

Environmental Status Report
For
Tatijharia 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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Agent of Mines
Samri Mines Division
Hindalco Industries Ltd



1.1 Introduction

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

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

HINDALCO INDUSTRIES LTD. awarded the work to M/s ANACON LABORATORIES PVT. LTD. NAGPUR (ALPL) for carrying out 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 Tatijharia mining lease in Balrampur District, Chhattisgarh State.

1.2 Background Information of Tatijharia Mine

Hindalco was granted Tatijharia Bauxite mining lease over an area of 1218.762hec.inTatijharia, Post Jamira, Tehsil Samri of Balrampur district, Chhattisgarh on 25/06/1998 for a period of 20 years. As per the Mines and Mineral (Development and Regulation) Amendment Act, 2015, Tatijharia lease has been extended up to 30 years i.e 24/06/2048. The mining operations were started on 01/04/2004. The production capacity of Tatijharia bauxite mine is 4.0 Lakh Tone/Year.



1.3 Salient Features of Tatijharia Bauxite Mine

The deposits occur in Tatijharia block, Post Jamira Tehsil Samri 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 Tatijharia Bauxite Mines

S.No.	Particulars	Details
1.	Survey of India Toposheet No.	64 M /15
2.	Latitude	23° 21' 02"N to 23° 24' 15"N
3.	Longitude	83° 54' 50"E to 83° 56' 30"E
4.	Elevation	1282-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	1218.762hec.
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 (143.56 km, E)
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 environment 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 impact of mining activity on sensitive receptors, it is necessary to monitor Environmental Quality to know ground level concentrations of pollutants within and around the mining lease area, accordingly Hindalco Industries through ALPL has been monitoring at the following locations air, water and Noise quality on monthly basis during these months (**Table 2**).

1.5 Air Environment

1.5.1 Ambient Air Quality Monitoring

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

Table 2

Locations of Ambient Air Quality Monitoring (AAQM)

(1218.762 hec.)

Sl. No.	(Core Zone)	Sl. No.	Buffer Zone
1	Piprapat/Nr.Mining Area	5	Kutku Village/Nr.V.T.Center
2	Betpani	6	Sairaidh Campus
3	Virhorepat	7	Rajendrapur/Nr.Mining Area
4	Tatijharia Village/Nr.Weigh Bridge	8	Dumerkholi/Nr.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. ALPL is carrying out regular monitoring for PM₁₀, PM_{2.5}, SO₂, NO₂ and Pb, Hg, As and Cr above Ambient Air Quality Monitoring (AAQM) locations. The AAQM sampling sites are selected considering seasonal variation in wind speed and wind direction.

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 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.

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 (October-November-December-2020) indicates that the wind was blowing predominately from (WSW and SW) directions, during study period.

Table 5

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%

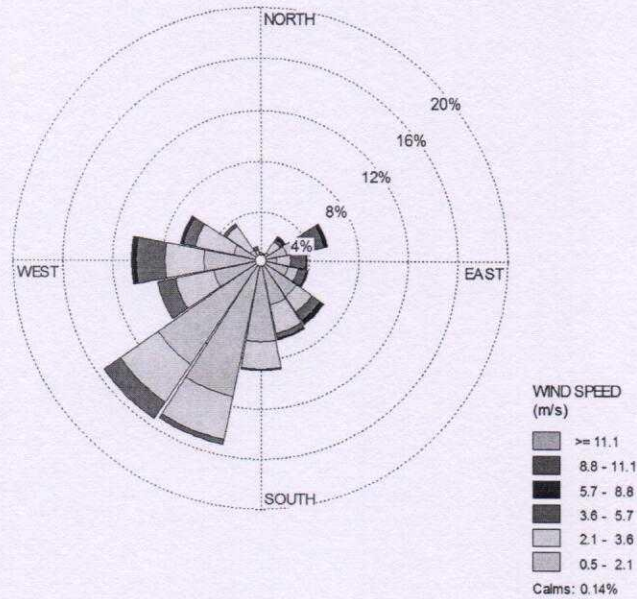


Figure.01: Wind Rose Diagram (July-August-September-2020)

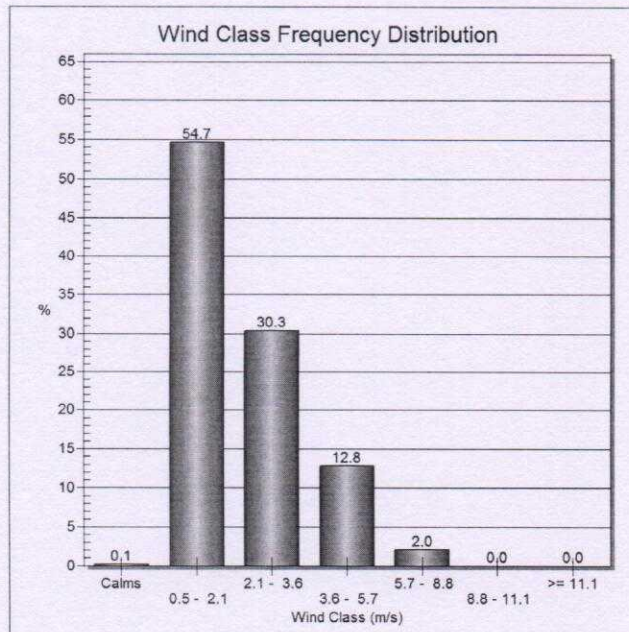


Figure.02: Wind Class Frequency Distribution (July-August-September-2020).



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Details of
Salient
Features

Table 6

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 ₂ ($\mu\text{g}/\text{m}^3$)	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									
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	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
Betpani	Oct-2020	51.9	18.3	7.1	17.3	0.014	ND	ND	ND
	Nov-2020	43.8	16.8	6.1	17.2	0.017	ND	ND	ND
	Dec-2020	48.1	18.2	6.8	17.3	0.013	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	16.2	5.7	14.9	0.012	---	---	---
Maximum		56.3	23.8	9.1	26.1	0.019	---	---	---
Average		50.7	18.9	7.5	19.5	0.016	---	---	---
98% le		56.3	23.7	8.9	25.8	0.019	---	---	---

- The Average Concentration of PM₁₀ within the Core Zone of Tatijharia Lease is 50.7 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Core Zone of Tatijharia Lease is 18.9 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Core Zone of Tatijharia Lease is 7.5 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO₂ within the Core Zone of Tatijharia Lease is 19.5 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Core Zone of Tatijharia Lease is 0.016 $\mu\text{g}/\text{m}^3$.

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



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Details of
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									
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
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
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
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	15.7	5.4	16.1	0.000	---	---	---
Maximum		56.1	23.7	11.2	21.6	0.019	---	---	---
Average		50.0	17.8	7.4	17.7	0.011	---	---	---
98%ile		55.8	22.8	10.8	20.9	0.019	---	---	---

- The Average Concentration of PM₁₀ within the Buffer Zone of Tatijharia Lease is 50.0 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of PM_{2.5} within the Buffer Zone of Tatijharia Lease is 17.8 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SO₂ within the Buffer Zone of Tatijharia Lease is 7.4 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Buffer Zone of Tatijharia Lease is 17.7 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of Pb within the Buffer Zone of Tatijharia Lease is 0.011 $\mu\text{g}/\text{m}^3$.

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



Month-wise Summary of Statistical Analysis

1.7 Tatijharia Lease (Core Zone):-

1.7.1 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.

1.7.2 Presentation of Results:

The summary of Ambient Air Quality monitoring results from October-2020 to December- 2020 are presented in detail in Table 6.0. 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.

1.7.3 Particulate Matter-PM₁₀:

The minimum and maximum concentrations for Particulate Matter-PM₁₀ were recorded as 43.8µg/m³ and 56.3µg/m³ at Betpani location and Virhorepat location respectively. The average concentration of PM₁₀ was 50.7µg/m³.

1.7.4 Particulate Matter-PM_{2.5}:

The minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 16.2µg/m³ & 23.8µg/m³ at Virhorepat and Piprapat/Nr. Mining area respectively. The average concentration of PM_{2.5} was 18.9µg/m³.

1.7.5 Sulphur Dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 5.7µg/m³ and 9.1µg/m³ respectively. The minimum concentration was recorded at Virhorepat and maximum concentration was also recorded at Virhorepat location. The average concentration SO₂ was 7.5µg/m³.

1.7.6 Nitrogen Dioxide (NO₂):

The minimum and maximum for NO₂ concentrations were recorded as 14.9µg/m³ and 26.1µg/m³. The maximum concentration was recorded at Piprapat/Nr. Mining area and the minimum concentration was also recorded at Virhorepat location. The average concentration of NO_x was 19.5µg/m³.



1.7.7 Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.019µg/m³ at Tatijharia village/Nr. Weigh Bridge and the minimum lead in PM₁₀ sample was 0.012µg/m³ also detected at Virhorepat location. No lead could be detected in PM_{2.5} samples at any of the Ambient Air samples at any of the locations.

1.7.8 Mercury(Hg):

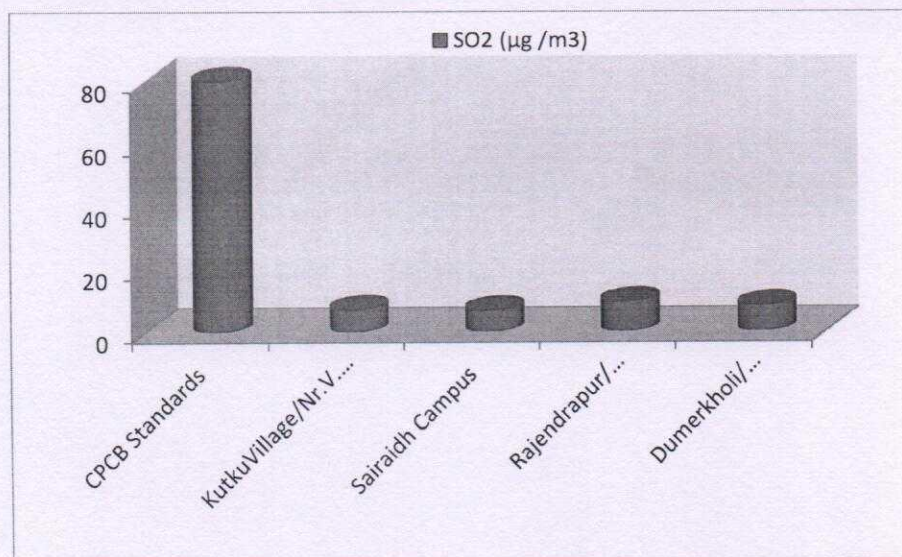
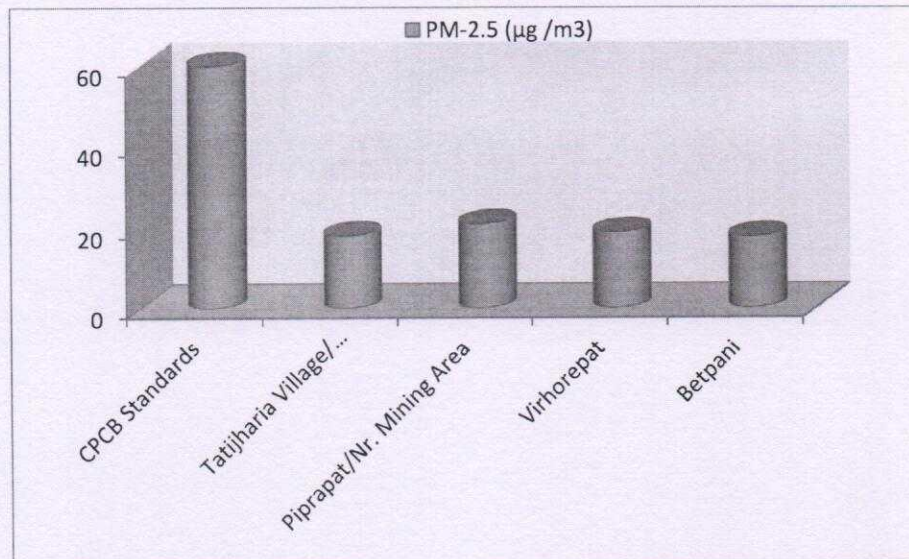
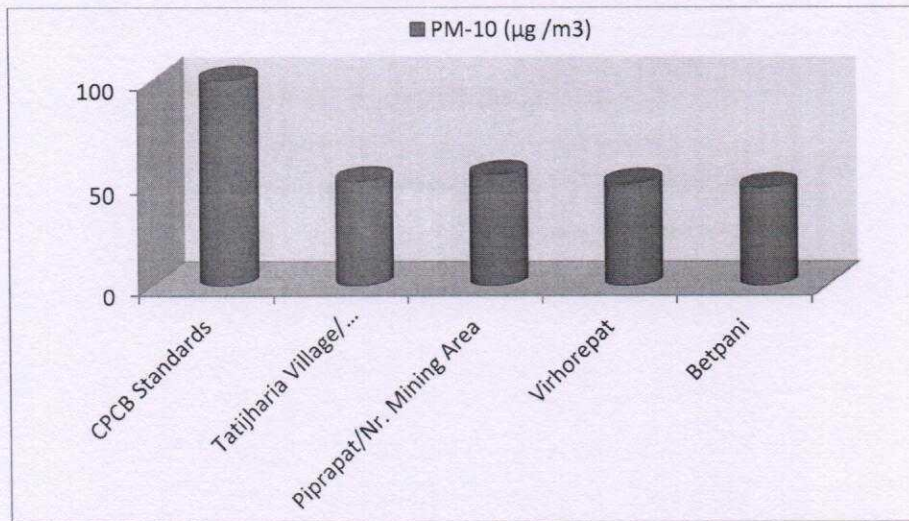
Mercury was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

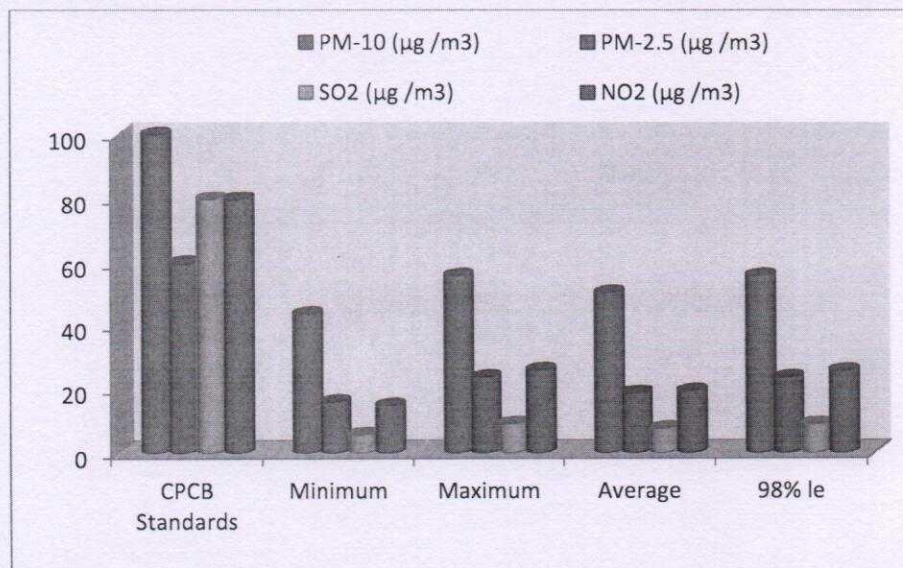
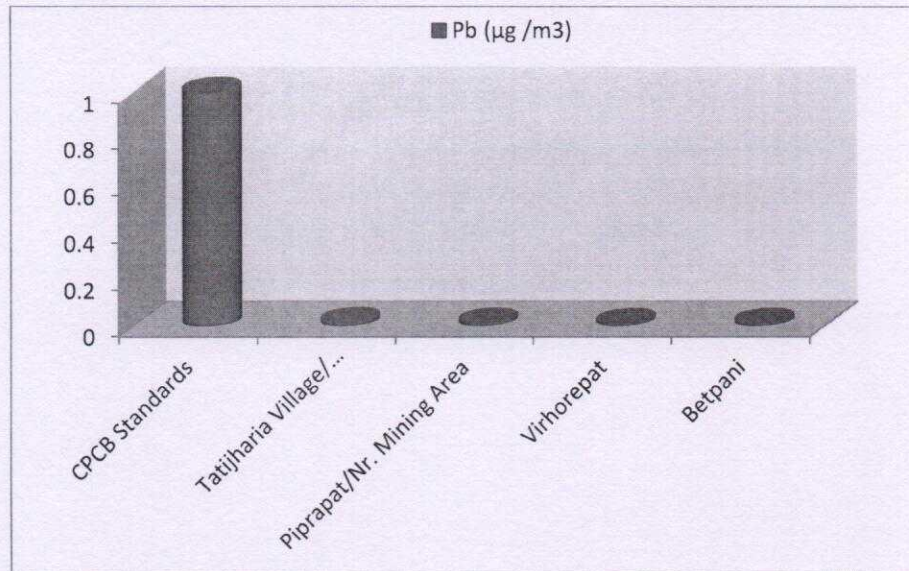
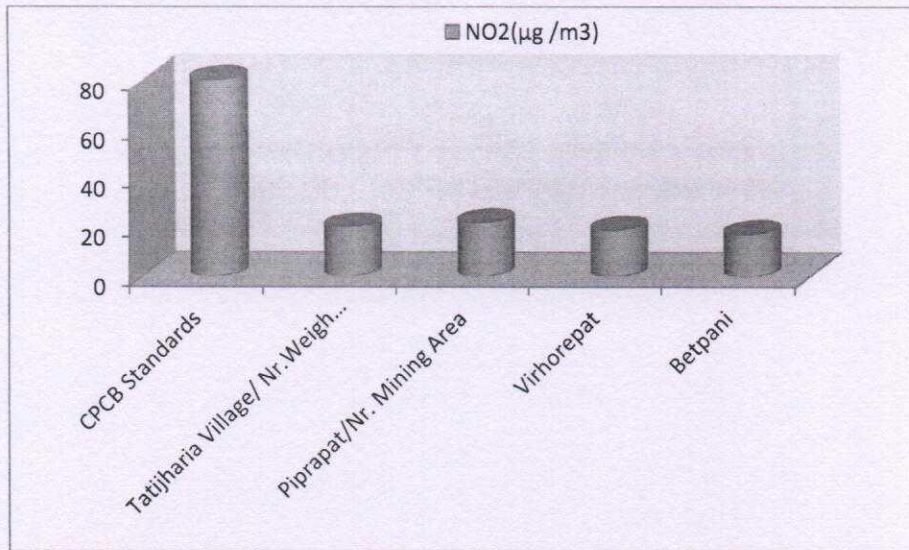
1.7.9 Arsenic (As):

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

1.7.10 Chromium(Cr):

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







Tatijharia Lease (Buffer Zone):-

1.8 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.

1.8.1 Presentation of Results:

The summary of Ambient Air Quality monitoring results from October-2020 to December- 2020 are presented in detail in Table 6.0. 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.

1.8.2 Particulate Matter-PM₁₀:

The minimum and maximum concentrations for Particulate Matter-PM₁₀ were recorded as 41.9µg/m³ and 56.1µg/m³ at Dumerkholi/ Nr.Mining area and Sairaidh Campus respectively. The average concentration of PM₁₀ was 50.0µg/m³.

1.8.3 Particulate Matter-PM_{2.5}:

The minimum and maximum concentrations for Particulate Matter-PM_{2.5} were recorded as 15.7µg/m³ & 23.7µg/m³ at Sairaidh Campus and Rajendrapur/Nr. Mining area location. The average concentration of PM_{2.5} was 17.8µg/m³.

1.8.4 Sulphur dioxide (SO₂):

The minimum and maximum for SO₂ concentrations were recorded as 5.4µg/m³ and 11.2µg/m³ respectively. The minimum concentration was recorded at Sairaidh Campus and maximum concentration was also recorded at Rajendrapur/Nr. Mining area location. The average concentration of SO₂ was 7.4µg/m³.

1.8.5 Nitrogen dioxide (NO₂):

The minimum and maximum for NO₂ concentrations were recorded as 16.1µg/m³ and 21.6µg/m³ at Dumerkholi/ Nr.Mining area & Rajendrapur/Nr. Mining location respectively. The average concentration of NO_x was 17.7µg/m³.



1.8.6 Lead (Pb):

Maximum Lead detected in PM₁₀ samples was 0.019µg/m³ at Rajendrapur/Nr. Mining location 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.

1.8.7 Mercury(Hg):

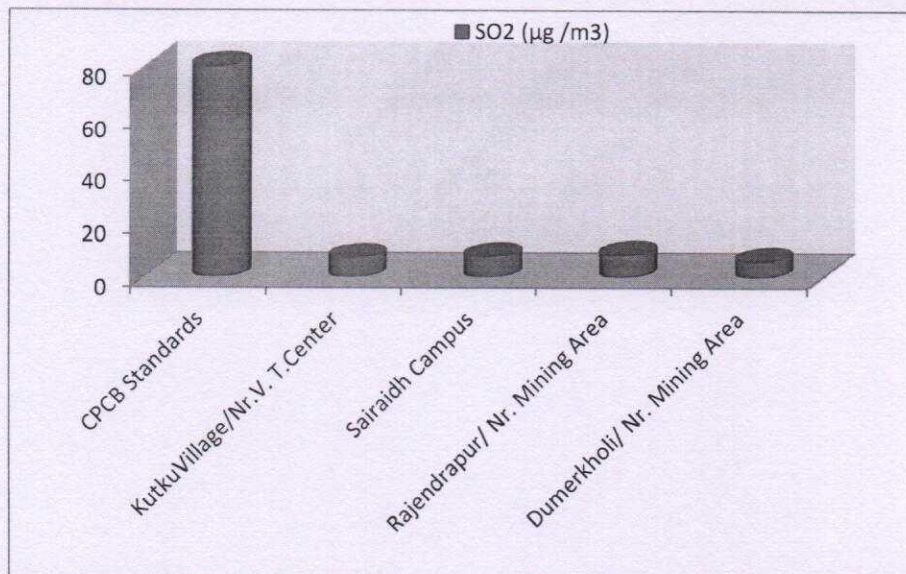
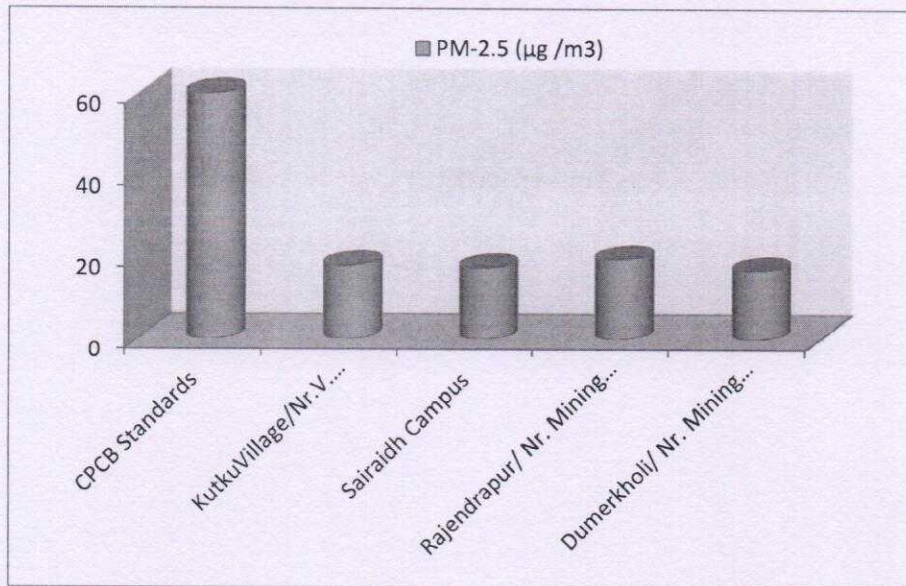
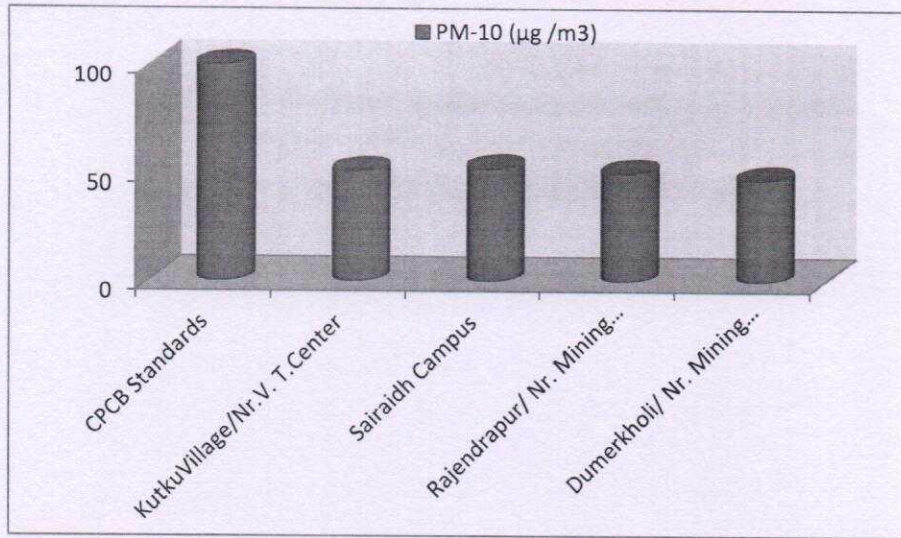
Mercury was not detected at any of the locations in PM₁₀ samples as well as PM_{2.5} Samples.

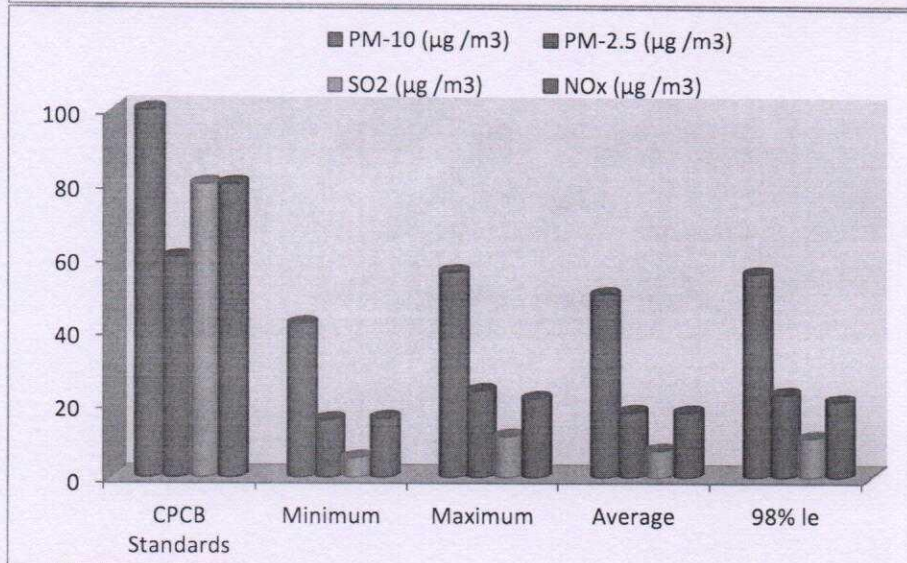
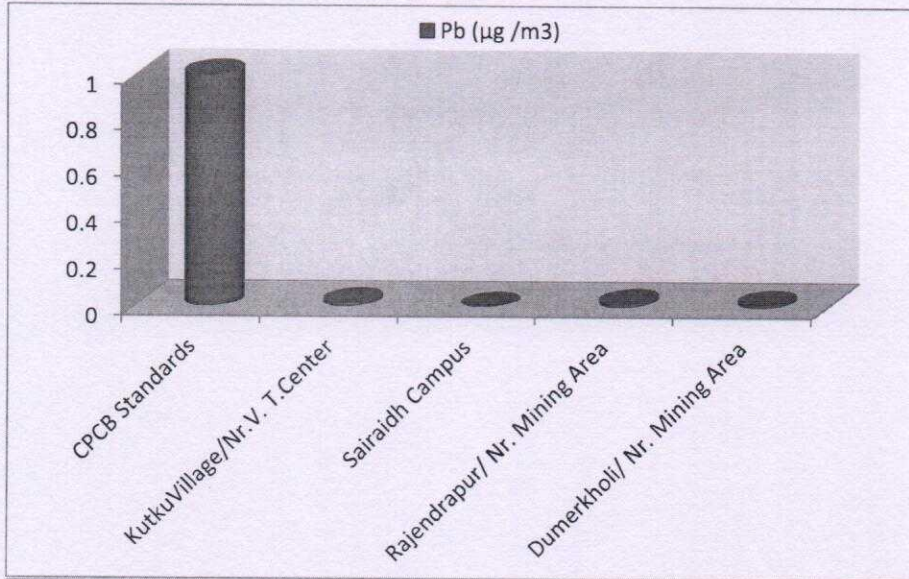
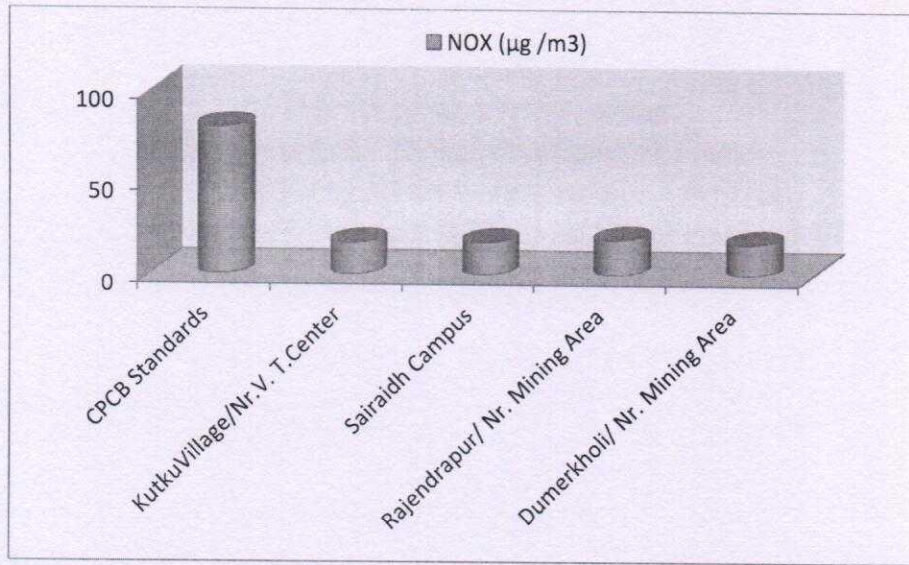
1.8.8 Arsenic(As):

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

1.8.9 Chromium(Cr):

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







2. Noise Environment

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

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

Identification of sampling locations

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

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

Method of Monitoring

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

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

Noise levels monitored during day and night at 8 locations are found to be below the stipulated standard of CPCB as for Industrial area as 75dB(A) and 70dB(A) for day and night respectively as given in **(Table7)**.



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Instrument used for monitoring

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

Table 7

Noise Emission Monitoring Report

SR. NO.	LOCATION	Month	Noise-dB(A)	
			Day Time	Night Time
Core 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
Buffer 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
CPCB Standards				
Industrial Area			75	70
Residential area			55	45

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

Table 8

HEMM Spot Noise Level Monitoring

Unit: dB(A)

Sl. No.	Location	October-2020		November-2020		December-2020	
		Min.	Max.	Min.	Max.	Min.	Max.
1.	Piprapat/Nr.Mining Area	53.8	64.7	47.3	58.2	43.7	54.1
2.	Tatijharia Village/ Nr.Weigh Bridge	56.2	61.9	51.9	64.8	51.9	57.6

3. 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 piprapat/Nr.mining area.

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

The physico-chemical analysis of water samples collected during the study period is given in **(Table-9 and Fig.3)**. The overall water quality found to be below the stipulated standards of IS 10500-2012 for ground water & found to be fit for drinking purpose for tested parameters. Thus the impacts due to mining activities have been found to be insignificant.

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

Table 9

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

Location:	GW1 Piprapat/Near Mining Area Sample Source:-Bore-well 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	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	129
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	43.82
9	Calcium (as Ca)	mg/l	IS 3025 (Part 40) : 1991	75	200	38.76
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	0.31
13	Magnesium (as Mg)	mg/l	IS 3025 (Part 46) : 1994	30	100	5.72
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	6.97 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	14.57
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	168
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	120.39
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)



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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 #	
				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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				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.

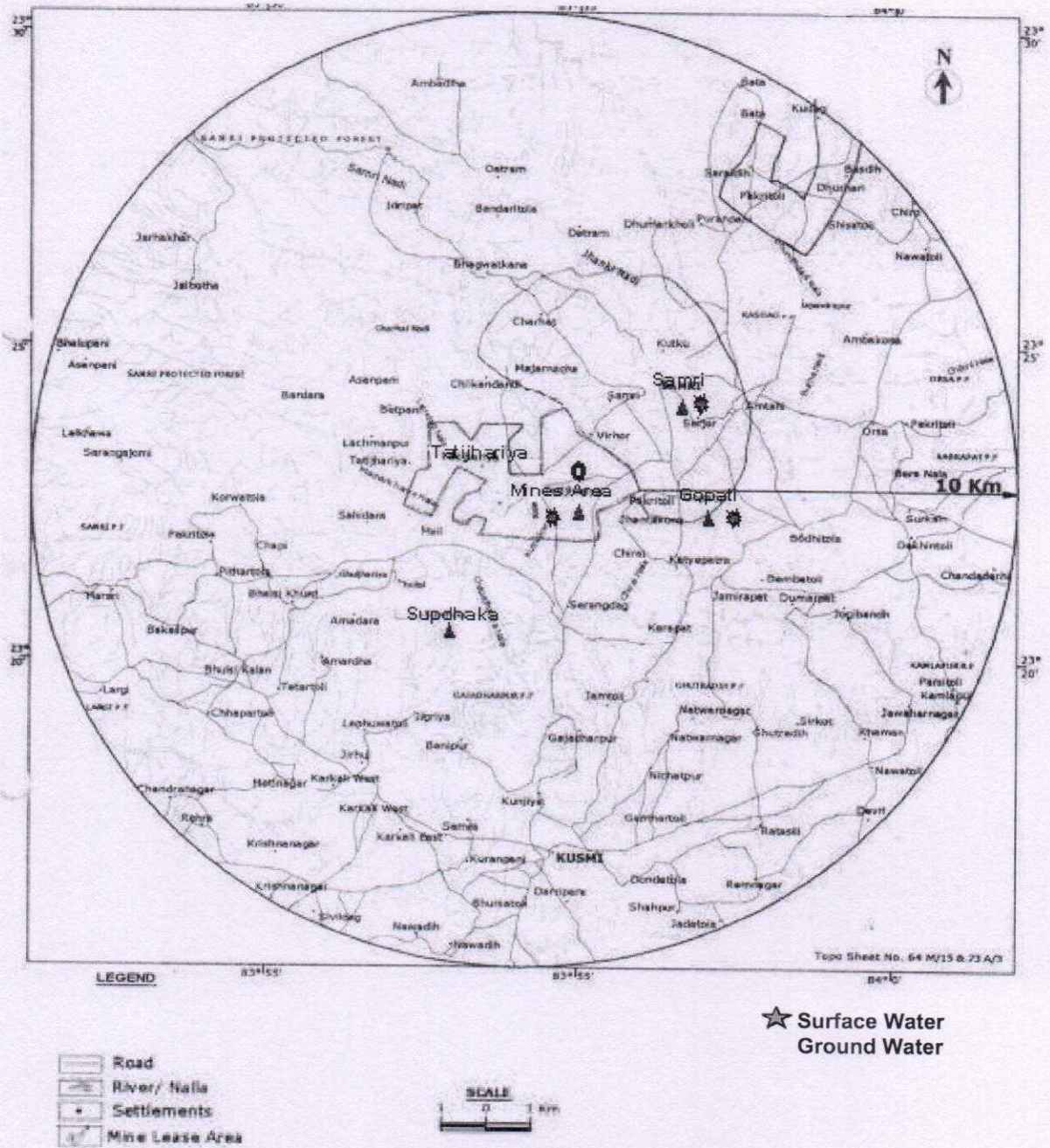


FIG 4: SAMPLING LOCATIONS FOR WATER