

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

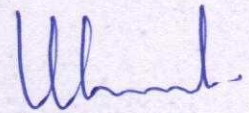
Duration: October-November-December-2020

Name of Industry:-



M/s. Hindalco Industries Limited.,

Name of Laboratory:-



QCI-NABET, MoEF & CC (GOI)
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1.0 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 (*October-November-December-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.

2.0 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.

2.1 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 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) |

2.2 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)**.



2.3 Air Environment

2.3.1 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, NO₂ and Pb, Hg, As & Cr at above Ambient Air Quality Monitoring (AAQM) locations.

2.3.2 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 October-2020 to December-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.



2.3.3 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 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) | — |



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**Details of
Salient Features**

2.3.4 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (October-November-December-2020) indicates that the wind was blowing predominately from (WSW and SW) 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 |
|--------------------------------|----------------------------------|-----------------------------------|----------------|
| October-November-December-2020 | SW (15.4%) | SSW (15.1%) | 0.14% |

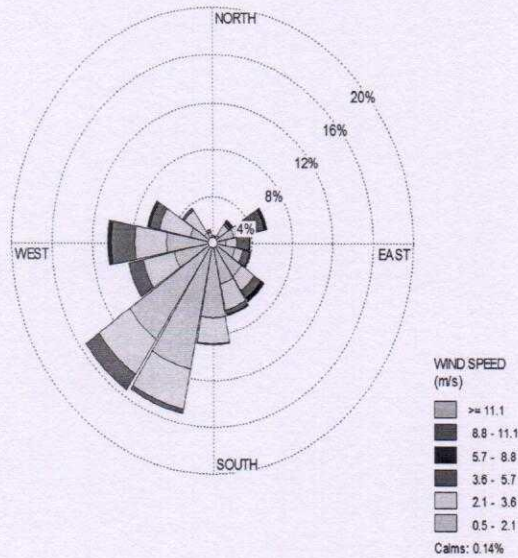


Figure.01: Wind Rose Diagram (July-August-September-2020)

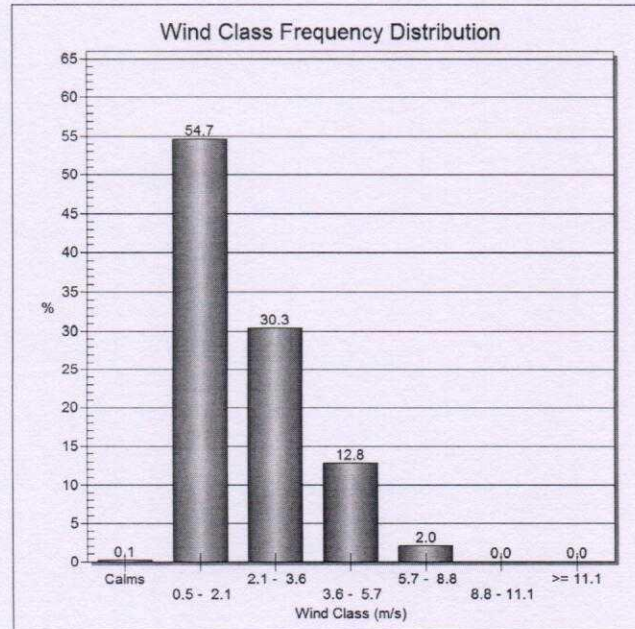


Figure.02: Wind Class Frequency Distribution (July-August-September-2020).



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Table 5

Statistical Analysis of Core Zone

| 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 | Oct-2020 | 42.8 | 14.7 | 5.3 | 16.9 | 0.013 | ND | ND | ND |
| | Nov-2020 | 51.7 | 19.6 | 8.4 | 17.3 | 0.017 | ND | ND | ND |
| | Dec-2020 | 43.8 | 14.7 | 6.2 | 16.3 | 0.016 | ND | ND | ND |
| Rajendrapur/ Nr.Mining Area | Oct-2020 | 46.3 | 17.2 | 6.4 | 17.4 | 0.016 | ND | ND | ND |
| | Nov-2020 | 54.9 | 23.7 | 11.2 | 21.6 | 0.014 | ND | ND | ND |
| | Dec-2020 | 48.7 | 17.3 | 7.9 | 18.2 | 0.019 | ND | ND | ND |
| Kutku Village/ Nr.V.T. Center | Oct-2020 | 51.9 | 18.6 | 6.7 | 18.3 | 0.017 | ND | ND | ND |
| | Nov-2020 | 48.3 | 16.4 | 8.1 | 17.2 | 0.013 | ND | ND | ND |
| | Dec-2020 | 51.6 | 18.6 | 6.8 | 16.4 | 0.014 | ND | ND | ND |
| Dumerkholi/Nr. Mining Area | Oct-2020 | 47.1 | 16.9 | 5.8 | 17.9 | 0.014 | ND | ND | ND |
| | Nov-2020 | 52.7 | 16.8 | 6.8 | 16.9 | 0.006 | ND | ND | ND |
| | Dec-2020 | 41.9 | 16.2 | 5.4 | 16.1 | 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 | | 41.9 | 14.7 | 5.3 | 16.1 | 0.006 | --- | --- | --- |
| Maximum | | 54.9 | 23.7 | 11.2 | 21.6 | 0.019 | --- | --- | --- |
| Average | | 48.5 | 17.6 | 7.1 | 17.5 | 0.015 | --- | --- | --- |
| 98% 1e | | 54.4 | 22.8 | 10.6 | 20.9 | 0.019 | --- | --- | --- |

- The Average Concentration of PM₁₀ within the Core Zone of Samri Lease is 48.5 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Core Zone of Samri Lease is 17.6 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Core Zone of Samri Lease is 7.1 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Core Zone of Samri Lease is 17.5 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Core Zone of Samri Lease is 0.015 $\mu\text{g}/\text{m}^3$.

Conclusion:-The Average Concentration within the Core Zone of Samri Lease during this period (October-November-December-2020). 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 | Oct-2020 | 46.2 | 15.7 | 5.6 | 17.3 | ND | ND | ND | ND |
| | Nov-2020 | 53.8 | 16.7 | 8.3 | 17.4 | ND | ND | ND | ND |
| | Dec-2020 | 56.1 | 19.4 | 9.3 | 18.2 | ND | ND | ND | ND |
| Tatijharia Village/Nr. Weigh Bridge | Oct-2020 | 51.7 | 18.2 | 7.6 | 19.4 | 0.018 | ND | ND | ND |
| | Nov-2020 | 54.7 | 19.4 | 8.2 | 18.6 | 0.019 | ND | ND | ND |
| | Dec-2020 | 46.2 | 16.7 | 7.3 | 21.9 | 0.019 | ND | ND | ND |
| Piprapat/ Nr. Mining Area | Oct-2020 | 56.2 | 23.8 | 8.4 | 23.1 | 0.017 | ND | ND | ND |
| | Nov-2020 | 52.9 | 17.6 | 7.6 | 16.4 | 0.016 | ND | ND | ND |
| | Dec-2020 | 52.8 | 21.6 | 8.4 | 26.1 | 0.016 | ND | ND | ND |
| Virhorepat Village | Oct-2020 | 46.3 | 17.1 | 7.3 | 16.8 | 0.012 | ND | ND | ND |
| | Nov-2020 | 47.3 | 16.2 | 5.7 | 14.9 | 0.014 | ND | ND | ND |
| | Dec-2020 | 56.3 | 23.4 | 9.1 | 24.8 | 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 | | 46.2 | 15.7 | 5.6 | 14.9 | 0.000 | --- | --- | --- |
| Maximum | | 56.3 | 23.8 | 9.3 | 26.1 | 0.019 | --- | --- | --- |
| Average | | 51.7 | 18.8 | 7.7 | 19.6 | 0.012 | --- | --- | --- |
| 98% 1e | | 56.3 | 23.7 | 9.3 | 25.8 | 0.019 | --- | --- | --- |

- The Average Concentration of PM₁₀ within the Buffer Zone of Samri Lease is 51.7 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Buffer Zone of Samri Lease is 18.8 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Buffer Zone of Samri Lease is 7.7 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Buffer Zone of Samri Lease is 19.6 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Buffer Zone of Samri Lease is 0.012 $\mu\text{g}/\text{m}^3$.

Conclusion:-The Average Concentration within the Buffer Zone of Samri Lease during this period (October-November-December-2020). It is within permissible limits as per CPCB Standards.



Month-wise Summary of Statistical Analysis

2.4 Samri Lease (Core Zone):-

2.4.1 Ambient Air Quality:

Ambient air quality has been generated as per NAAQS 2009 for the month of October-November-December-2020. PM₁₀, PM_{2.5}, SO₂ & NO₂, The values obtained were then compared vis-a-vis the standards prescribed by CPCB for Industrial/ Rural / Residential uses.

2.4.2 Presentation of Results:

The summary of Ambient Air Quality monitoring results from October-2020 to December- 2020 are presented in detail in Table 5.0.98th 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.

2.4.3 Particulate Matter-PM₁₀:

The Minimum and maximum concentrations for Particulate Matter-PM₁₀ were recorded as 41.9µg/m³ and 54.9µg/m³ at Dumerkholi/Nr. Mining Area and Rajendrapur/Nr. Mining Area location respectively. The average concentration of PM₁₀ was 48.5µg/m³.

2.4.4 Particulate Matter-PM_{2.5}:

The Minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 14.7µg/m³ & 23.7µg/m³ at Samri-Gopatu/Nr. Weigh bridge and Rajendrapur/Nr. Mining Area location. The average concentration of PM_{2.5} was 17.6µg/m³.

2.4.5 Sulphur Dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 5.3µg/m³ and 11.2µg/m³ respectively. The minimum concentration was recorded at Samri-Gopatu/Nr. Weigh bridge and maximum concentration was recorded at Rajendrapur/Nr. Mining Area location. The average concentration of SO₂ was 7.1µg/m³.

2.4.6 Nitrogen Dioxide (NO₂):

The minimum and maximum for NO₂ concentrations were recorded as 16.1 µg/m³ and 21.6µg/m³. The minimum concentration was recorded at Dumerkholi/Nr. Mining Area and maximum concentration was recorded at Rajendrapur/Nr. Mining Area location. The average concentration of NO_x was 17.5µg/m³.



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2.4.7 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 0.006/m³ detected at Dumerkholi/Nr. Mining Area location.

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

2.4.8 Mercury (Hg):

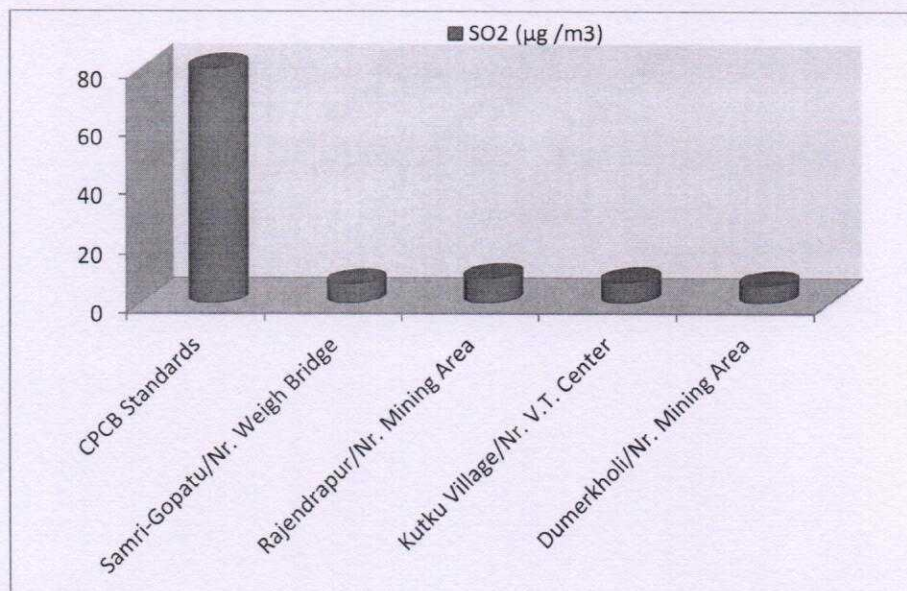
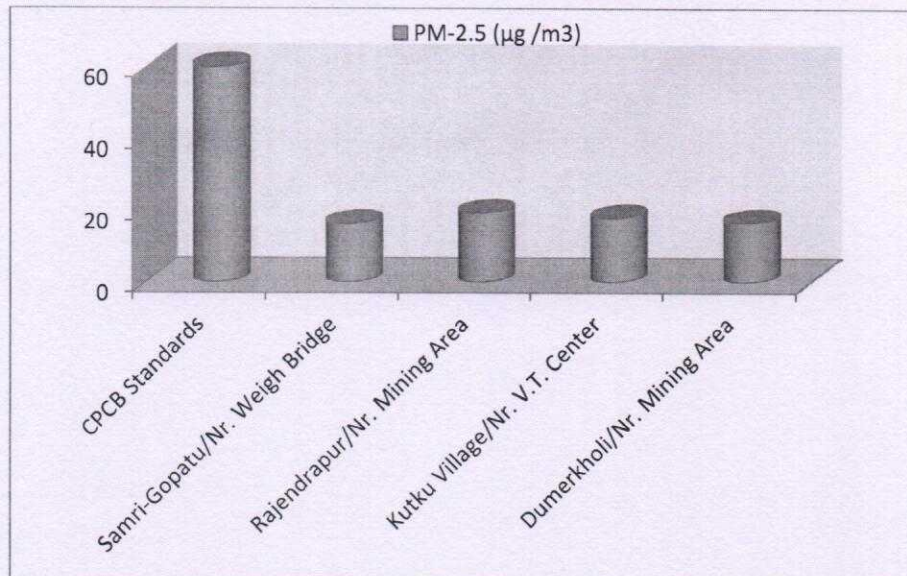
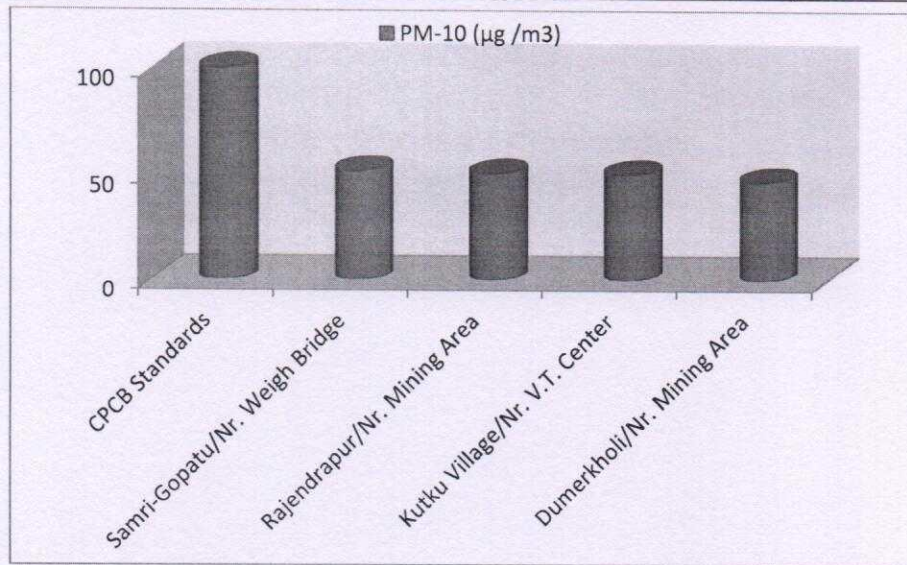
Mercury was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

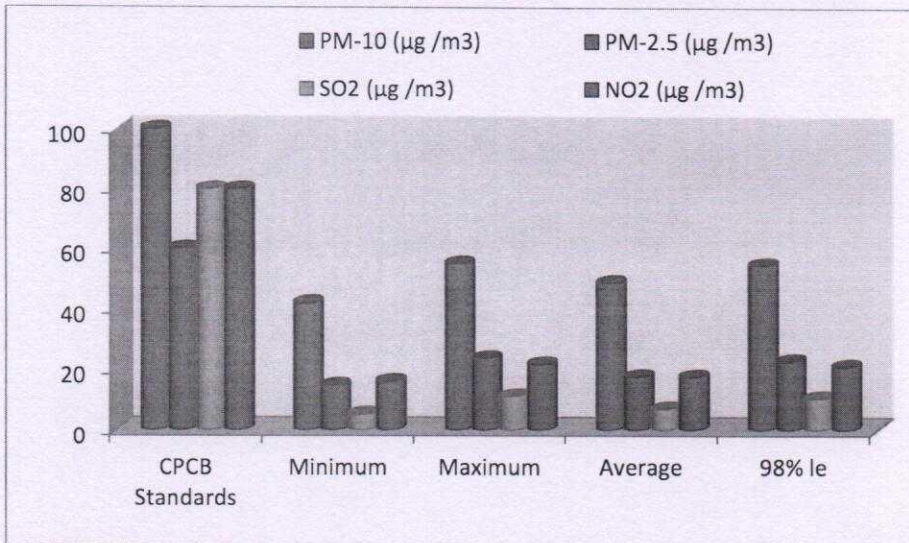
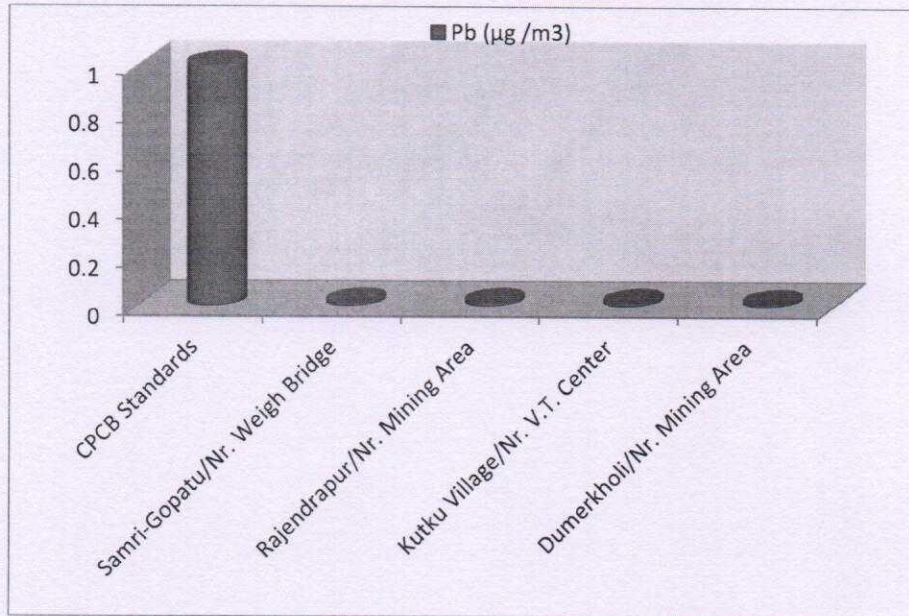
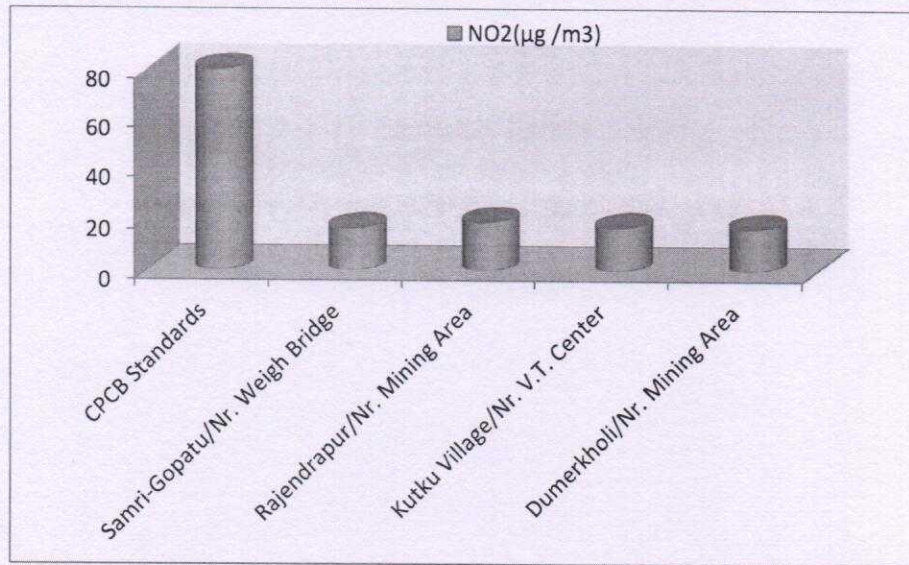
2.4.9 Arsenic (As):

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

2.4.10 Chromium (Cr):

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







2.5 Samri Lease (Buffer Zone):-

2.5.1 Ambient Air Quality:

Ambient air quality has been generated as per NAAQS 2009 for the month of October-November-December-2020. PM₁₀, PM_{2.5}, SO₂ & NO₂, The values obtained were then compared vis- a-vis the standards prescribed by CPCB for Industrial/ Rural / Residential uses.

2.5.2 Presentation of Results:

The summary of Ambient Air Quality monitoring results from October- 2020 to December- 2020 are presented in detail in Table 5.0. 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.

2.5.3 ParticulateMatter-PM₁₀:

The minimum and maximum concentrations for Particulate Matter-PM₁₀ were recorded as 46.2µg/m³ and 56.3µg/m³ at Sairaidh Campus and Virhorepat village location respectively. The average concentration of PM₁₀ was 51.7µg/m³.

2.5.4 ParticulateMatter-PM_{2.5}:

The minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 15.7µg/m³ & 23.8µg/m³ at Sairaidh Campus and Piprapat/Nr. Mining Area location respectively. The average concentration of PM_{2.5} was 18.8µg/m³.

2.5.5 Sulphur Dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 5.6µg/m³ and 9.3µg/m³ respectively. The minimum concentration was recorded at Sairaidh Campus and maximum concentration was also recorded at Sairaidh Campus. The average concentration of SO₂ was 7.7µg/m³.

2.5.6 Nitrogen Dioxide (NO₂):

The minimum and maximum for NO₂ concentrations were recorded as 14.9µg/m³ and 26.1µg/m³. The minimum concentration was recorded at Virhorepat village and maximum concentration was also recorded at Piprapat/Nr. Mining Area. The average concentration of NO₂ was 19.6µg/m³.



2.5.7 Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.019µg/m³ at Tatijharia Village/Nr. weigh bridge and No lead could be detected in PM₁₀ sample at Sairaidh Campus location.

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

2.5.8 Mercury(Hg):

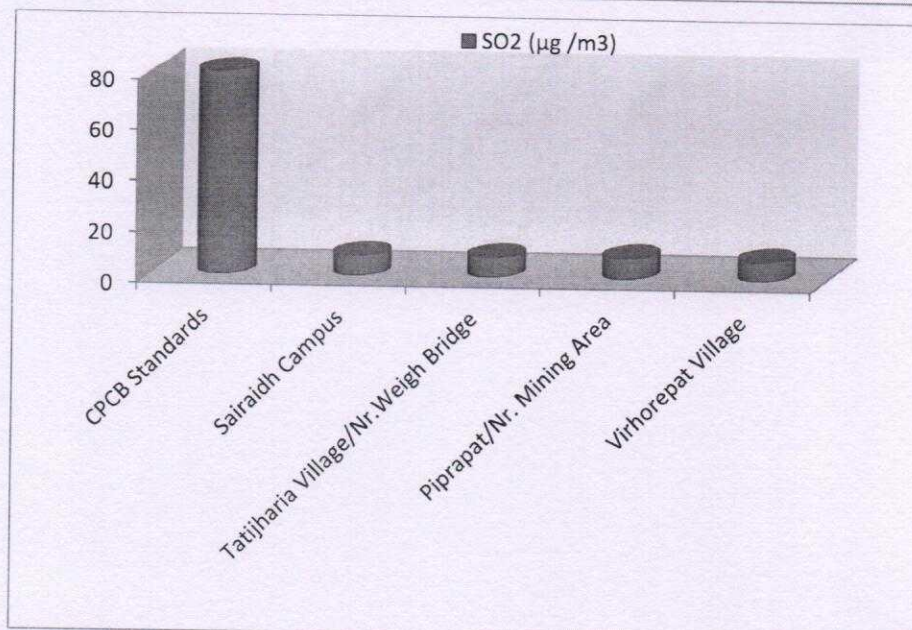
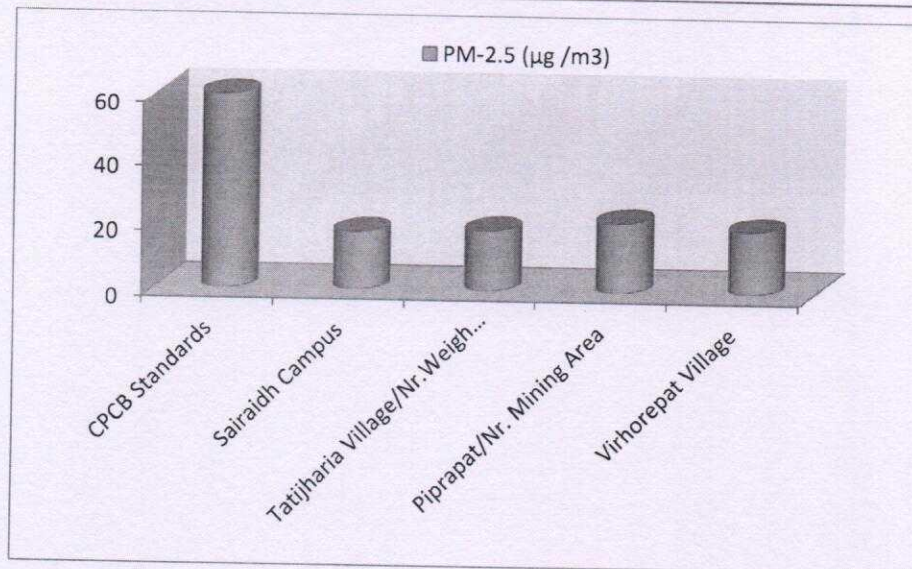
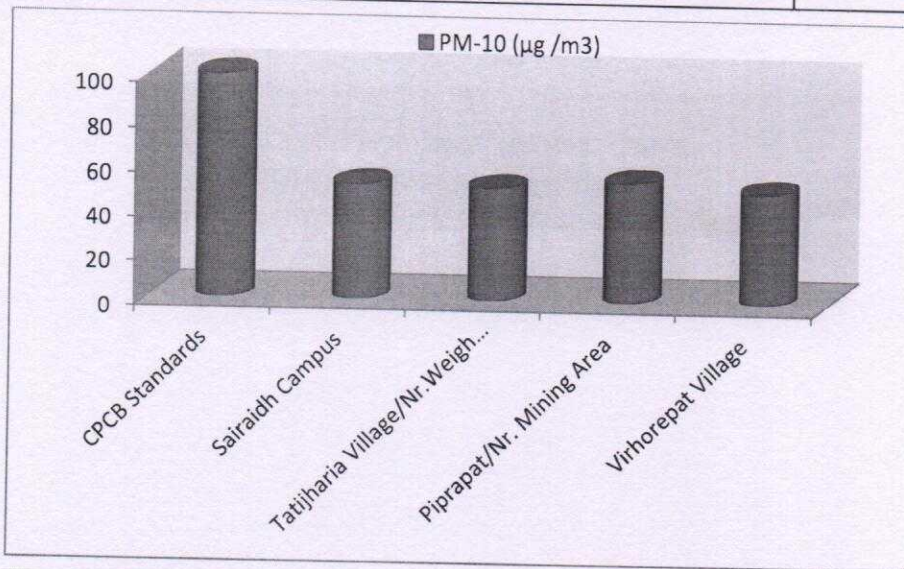
Mercury was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

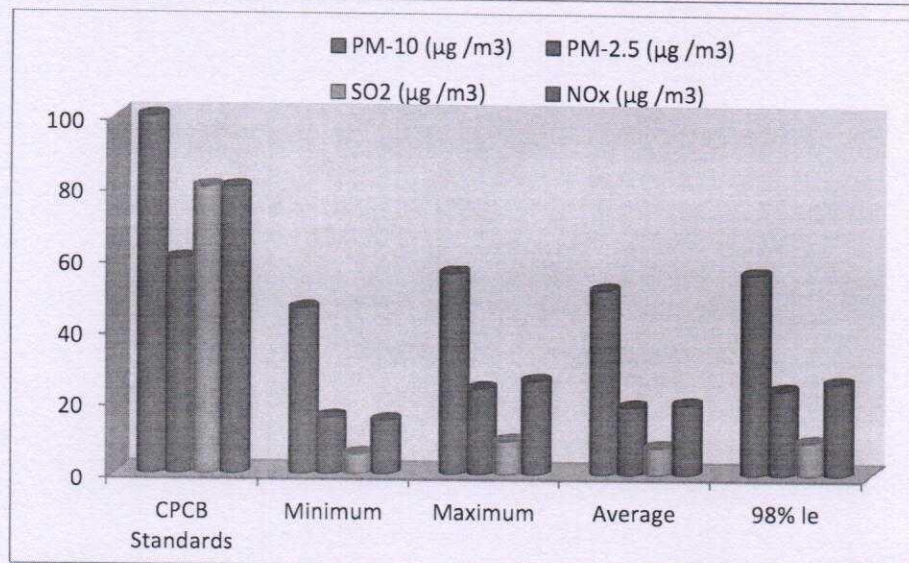
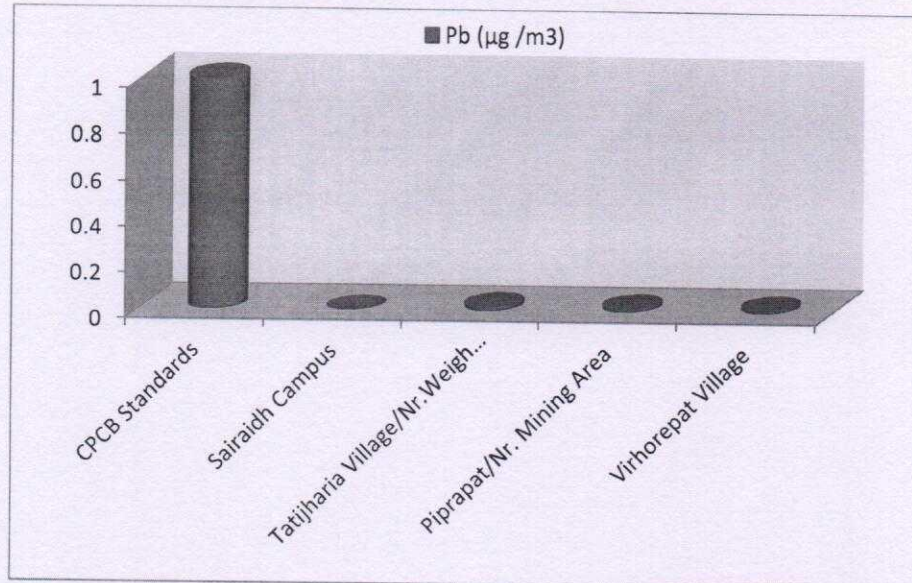
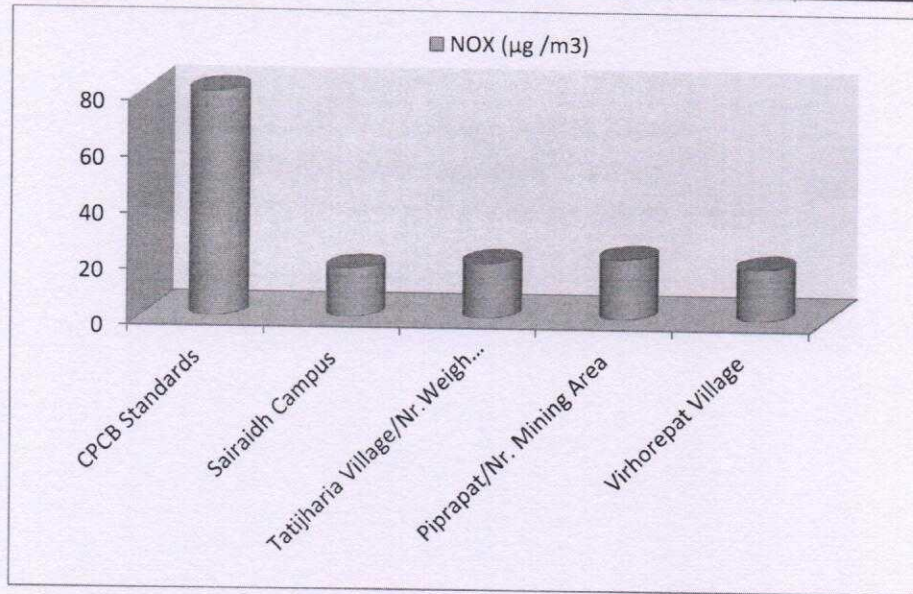
2.5.9 Arsenic (As):

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

2.5.10 Chromium(Cr):

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







3.0 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 **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.


| | | |
|--|--|--|
|  | Hindalco Industries Limited Samri Mining Environmental Status Report for October-2020 to December -2020 | Details of Salient Features |
|--|--|--|

Table 6

Noise Emission Monitoring Report

| SR. NO. | LOCATION | Month | Noise-dB(A) | |
|-------------------------|--|---------------|-------------|------------|
| | | | Day Time | Night Time |
| Core Zone | | | | |
| 1. | Samri-Gopatu/ Near Weigh bridge | October-2020 | 51.6 | 42.9 |
| | | November-2020 | 53.8 | 41.6 |
| | | December-2020 | 48.3 | 37.6 |
| 2. | Rajendrapur/ Nr. Mining Area | October-2020 | 46.2 | 38.1 |
| | | November-2020 | 52.7 | 37.2 |
| | | December-2020 | 42.9 | 36.8 |
| Buffer Zone | | | | |
| 1. | Tatijharia Village/Nr. Weigh Bridge | October-2020 | 52.7 | 39.6 |
| | | November-2020 | 56.2 | 47.2 |
| | | December-2020 | 47.2 | 39.1 |
| 2. | Piprapat/Nr. Mining Area | October-2020 | 56.2 | 41.7 |
| | | November-2020 | 53.9 | 41.8 |
| | | December-2020 | 52.6 | 41.8 |
| CPCB Standards | | | | |
| Industrial Area | | | 75 | 70 |
| Residential area | | | 55 | 45 |

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

Table 6.1

HEMM Spot Noise Level Monitoring

Unit: dB(A) Leq

| Sl. No. | Location | October-2020 | | November-2020 | | December-2020 | |
|---------|------------------------------------|--------------|------|---------------|------|---------------|------|
| | | Min. | Max. | Min. | Max. | Min. | Max. |
| 1. | Samri-Gopatu/ Near Weigh bridge | 54.8 | 62.7 | 56.8 | 61.7 | 48.2 | 54.9 |
| 2. | Near Mining Area | 56.9 | 61.4 | 61.3 | 64.9 | 51.6 | 56.2 |



4.0 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.



**Hindalco Industries Limited Samri
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**Details of
Salient Features**

Table 7

Report on Chemical Examination of Ground Water (December-2020)

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

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 | Absent | Absent | Absent |
| 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 | 140 |
| 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 | 38.26 |
| 9 | Calcium (as Ca) | mg/l | IS 3025 (Part 40) : 1991 | 75 | 200 | 47.13 |
| 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 | 0.28 |
| 13 | Magnesium (as Mg) | mg/l | IS 3025 (Part 46) : 1994 | 30 | 100 | 6.73 |
| 14 | Nitrate (as NO ₃) | mg/l | APHA 23 rd Edition | 45 | No relaxation | 11.24 |
| 15 | Odour | - | IS 3025 (Part 5) : 2018 | Agreeable | Agreeable | Agreeable |
| 16 | pH | - | IS 3025 (Part 11) : 1983 | 6.5 to 8.5 | No relaxation | 7.64 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 | 13.82 |
| 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 | 194 |
| 22 | Turbidity | NTU | IS 3025 (Part 10) : 1984 | 1 | 5 | 0.2 |
| 23 | Total hardness (as CaCO ₃) | mg/l | IS 3025 (Part 21) : 2009 | 200 | 600 | 145.46 |
| 24 | Mineral Oil | mg/l | ANqr RES-40 | 0.5 | No relaxation | BDL (DL - 0.001) |
| III | 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) |



**Hindalco Industries Limited Samri
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**Details of
Salient Features**

| 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 # | |
| | | | | 30 | Cadmium (as Cd) | |
| 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 - 0.03) |
| 40 | Zinc (as Zn) | mg/l | IS 3025 (Part 2) : 2019 | 5 | 15 | BDL (DL - 0.1) |
| IV | Chemical Testing 3. 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) |



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**Details of
Salient Features**

| 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 # | |
| 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 | | | | | |
| | Alpha-Endosulphan | µg/l | ANqr RES-28 | 0.4 | No relaxation | BDL (DL - 0.03) |
| | Beta-Endosulphan | | | | | |
| | Endosulphan sulphate | | | | | |

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. ● 'mg/l' is equivalent to 'ppm'. ● 'µg/l' is equivalent to 'ppb' ● Result for test no. 11 is not relevant. ● **BDL- Below detection limit.** ● **DL- DL Indicates detection limit of instrument /method and shall be considered as 'absent'.** ● **ANqr RES-29, 30, 31 & 40 : Inhouse validated method.**

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.

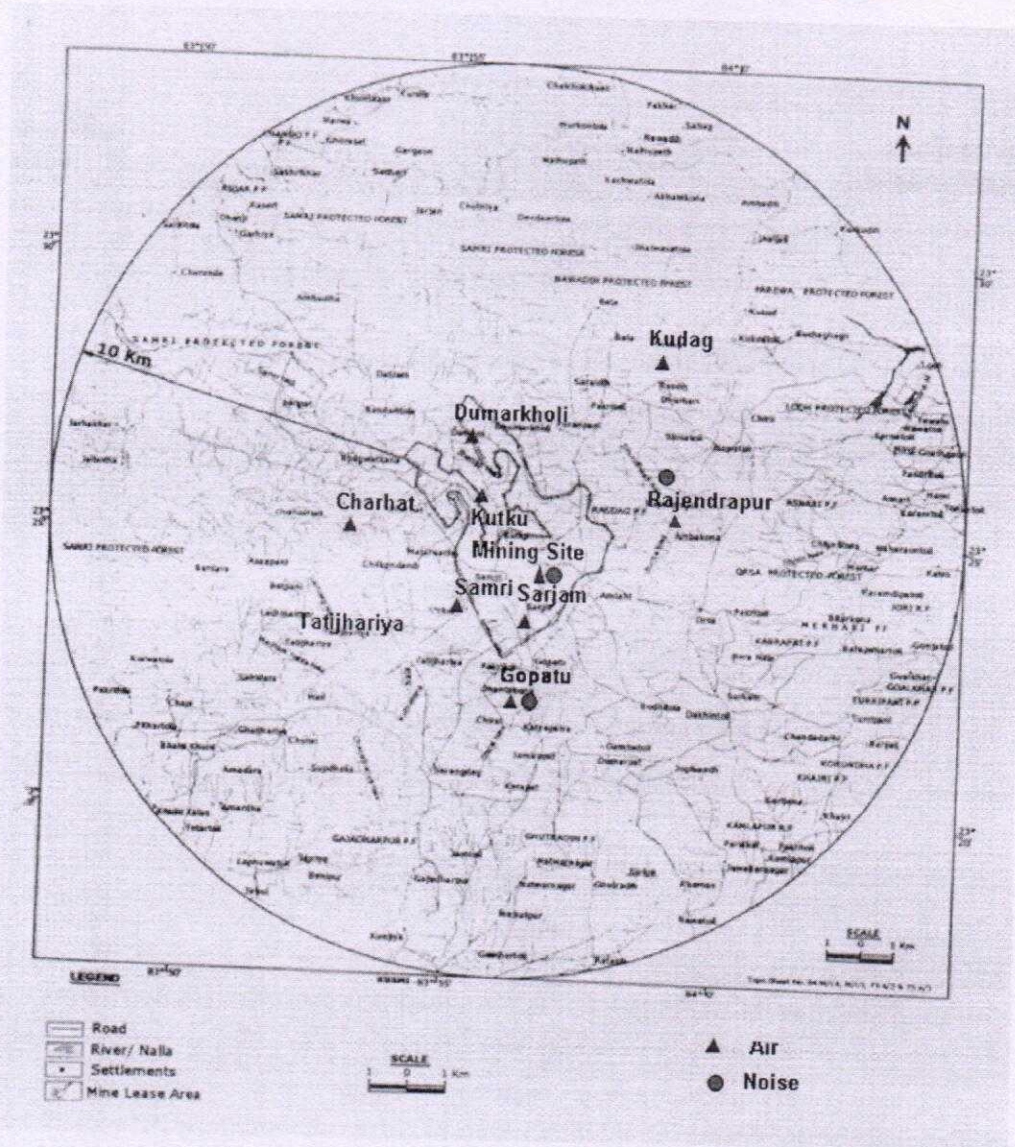
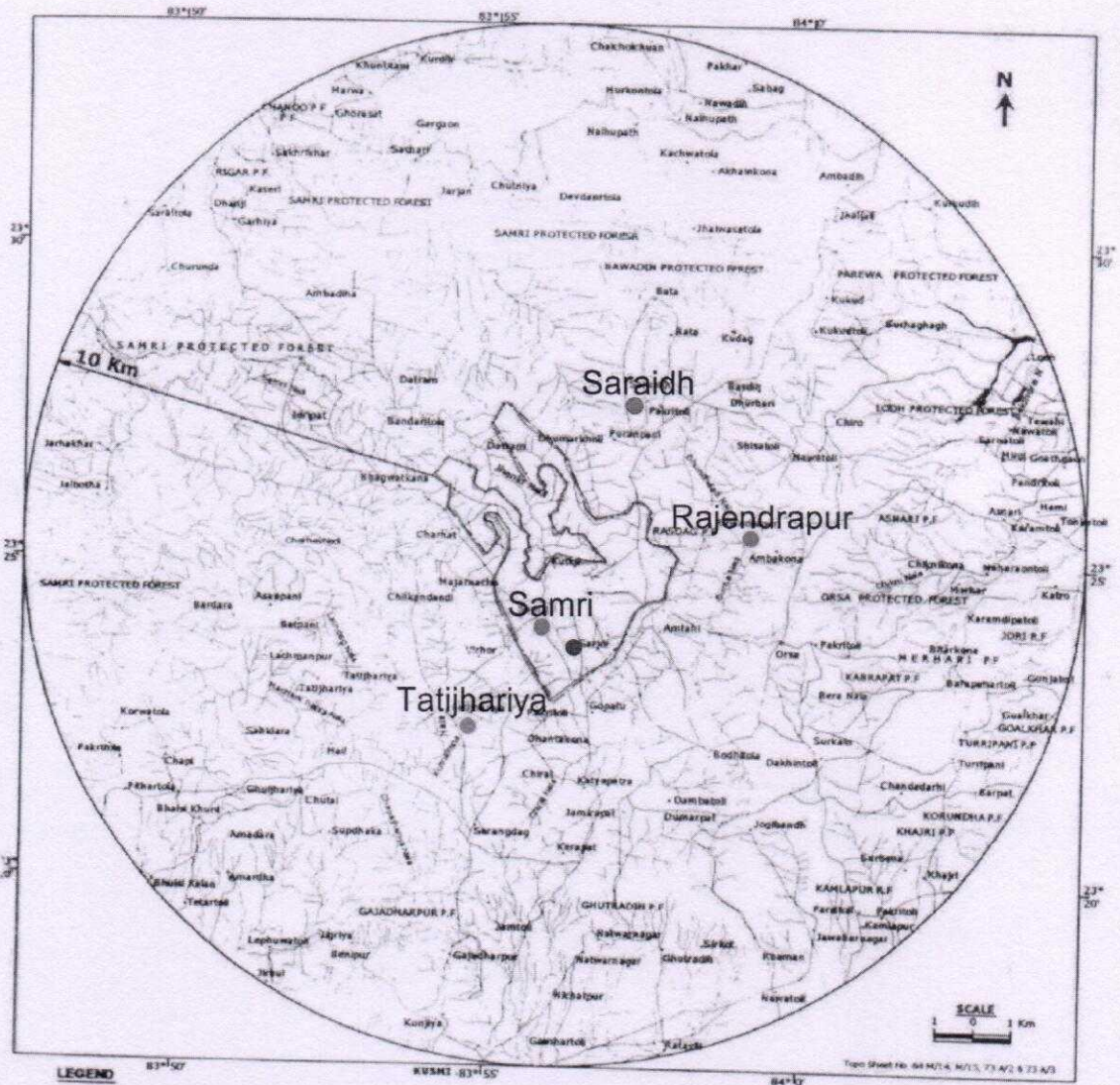


Fig3: Sampling Locations for Air, Noise



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



- Surface Water
- GroundWater

Fig 04: Sampling Locations for Water