - 326.25	0.010884	0.023129	0.002721	0.000000	0.000000	0.000000	0.036735
16	326.25 - 348.75	0.002721	0.006803	0.002721	0.000000	0.000000	0.000000	0.012245
	Sub-Total	0.546939	0.303401	0.353352	0.020408	0.000000	0.000000	0.997283
	Calms							0.001359
	Missing/Incomplete							0.001359
	Total							1.000000

Summary of Wind Pattern

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
July-August-Sept-2020	SW (15.4%)	SSW (15.1%)	0.14%

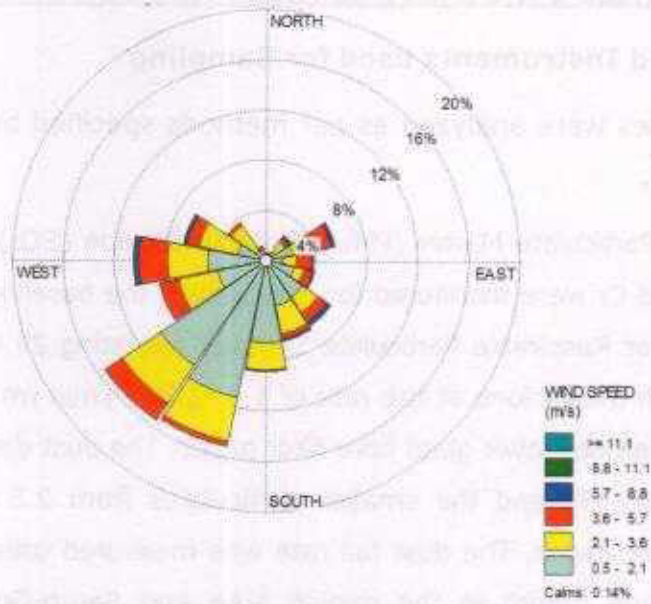


Figure.01: Wind Rose Diagram (July-August-September-2020)

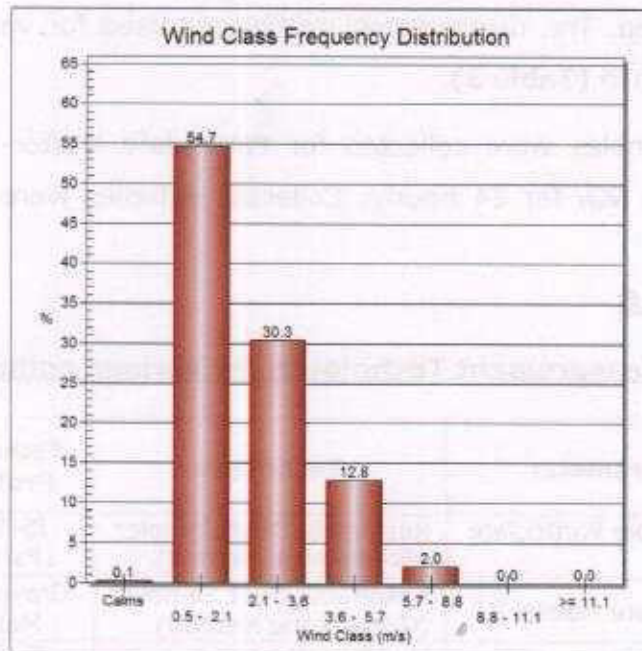


Figure.02: Wind Class Frequency Distribution (July-August-September-2020).

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/m³)
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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**Details of
Salient Features**

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	July-2020	47.3	16.9	6.2	17.4	0.017	ND	ND	ND
	Aug-2020	53.9	18.2	7.2	16.4	0.014	ND	ND	ND
	Sept-2020	52.7	16.9	7.6	17.2	0.018	ND	ND	ND
Rajendrapur/ Nr.Mining Area	July-2020	53.1	18.2	7.3	18.6	0.014	ND	ND	ND
	Aug-2020	56.1	21.7	9.4	18.3	0.016	ND	ND	ND
	Sept-2020	54.9	18.3	9.4	21.7	0.021	ND	ND	ND
Kutku Village/ Nr.V.T. Center	July-2020	48.9	16.4	6.8	17.1	0.016	ND	ND	ND
	Aug-2020	46.2	16.9	7.3	16.7	0.017	ND	ND	ND
	Sept-2020	48.3	16.2	5.8	16.1	0.013	ND	ND	ND
Dumerkholi/Nr. Mining Area	July-2020	57.2	21.6	6.4	21.7	0.018	ND	ND	ND
	Aug-2020	51.4	17.2	7.1	16.2	0.014	ND	ND	ND
	Sept-2020	51.7	21.4	6.2	16.9	0.018	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	16.2	5.8	16.1	0.013	---	---	---
Maximum		57.2	21.7	9.4	21.7	0.021	---	---	---
Average		51.8	18.3	7.2	17.9	0.016	---	---	---
98% le		57.0	21.7	9.4	21.7	0.020	---	---	---

- The Average Concentration of PM₁₀ within the Core Zone of Samri Lease is 51.8 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Core Zone of Samri Lease is 18.3 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Core Zone of Samri Lease is 7.2 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Core Zone of Samri Lease is 17.9 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Core Zone of Samri Lease is 0.016 $\mu\text{g}/\text{m}^3$.

Conclusion:-The Average Concentration within the Core Zone of Samri Lease during this period (July-August-September-2020). It is within permissible limits as per CPCB Standards.



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Salient Features**

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	July-2020	43.8	14.9	5.2	16.4	ND	ND	ND	ND
	Aug-2020	54.1	17.3	7.6	16.9	ND	ND	ND	ND
	Sept-2020	54.8	18.3	8.1	19.4	ND	ND	ND	ND
Tatijharia Village/Nr. Weigh Bridge	July-2020	48.3	17.3	6.8	18.9	0.014	ND	ND	ND
	Aug-2020	51.6	18.2	7.6	21.4	0.016	ND	ND	ND
	Sept-2020	54.8	21.6	8.4	23.9	0.018	ND	ND	ND
Piprapat/ Nr.Mining Area	July-2020	53.7	21.6	7.3	21.4	0.016	ND	ND	ND
	Aug-2020	56.2	23.9	8.1	23.7	0.019	ND	ND	ND
	Sept-2020	58.1	24.7	8.9	24.6	0.021	ND	ND	ND
Virhorepat Village	July-2020	47.1	16.2	6.1	17.3	0.013	ND	ND	ND
	Aug-2020	49.7	17.4	6.4	18.2	0.017	ND	ND	ND
	Sept-2020	49.3	18.2	6.8	19.4	0.017	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	14.9	5.2	16.4	0.013	---	---	---
Maximum		58.1	24.7	8.9	24.6	0.021	---	---	---
Average		51.8	19.1	7.3	20.1	0.017	---	---	---
98% le		57.7	24.5	8.8	24.4	0.021	---	---	---

- The Average Concentration of PM₁₀ within the Buffer Zone of Samri Lease is 51.8 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Buffer Zone of Samri Lease is 19.1 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Buffer Zone of Samri Lease is 7.3 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Buffer Zone of Samri Lease is 20.1 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Buffer Zone of Samri Lease is 0.017 $\mu\text{g}/\text{m}^3$.

Conclusion: - The Average Concentration within the Buffer Zone of Samri Lease during this period (July-August-September-2020). 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 AirQuality:

Ambient air quality has been generated as per NAAQS 2009 for the month of July-August-September-2020. 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 July-2020 to September-2020 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. ParticulateMatter-PM₁₀:

The Minimum and maximum concentrations for Particulate Matter-PM₁₀ were recorded as 46.2 µg/m³ and 57.2µg/m³ at Kutku Village/ Nr.V.T. Center and Dumerkholi/Nr. Mining Area location respectively. The average concentration of PM₁₀ was 51.8 µg/m³.

B. ParticulateMatter-PM_{2.5}:

The Minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 16.2 µg/m³ & 21.7µg/m³ at Kutku Village/ Nr.V.T. Center and Rajendrapur/Nr. Mining Area location. The average concentration of PM_{2.5} was 18.3 µg/m³.

C. Sulphur Dioxide(SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 5.8 µg/m³ and 9.4 µg/m³ respectively. The minimum concentration was recorded at Kutku village and maximum concentration was also recorded at Rajendrapur/Nr. Mining Area location. The average concentration of SO₂ was 7.2 µg/m³.

D. Nitrogen Oxide(NO_x):

The minimum and maximum for NO_x concentrations were recorded as 16.1 µg/m³ and 21.7µg/m³. The minimum concentration was recorded at Kutku village and maximum concentration was also recorded at Dumerkholi/Nr. Mining Area & Rajendrapur/Nr. Mining Area location. The average concentration of NO_x was 17.9 µg/m³.



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E. Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.021µg/m³ at Rajendrapur/Nr. Mining Area and the minimum lead in PM₁₀ sample was 0.013/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):

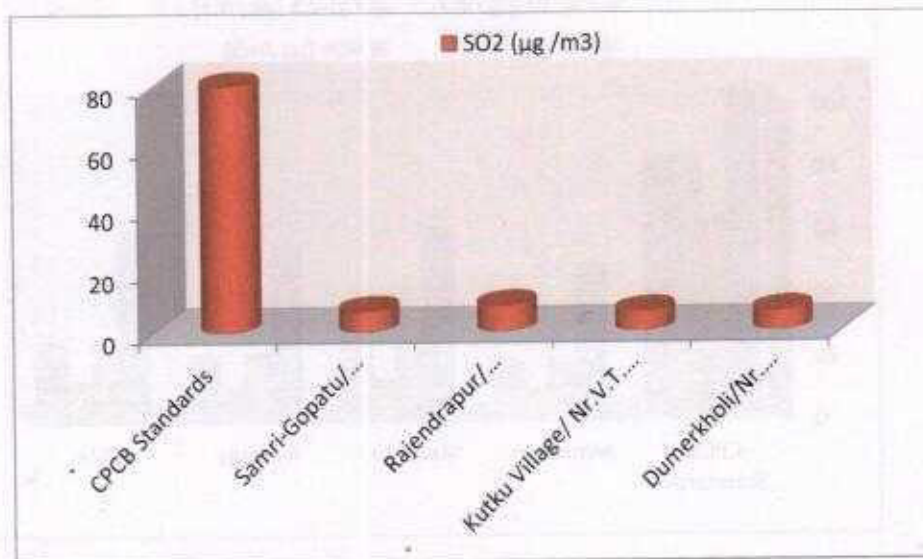
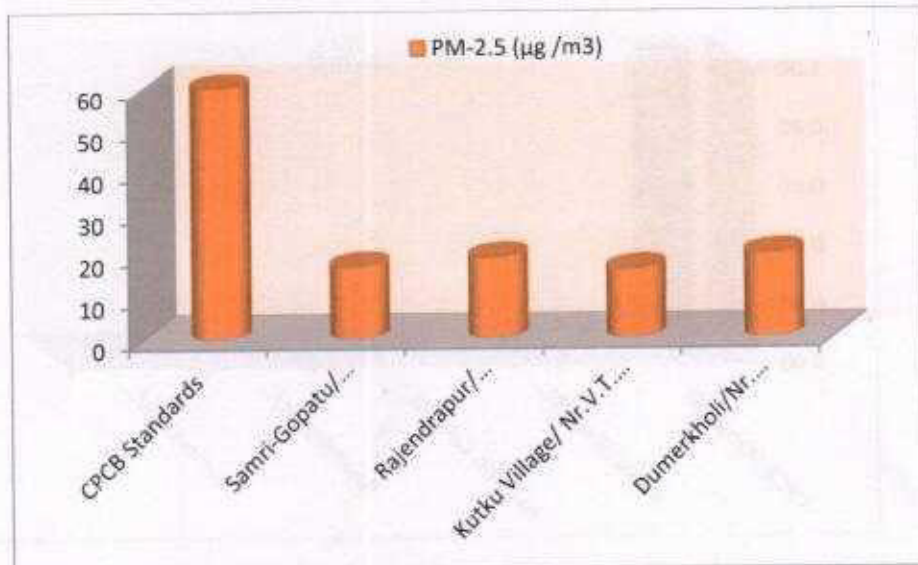
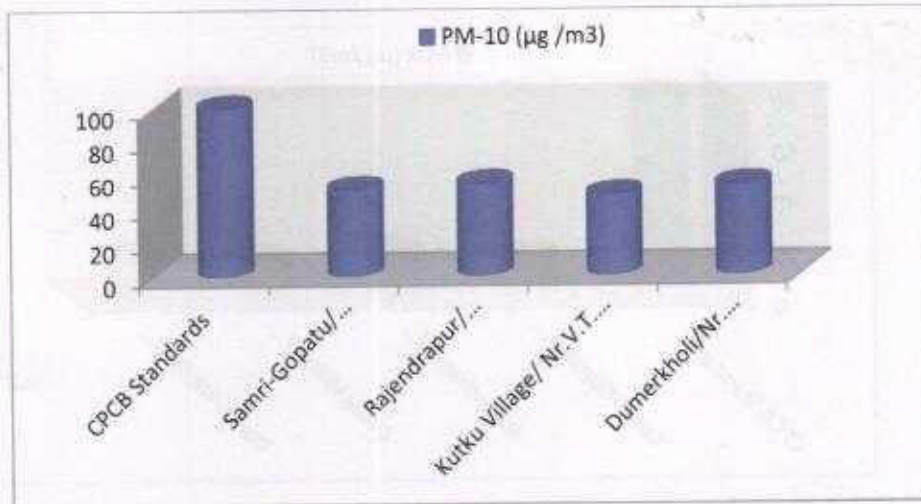
Mercury was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

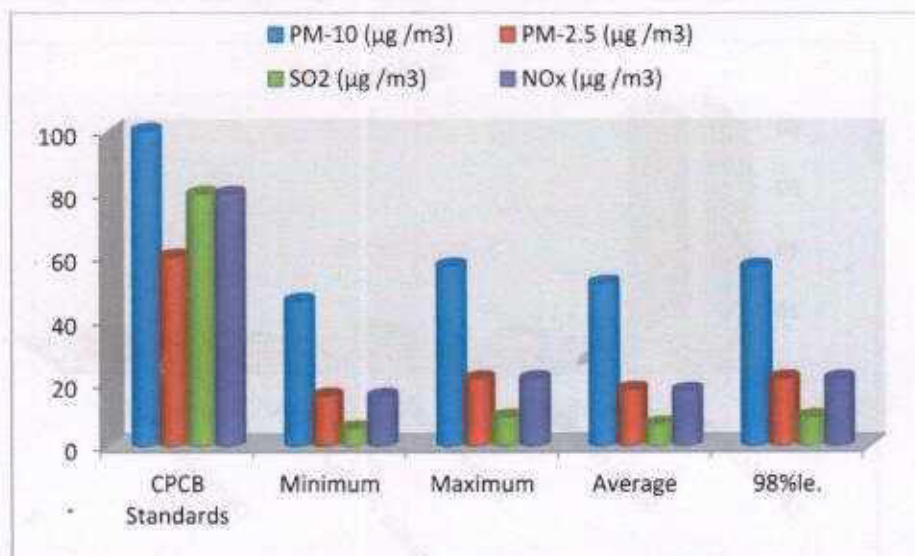
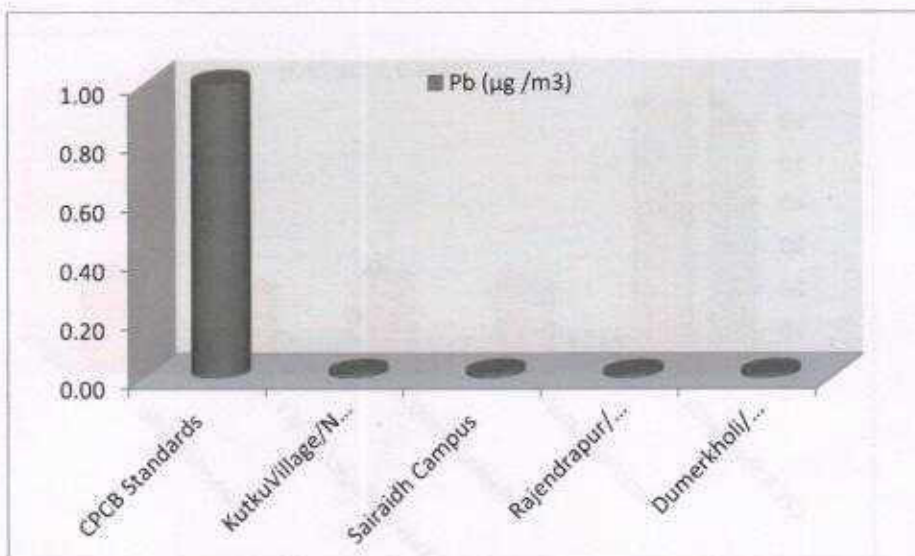
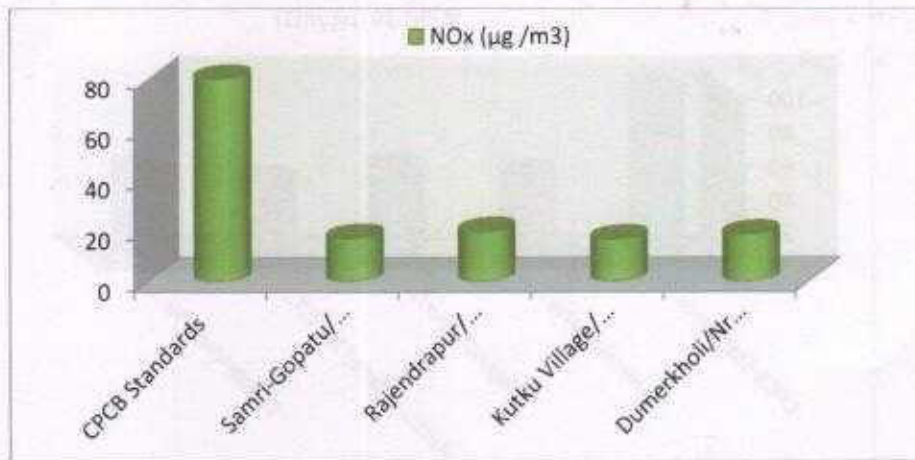
G. Arsenic (As):

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.







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 July-August-September-2020. 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 July- 2020 to September-2020 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-PM₁₀:

The minimum and maximum concentrations for Particulate Matter-PM₁₀ were recorded as 51.8 µg/m³ and 43.8 µg/m³ at Sairaidh Campus and Piprapat/Nr. Mining Area location respectively. The average concentration of PM₁₀ was 51.8µg/m³.

J. Particulate Matter-PM_{2.5}:

The minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 14.9 µg/m³ & 24.7µg/m³ at Sairaidh Campus and Piprapat/Nr. Mining Area location respectively. The average concentration of PM_{2.5} was 19.1µg/m³.

K. Sulphur Dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 5.2 µg/m³ and 8.9 µg/m³ respectively. The minimum concentration was recorded at Sairaidh Campus and maximum concentration was also recorded at Piprapat/Nr. Mining Area. The average concentration of SO₂ was 7.3µg/m³.

L. Nitrogen Oxide (NO_x):

The minimum and maximum for NO_x concentrations were recorded as 16.4 µg/m³ and 24.6 µg/m³. The minimum concentration was recorded at Sairaidh Campus and maximum concentration was also recorded at Piprapat/Nr. Mining Area. The average concentration of NO_x was 20.1 µg/m³.



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M. Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.021 µg/m³ Piprapat/Nr. Mining Area and the minimum lead in PM₁₀ sample at Virhorepat Village.

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

N. Mercury (Hg):

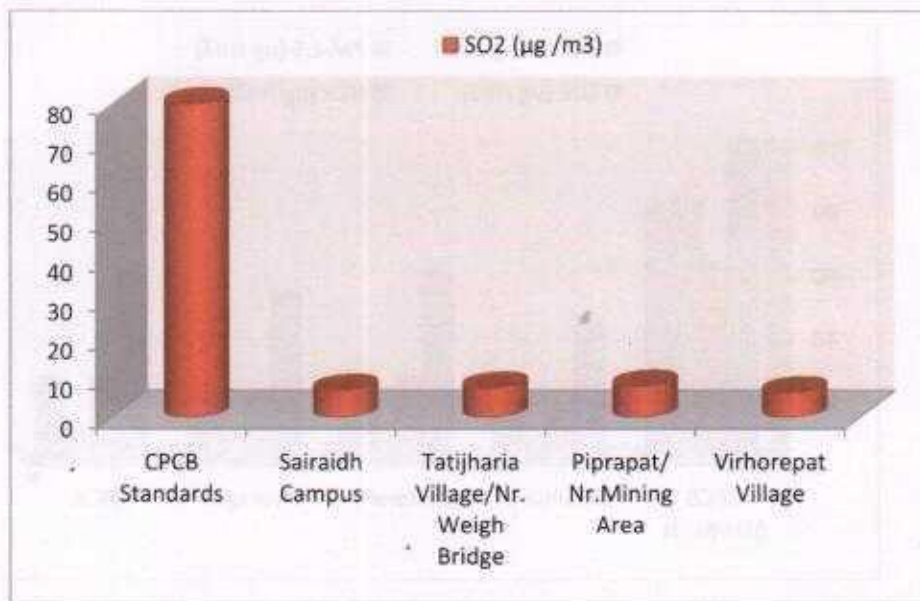
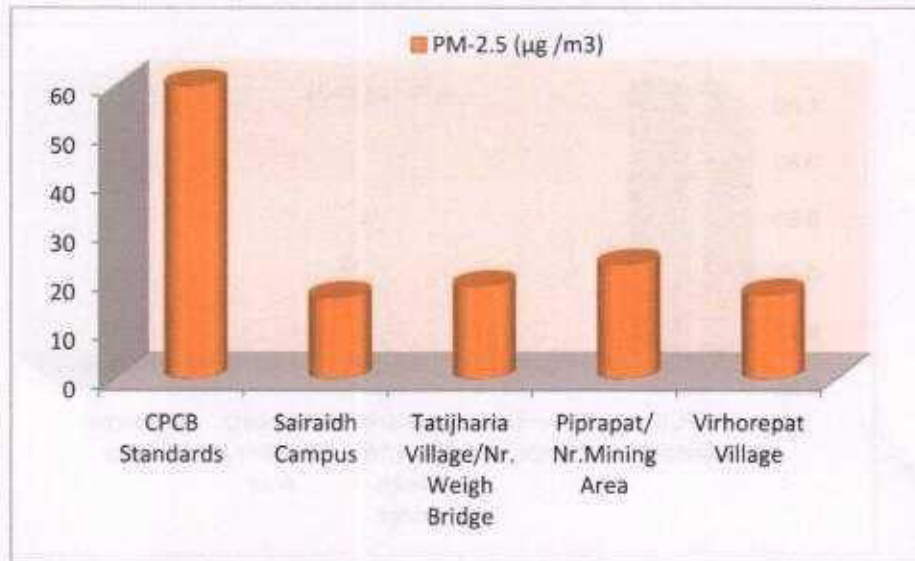
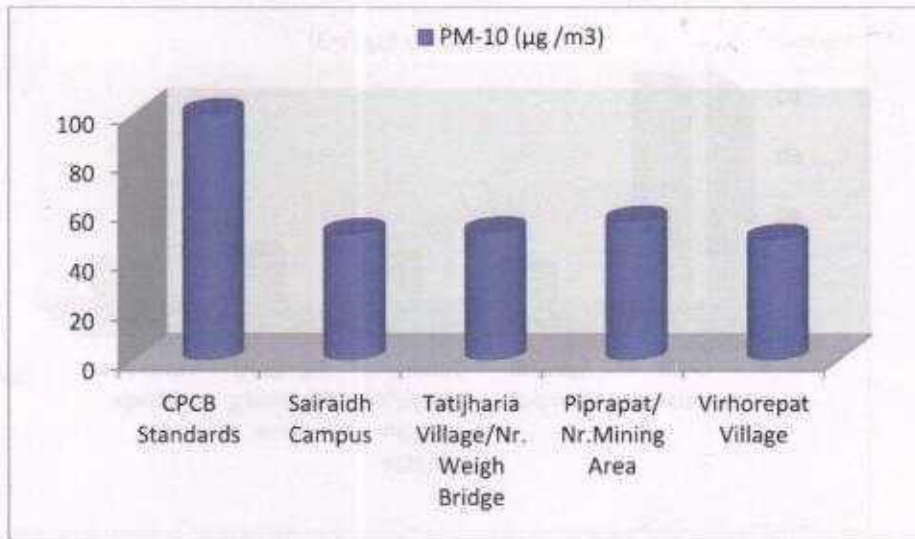
Mercury was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

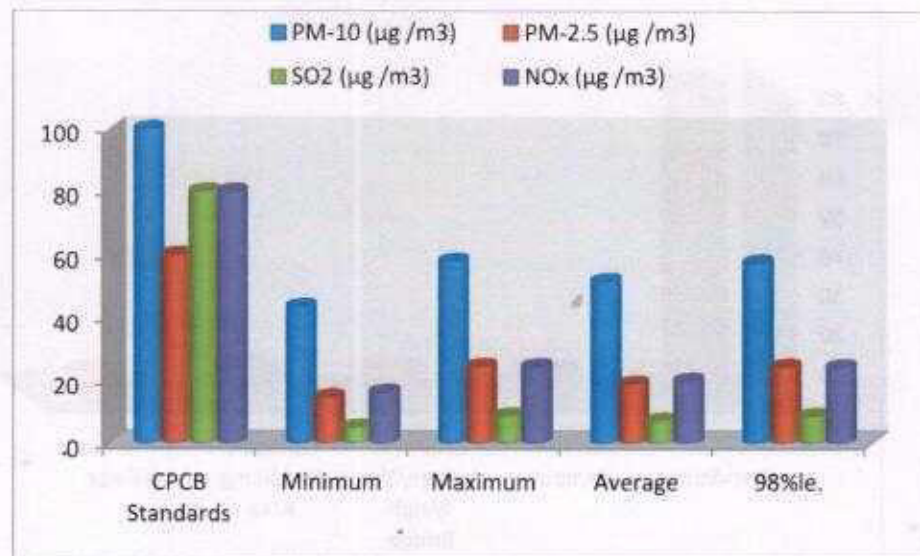
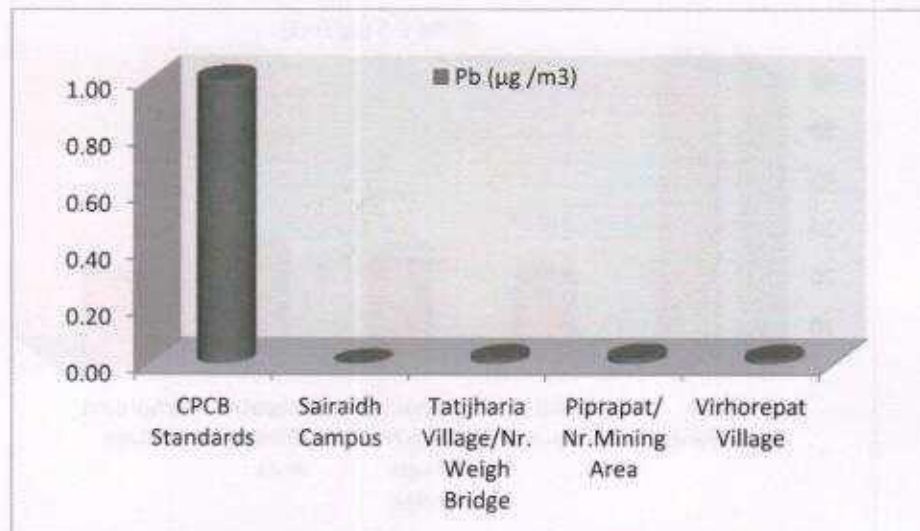
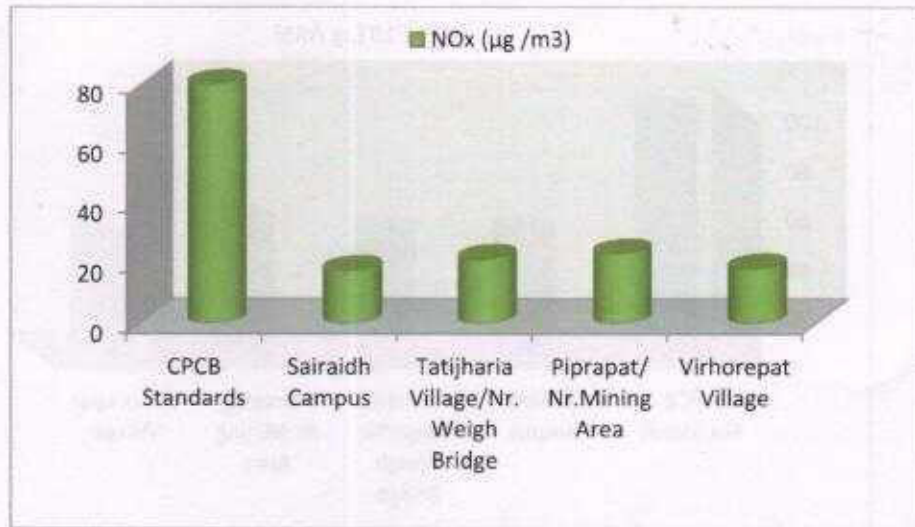
O. Arsenic (As):

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

P. Chromium (Cr):

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







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.

	<p align="center">Hindalco Industries Limited Samri Mining Environmental Status Report for July -2020 to September -2020</p>	<p align="center">Details of Salient Features</p>
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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	July-2020	56.2	41.6
		August-2020	57.3	42.9
		September-2020	57.1	42.9
2.	Rajendrapur/ Nr. Mining Area	July-2020	47.1	37.3
		August-2020	51.7	39.2
		September-2020	49.3	37.1
Buffer Zone				
1.	Tatijharia Village/Nr. Weigh Bridge	July-2020	47.2	38.1
		August-2020	49.1	41.6
		September-2020	52.1	39.8
2.	Piprapat/Nr. Mining Area	July-2020	51.9	42.6
		August-2020	52.7	43.8
		September-2020	54.7	41.6
CPCB Standards				
Industrial Area			75	70
Residential area			55	45

Conclusion: -The Noise Monitoring Results at Samri Lease during this period (July-August-September-2020), it is within permissible limits as per CPCB Standards.

Table 5.1

HEMM Spot Noise Level Monitoring

Unit: dB(A) Leq

Sl. No.	Location	July-2020		August-2020		September-2020	
		Min.	Max.	Min.	Max.	Min.	Max.
1.	Samri-Gopatu/ Near Weigh bridge	56.2	61.4	57.2	63.9	56.1	68.3
2.	Near Mining Area	61.9	67.2	62.8	72.4	61.9	71.6



2.0 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 being significant.

Sl. No.	Parameter	Unit	Observed Value	IS 10500-2012 Standard	Remarks
1	pH		7.5	6.5-8.5	Compliant
2	Total Hardness	mg/l	150	500	Compliant
3	Calcium Hardness	mg/l	100	300	Compliant
4	Magnesium Hardness	mg/l	50	200	Compliant
5	Total Dissolved Solids (TDS)	mg/l	100	500	Compliant
6	Total Suspended Solids (TSS)	mg/l	5	50	Compliant
7	Chloride	mg/l	100	250	Compliant
8	Sulfate	mg/l	100	400	Compliant
9	Iron	mg/l	0.5	1.0	Compliant
10	Copper	mg/l	0.05	1.0	Compliant
11	Zinc	mg/l	0.1	1.0	Compliant
12	Lead	mg/l	0.05	1.0	Compliant
13	Cadmium	mg/l	0.01	1.0	Compliant
14	Fluoride	mg/l	1.0	1.5	Compliant
15	Ammonia Nitrogen	mg/l	0.1	1.0	Compliant
16	Nitrate Nitrogen	mg/l	10	45	Compliant
17	Phosphate	mg/l	0.1	1.0	Compliant
18	Free Chlorine	mg/l	0.5	1.0	Compliant
19	Free Chlorine	mg/l	0.5	1.0	Compliant
20	Free Chlorine	mg/l	0.5	1.0	Compliant
21	Free Chlorine	mg/l	0.5	1.0	Compliant
22	Free Chlorine	mg/l	0.5	1.0	Compliant
23	Free Chlorine	mg/l	0.5	1.0	Compliant
24	Free Chlorine	mg/l	0.5	1.0	Compliant
25	Free Chlorine	mg/l	0.5	1.0	Compliant
26	Free Chlorine	mg/l	0.5	1.0	Compliant
27	Free Chlorine	mg/l	0.5	1.0	Compliant
28	Free Chlorine	mg/l	0.5	1.0	Compliant
29	Free Chlorine	mg/l	0.5	1.0	Compliant
30	Free Chlorine	mg/l	0.5	1.0	Compliant



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Table 6

**Report on Chemical Examination of Ground
Water (September-2020)**

Location:	GW1) Samari Weigh Bridge Sample Source:-Borewell Water
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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	7.18 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	0.24
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	472
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.46
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	109.38
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	157.81
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	177.66
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	48.59
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	13.68
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	27.16
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	< 2
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	1.2



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Details of
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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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**Details of
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TEST RESULTS

(Page 3 of 3)

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.

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.



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Table 7

Dust fall Rate

Sr.No.	Location	September-2019
		Rate (MT/km ² /Month)
1.	Samri- Gopatu/ Near Weigh bridge	21.52

Table 8

**Report on Soil Analysis, Samri
Sampling Date: 16.09.2020
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	23.52
2	Bulk density	g/cm ³	IS 2720 (Part 29)	1.27
3	Water holding capacity	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	28.46
4	Particle size distribution			
	Sand	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	27.52
	Silt	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	23.49
	Clay	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	48.99
5	Texture	-	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	Clay
6	pH (1:2.5 Aq. Extract) at 25°C	-	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	6.91 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)	518.47
8	Water soluble Calcium (as Ca)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	239.51
9	Water soluble Magnesium (as Mg)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	182.76
10	Water soluble Sodium (as Na)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	309.52
11	Water soluble Potassium (as K)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	107.36
12	Water soluble Chloride (as Cl)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	164.28
13	Water soluble Sulphate (as SO ₄)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	392.51



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**Report on Soil Analysis, Samri
Sampling Date: 16.09.2020
Sample Location: (Rajendrapur/Nr.Mining Area)**

TEST RESULTS

(Page 2 of 2)

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)	137.51
15	Exchangeable Potassium (as K)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	62.94
16	Exchangeable Calcium (as Ca)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	118.26
17	Exchangeable Magnesium (as Mg)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	107.39
18	Sodium adsorption ratio	-	By Calculation	17.1
19	Total Organic matter	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	4.87
20	Total Organic Carbon	%	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	2.94
21	Available Nitrogen (as N)	Kg/hect	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	204.76
22	Available Phosphorous (as P)	Kg/hect	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	11.52
23	Available Potassium (as K)	Kg/hect	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	118.39
24	CEC	meq/100g	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	12
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)	0.17
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)	3.46
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)	0.17
33	Iron (Fe)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	6.94
34	Manganese (Mn)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	12.58
35	Zinc (Zn)	mg/Kg	Method Manual, Soil testing in India (Department of agriculture & corporation, Govt of India)	0.32
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.

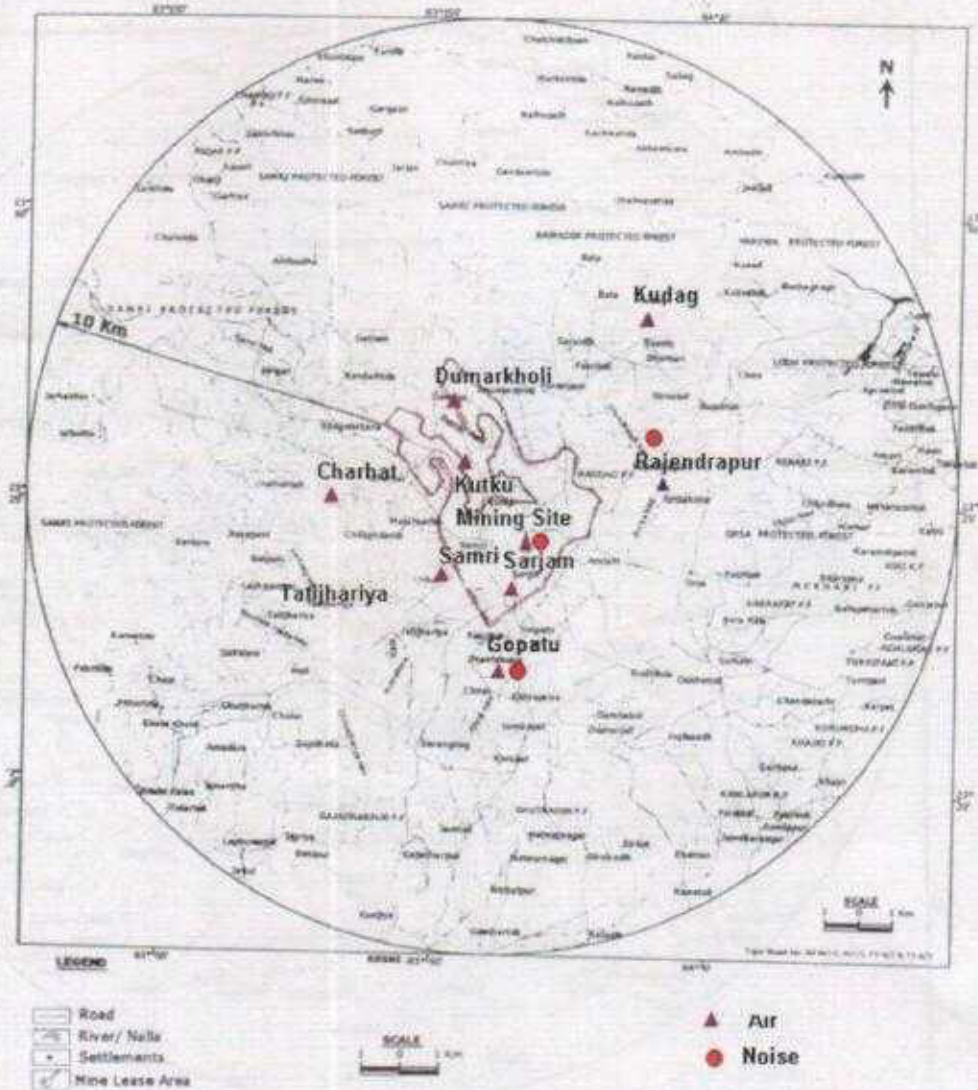
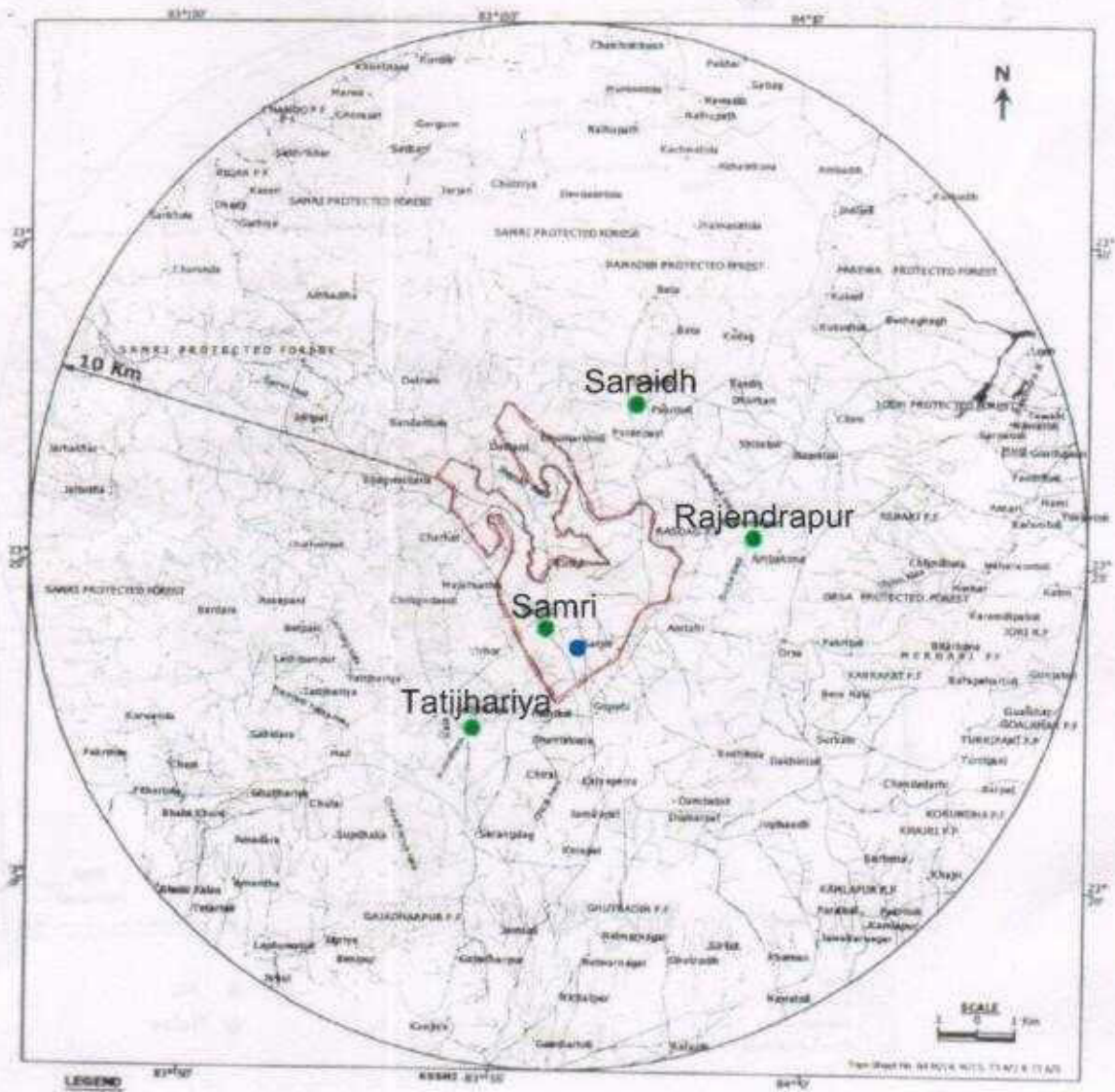


Fig3: Sampling Locations for Air, Noise



-  Road
-  River/ Nala
-  Settlements
-  Mine Lease Area





-  Surface Water
-  GroundWater

Fig 04: Sampling Locations for Water