



f:- HIL/SAM/CCF/49/2014/T

24.5.2014

To,
The Chief Conservator of Forest (Central),
MoEF Regional Office (Western Zone)
Kendriya Paryavaran Bhawan, Link Road
Bhopal-462016

Sub:- Status of compliance of EC condition (Half yearly status of compliance report) Tatijharia Bauxite Mine (Lease area- 1218.762 Ha.) of Hindalco Industries Limited of Chhattisgarh state from Apr-2013 to Sep-2013.

Ref No:- Environment Clearance Letter No-J-11015/337/2007-IA. II(M) dated August 9, 2007

Dear Sir,

We do hereby submit half yearly status of compliance report of EC condition with respect of Tatijharia Bauxite Mine, Lease area -1218.762 Ha, of Hindalco Industries Limited, located in Balrampur-Ramanujan district of Chhattisgarh state from Oct -2013 to Mar-2014.

We assure that we comply all the conditions laid down in the consent letter and also abide to follow all the Rules and Regulations.

Thanking you,

Yours' faithfully

For Hindalco Industries Limited

(M. K. Nayak)

GM- Mines

Encl:-

1. Half Yearly Status of compliance of Environment condition as annexure-I.
2. Copy of Diversion of Revenue Forest Land enclosed as annexure -II.
3. Jan-14 to Mar-14, Environment Status Report enclosed as annexure -III
4. Yearly Production report enclosed as annex-V.
5. Status report of mined out, reclaimed and afforested land as annexure-VI.
6. Actual expenditure incurred in environment measure from Apr-13 to Mar-14 as annex-VII.

Note:-Renewal for consent to operate from CECB dated 01.12.2013 to 30.11.2014 has been applied in time. Field inspection has been completed by CECB. Renewal is under process for approval.

HINDALCO INDUSTRIES LIMITED
Samri Mines Division, Baba Chowk
At & Post - Kusmi, PIN : 497 224,
Distt. - Balrampur-Ramanujan (CG), INDIA
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Telephone +91 22 6662 6666.

Website www.hindalco.com
E mail hindalco@adityabirla.com
Corporate Identity No- L27020MH1958PLCO11238.

20.5.2014

**Status of Compliance from Oct-2013 to Mar-2014 of Environmental
Condition laid down by MOEF**

Tatijharia Bauxite Mine

The status of compliance of the conditions (as per point no.3) with reference to the environment clearance letter no.J-11015/337/2007-IA. II(M) dated 9.8.2012 of Ministry of Environment & Forests, New Delhi, to maintain the production capacity of Tatijharia Bauxite Mine as under.

A Specific condition:-

- (i) The wild life management plan has been approved.
- (ii) We accept the condition.
- (iii) The conservation plan for schedule I fauna have been prepared. The authenticated list of flora and fauna for core and buffer zone is enclosed for perusal please. (Annexure- I).
- (iv) The mining operation is restricted to well above ground water table during currency of mining operation. The ultimate depth of working will be about 14 meters below whereas the water table in the core zone is about 50-52 meters.
- (v) Top soil and solid waste is being utilized for simultaneous back filling of mined out area for reclamation purpose and practice is followed.
- (vi) OB is stacked at earmark location and slope of dump is maintained less than 28 degree. All protective measure such as retaining walls, bunds


(M. K. Nayak)
Agent of mines
Samri mines Division
Hindalco Industries Ltd

- (vii) and also plantation on available land are being taken to prevent erosion of soil.
- (viii) Garland drains have been made around the active mining pits coupled with arrester to arrest silt from soil and dumps are maintained. The garland drains are regularly desilted before the monsoon.
- (ix) We undertake that no natural water course is obstructed during mining operation.
- (x) Controlled blasting is in practiced in the mine. Dust extractors are being used during drilling operations. Cord relay & effective blast design are used to control blast vibration and fly rocks. Blasting is carried out only in day hours.
- (xi) The plantation in reclaimed area is carried out as per plan and is carried out as suggested. The density is being maintained about 2500 plant per hectare with the species like jatorpha, Kasia-Samia, mango, babul, pears, & guava etc. Social forestry is also being encouraged among the local villagers.
- (xii) The ground water table does not intersect during our mining operation because of shallow depth of mining
- (xiii) Regular water spraying with 12 KL water tanker in the mine lease hold area is being carried out regularly to control air pollution. The ambient air quality is within the stipulated norms.
- (xiv) Regular monitoring of ground water quality is being carried out. The analysis reports are being submitted to Regional Office, CEGB, Ambikapur and other regulating authority.
- (xv) Till date three rain water harvesting ponds has been made at lease area.
- (xvi) If required, the permission will be taken from competent authority.
- (xvii) No endanger fauna is present in mines area however all possible measures is taken to prevent ecological status of project area.
- (xviii) Regular and periodic maintenance of HEMM is being carried out for control of vehicular emission in mines area. The bauxite ore are transported in trucks with tarpaulin cover.
- (xix) All workers are provided personal protective equipment and training are also being imparted to them for safety & health, sanitation and will be continued. Health awareness camps including HIV are organized for all workmen. One doctor having MBBS qualification has been appointed for facilitation of OHS. The records related to initial and periodical medical examination of all workmen is maintained.
- (xx) We accept the condition.

(B) General Condition.

- (i) No change in mining technology and scope of working will be done without approval of MOEF New Delhi.
 - (ii) Calendar plan will be followed and there will not be any change in calendar plan.
 - (iii) The suggestion of local forest department will be implemented for conservation of flora and fauna in and around lease hold area.
 - (iv) Ambient Air quality monitoring is being carried out as per guideline and will be followed.
 - (v) Data of ambient air quality (RPM, SPM, SO₂, Nox) are being submitted to CECB and will be submitted to other regulatory authorities as per guidelines.
 - (vi) Fugitive dust emission from generating sources is being controlled. The dust extractor, wet drilling, regular water spraying with 12 KL water tanker in the mine lease hold area is being carried out regularly.
 - (vii) The noise level in working are being maintained below the limit prescribed and will be maintained. The operators of HEMM are being provided earplug/muffs. The proper maintenance of HEMM is being carried out to control noise emission.
 - (viii) No waste water is generated from the mine however as suggested measures will be taken if required.
 - (ix) All workers are provided personal protective equipment and training are also being imparted to them for safety & health and will be continued as per guidelines.
 - (x) Periodical and Initial medical examination of all workers are being carried out as per provision of Mines Act.
 - (xi) Separate Environment cell is already in place at Samri Mines Division headed by GM (Mines) and comprises of suitable qualified persons.
 - (xii) In case of final closure of mine the information will be submitted to Regional Office, Ministry of Environment & Forests, Bhopal.
 - (xiii) Adequate fund provision is already earmarked for environmental protection measures and will not be diverted to other purpose. The year wise expenditure will be submitted to concern authorities as per guidelines.
 - (xiv) The same will be intimated to Regional Office, Ministry of Environment & Forests, Bhopal.
-

- (xv) All cooperation is being extended to regulatory authorities and will be extended as earlier.
- (xvi) Although no suggestion/representation has been received by any Panchayat/Local NGO while processing the proposal. However we have forwarded the copy of clearance letter to Panchayat in our area. The copy of same has been already submitted to your good office.
- (xvii) The copy has been displayed by CECB in Balrampur Collectorate.
- (xviii) The information regarding environment clearance has been published in two local new papers namely Hari Bhumi & Ambika Vani. The copy of same has been already submitted to your good office.

Hope the above compliance will be found in order.

Yours truly,
For Hindalco Industries Limited



(M K Nayak)
Agent of Mines.

(M. K. Nayak)
Agent of mines
As Above
Samri mines Division
Hindalco Industries Ltd

(18)

तार

Telegram : PARYAVARAN,
NEW DELHI

दूरभाष :

Telephone :

तेल्लेग (द्विभाषी) :

Telex : (bi-lingual) : W-26195 DOE IN

FAX : 4360678

TATISHARIA

भारत सरकार
पर्यावरण एवं वन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS
पर्यावरण भवन, नं० ३, श्री० कामधेनव
PARYAVARAN BHAWAN, C.G.O. COMPLEX
लोधी रोड, नई दिल्ली - 110003
LODHI ROAD, NEW DELHI - 110003
Dated: 17th March, 1996.

No.3-2J/95-FC

To

The Secretary (Forests),
Government of Madhya Pradesh
Bhopal.

Sfg
Suraj Gupta

R.O.P.

R.O.P./N.G.P./348/2006/A

Sub: Diversion of 514.019 ha. of revenue forest land in
favour of M/s HINDALCO Industries Ltd. for Bauxite
mining in District Sarguja.

Sir,

I am directed to refer to your letter no. F.5/19/95/10/3 dated 9.3.95 on the above mentioned subject seeking prior approval of the Central Government in accordance with Section-2 of the Forest (Conservation) Act, 1980 and to say that the proposal has been examined by the Advisory Committee constituted by the Central Government under Section-3 of the aforesaid Act.

2. After careful consideration of the proposal of the State Government and on the basis of the recommendation of the above mentioned Advisory Committee, the Central Government hereby conveys its approval under Section-2 of the Forest (Conservation) Act, 1980 for diversion of 514.019 ha. of revenue forest land in favour of M/s HINDALCO Industries Ltd. for Bauxite mining in District Sarguja subject to the following conditions:

- 1) Legal status of forest land shall remain unchanged.
- 11) Compensatory afforestation shall be carried out over double the degraded forest land at the project cost.

APPROVED

- (iii) Acclamation of the mining area will be done in consultation with the State Forest Deptt. at the project cost as per plan prepared in this regard.
- (iv) Demarcation of the mining area will be done on the ground at the project cost.
- (v) Forest land will not be used for construction of buildings etc. and any purpose other than those mentioned in the proposal.
- (vi) Lease period shall remain coterminous with lease under MWID Act subject to maximum of 20 years.
- (vii) Free fuelwood will be provided to the labourers and staff working at the project site at the project cost.
- (viii) Any other condition the State Govt. may impose.
- (ix) This clearance is subject to the environmental clearance of the project under the Environment Protection Act.

Yours faithfully,

(R.K. CHAUDHRY)
Asstt. Inspector General of Forests.

Copy to:

1. The Principal Chief Conservator of Forests
Government of Madhya Pradesh, Bhopal.

2. Nodal Officer, Office of the Principal Chief Conservator
of Forests, Govt. of Madhya Pradesh, Bhopal.

3. The CCF (Central), Regional Office, Bhopal.

4. RO(HQ), New Delhi.

5. Guard file.

4.11.2016
(R.K. CHAUDHRY)
AIGF.

APPROVED

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

Duration: January-February-March-2014

Sponsor:-



M/s. Hindalco Industries Limited

(M. K. Nayak)
Agent of mines
Samri mines Division
Hindalco Industries Ltd

Prepared By :-



Recognised by MoEF (GOI) Notifn. No. D.L.33004/99 Dt.24.10.2007
NABL (DST GOI) Cert. No. T-1550 Dt. 16/05/2011
NABL (DST GOI) Cert. No.T-1826 dt. 04/10/2010
QCI-NABET Scheme for Accreditation of EIA Consultant
ISO 9001:2008 vide Registration No. 44 100 094152-E3
Head Office: 60, Bajiprabhu Nagar, Nagpur-440 033, MS
Lab. : FP-34, 35, Food Park, MIDC, Butibori, Nagpur - 441122
Ph. : (0712) 2242077, 9373287475 Fax: (0712) 2242077
Email: anaconngp@gmail.com, anaconlabngp@gmail.com
website: www.anaconlaboratories.com, www.anacongarway.com

Foreword

The protection of environment plays a crucial role in maintaining the local environment quality for any mining industry. Hence compliance of the statutory requirements becomes very important to conserve the ecological balance within and surrounding the mine area. Therefore, environment protection is becoming a prerequisite for sustainable development. In line with this requirement, the management of **M/s Hindalco Industries Ltd.** has adopted a corporate responsibility of environment protection.

In order to comply with the Environment protection act, to fulfill statutory requirement and to be in tune with Environmental Preservation and sustainable development, **M/s Hindalco Industries Ltd.** has retained **ANACON LABORATORIES PVT. LTD.,** Nagpur as Environment Consultants and for various Environmental issues related to their mines.

This report presents the Environmental Status for the period **January-2014 to March-2014** as compliance to the statutory requirements.

The co-operation extended by the Staff and Management of **M/s Hindalco Industries Ltd.** during the work execution period is gratefully acknowledged.

for **ANACON LABORATORIES PVT. LTD.**

Place : Nagpur

Date : March, 2014

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 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 (January-February-March-2014) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment and Forest (MoEF) 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 1218.762ha in Tatijharia, Post Jamira, Tehsil Samri of Balrampur district, Chhattisgarh on 25/06/1998 for a period of 20 years. The mining operations were started on 01/04/2004. The production capacity of bauxite is 4.0 Lakh Tonnes Per Annum (LTPA).

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	1218.762ha.
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) & Fugitive Emission

S.No.	Fugitive Emission (Core Zone)	S.No.	Buffer Zone
1	Mining Area (Piprapat Mines)	5	Samri Chowk
2	Tatijharia East/Weighbridge	6	Rajenderpur Mines
3	Virhorepat	7	Saraidih
4	Tatijharia West	8	Gopatu

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 PM_{2.5}, RPM(PM₁₀), SO₂, NO_x and SPM, RSPM, SO₂, NO_x, Pb, Hg, As and Cr at above Ambient Air Quality Monitoring (AAQM) locations. The dust fall rate was measured in the mining area (BKB campus) and Tatijharia village during January 2014. The AAQM sampling sites are selected considering seasonal variation in wind speed and wind direction.

Sampling Duration and Frequency

Ambient air quality monitoring was carried out for the parameters PM_{2.5}, RPM(PM₁₀), SO₂, NO_x and SPM, RSPM, SO₂, NO_x, Pb, Hg, As and Cr from January, February, March-2014 as per CPCB norms. Sampling Frequency is given in **Table-3**.

Data is compared with the present revised standards mentioned in the latest Gazette Notification of the Central Pollution Control Board (CPCB) (August-20, 1994), and as per consent conditions mentioned in consent letter.



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 Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Pb, Hg, As and Cr were monitored for establishing the baseline status. SPM and RPM 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 and the bigger particulates from 10 to 100 µm are collected into the cup provided at the bottom of the cyclone.. The dust deposited over the filter paper is measured as RPM, PM_{2.5} collected with the help of Fine Dust sampler operating 24 hours Due to the high flow rate of air. 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 January-14. The jar was filled with 2 lit of distilled water. The water in the jar is mixed with copper sulphate solution (0.02 N solution) 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 4)**.

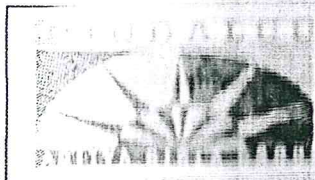


Table 3

MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

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

Table 4.0

Measurement Techniques for various pollutants

S.No.	Parameter	Technique	Technical Protocol	Minimum Reportable Value (µg/ 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)	Gravimetric Method	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 Fugitive Emission Monitoring

The summary of Fugitive Emission monitoring results for the month of January-2014 to March-2014 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 Fugitive monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQ for residential and rural zone.

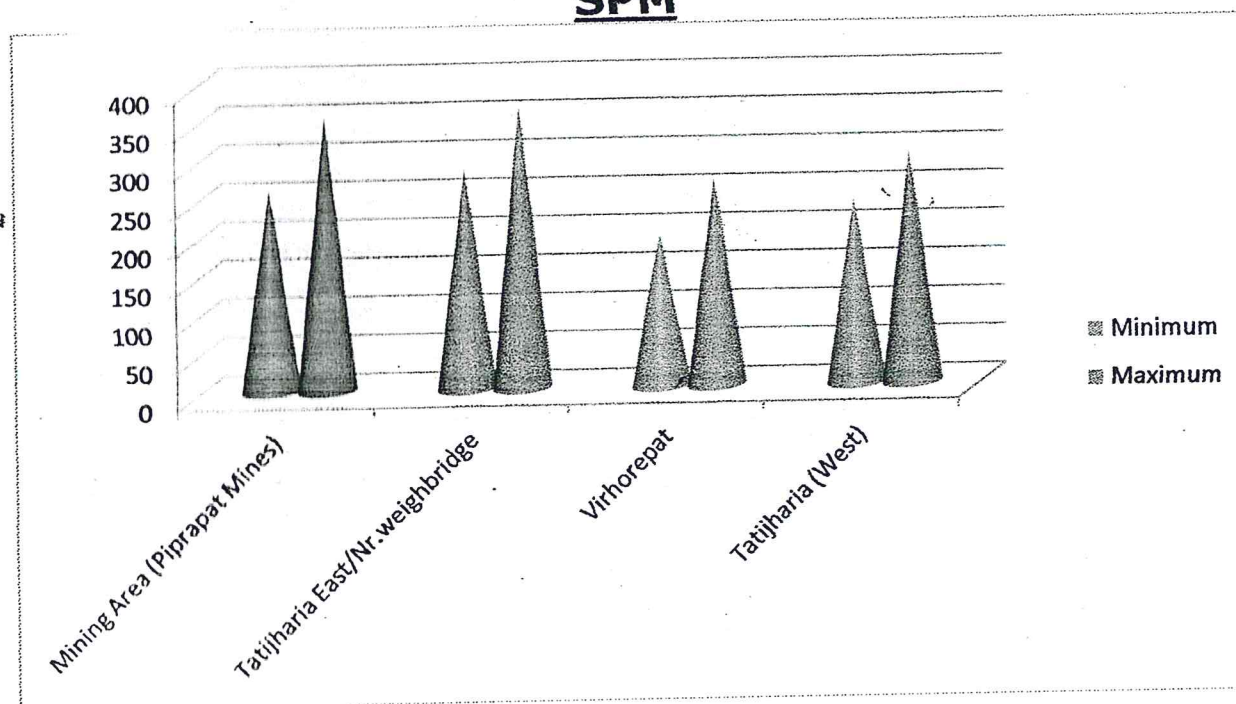
1.6.1 Presentation of Results.

Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 198 $\mu\text{g}/\text{m}^3$ and 367 $\mu\text{g}/\text{m}^3$ respectively. The average concentrations were ranged between 195 to 336 $\mu\text{g}/\text{m}^3$. and 98th percentile values ranged between 186 to 367 $\mu\text{g}/\text{m}^3$ in the study area (**Table 6**).

Graphical Presentation Of Fugitive Emission Monitoring

SPM

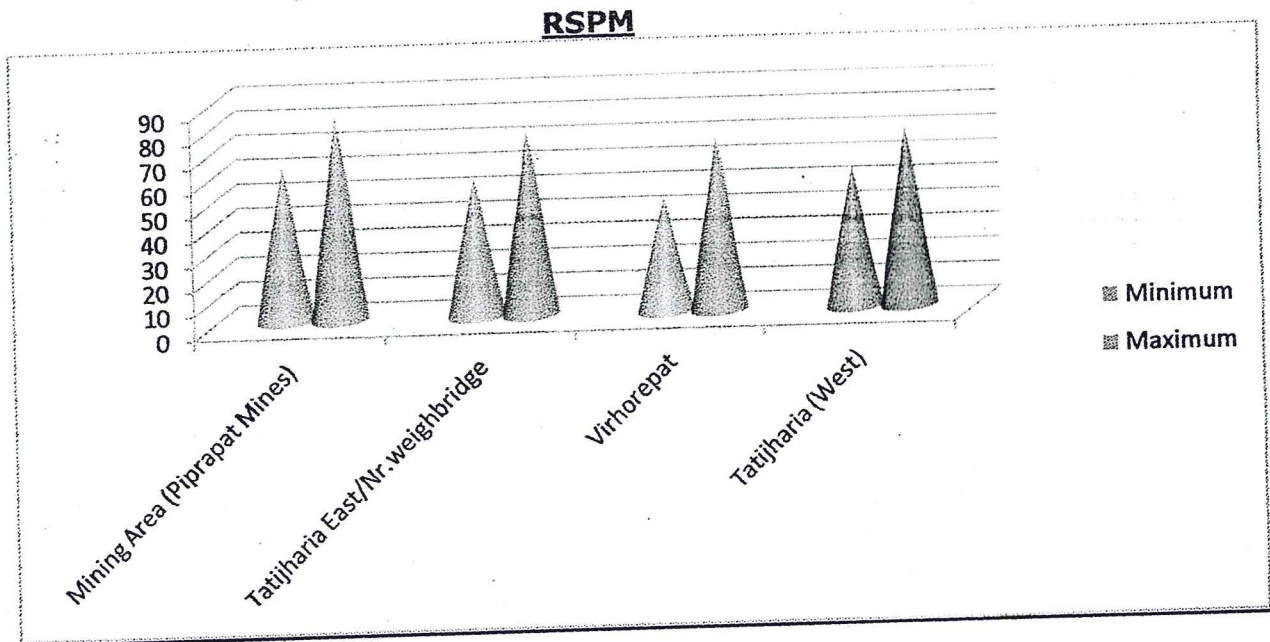




Respirable Suspended Particulate Matter –RSPM

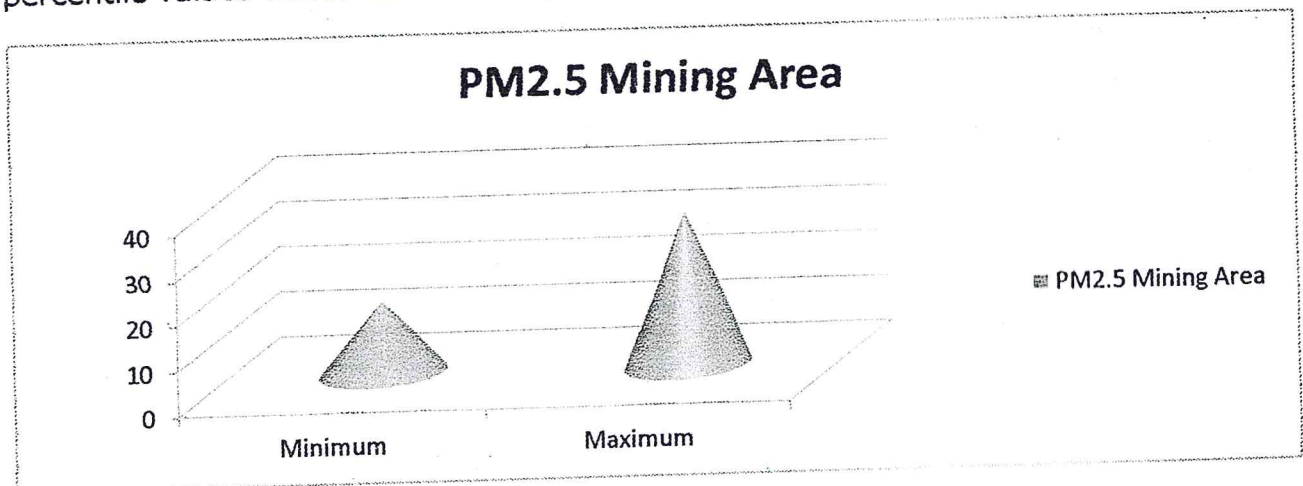
The minimum and maximum concentrations for RSPM were recorded as 47 $\mu\text{g}/\text{m}^3$ and 84 $\mu\text{g}/\text{m}^3$ respectively. The average values were observed to be in the range of 53 to 79 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 59 to 84 $\mu\text{g}/\text{m}^3$ in the study area (**Table 7**).

Graphical Presentation Of Fugitive Emission Monitoring



Particulate Matter –PM_{2.5}

The minimum and maximum values of PM_{2.5} concentrations varied between 16 to 34 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 22 to 28 $\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 28 to 34 $\mu\text{g}/\text{m}^3$ (**Table 8**).



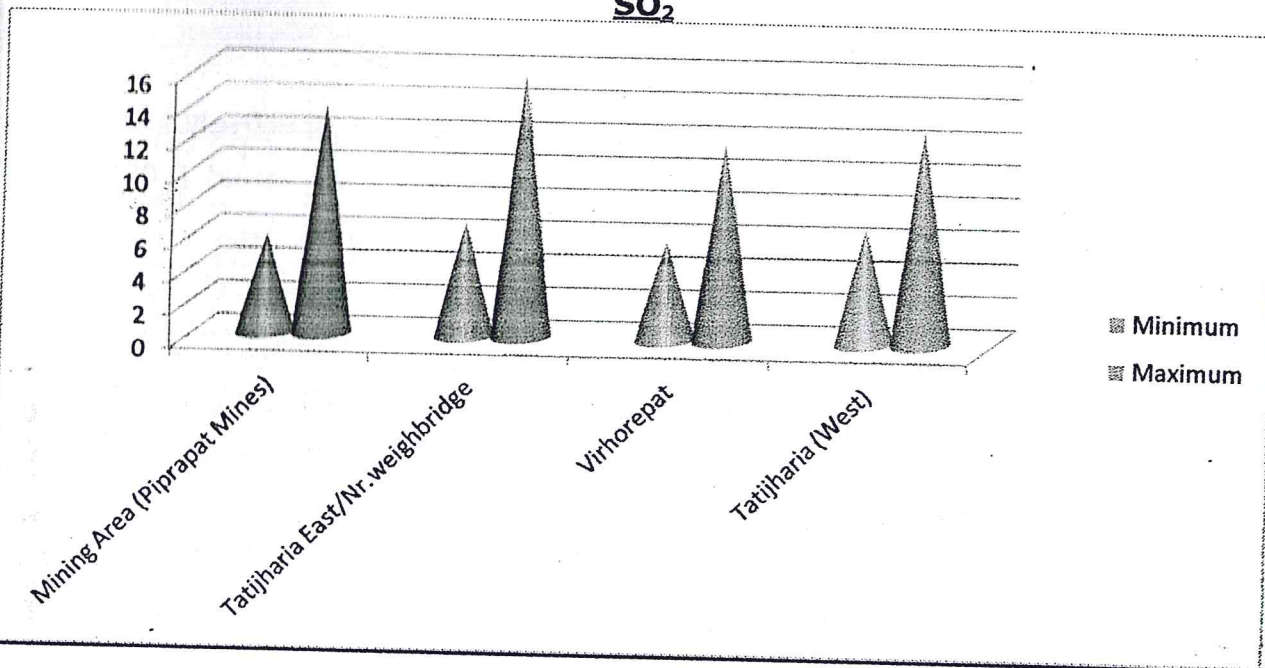


Sulphur Dioxide (SO₂)

The minimum and maximum SO₂ concentrations were recorded as 6 µg/m³ and 16 µg/m³ respectively. The average values were observed to be in the range of 8 to 13 µg/m³ and 98th percentile values varied between 9 to 16 µg/m³ (Table 9).

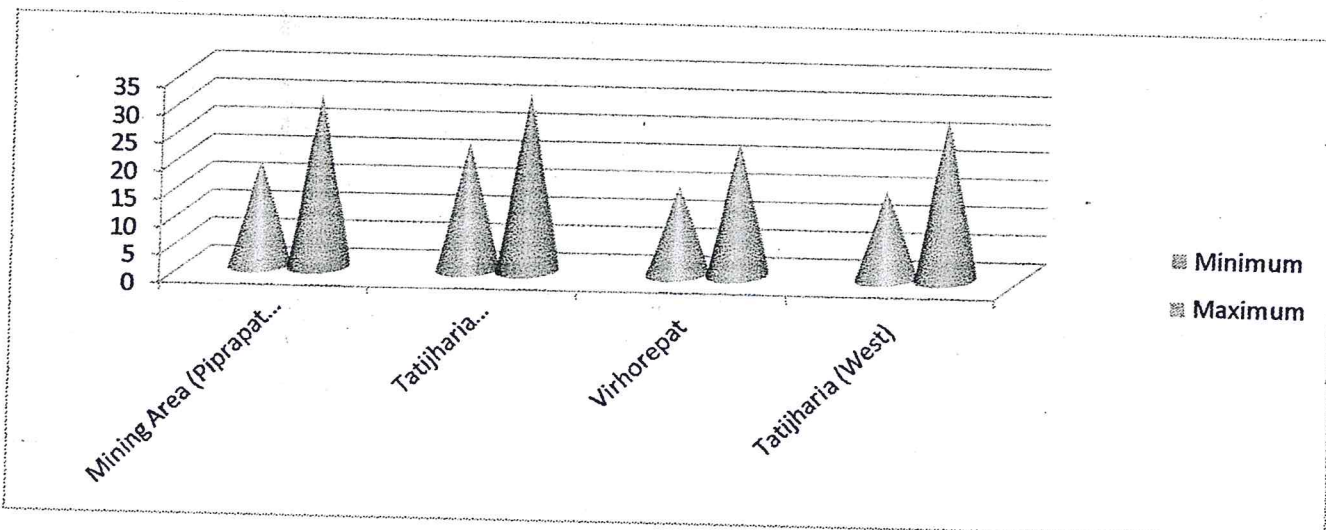
Graphical Presentation Of Fugitive Emission Monitoring

SO₂



Nitrogen Oxide (NO_x)

The minimum and maximum NO_x concentrations were recorded as 16 µg/m³ and 32 µg/m³. The average concentrations were ranged between 18 to 30 µg/m³ and 98th percentile values varied between 19 to 32 µg/m³ (Table 10).





Lead (Pb)

The minimum and maximum Lead detected between 0.021 to 0.073 $\mu\text{g}/\text{m}^3$ respectively. The average Lead detected between 0.028 to 0.057 $\mu\text{g}/\text{m}^3$ & 98th percentile values varied between 0.028 to 0.073 $\mu\text{g}/\text{m}^3$ in the study region. **(Table 11).**

Mercury (Hg)

The maximum concentrations of Hg varied 0.051 $\mu\text{g}/\text{m}^3$ respectively. The average concentration varied 0.041 $\mu\text{g}/\text{m}^3$ 98th percentiles values varied 0.051 $\mu\text{g}/\text{m}^3$ in the study region. **(Table 12).**

Arsenic (As)

The maximum concentrations of As varied 0.82 $\mu\text{g}/\text{m}^3$ respectively. The average concentration varied 0.72 $\mu\text{g}/\text{m}^3$ and 98th percentiles values varied 0.82 $\mu\text{g}/\text{m}^3$ in the study region **(Table 13).**

Chromium (Cr)

Chromium was not detected at any of the locations in SPM samples as well as RSPM Samples.



1.7 Ambient Air Quality (Buffer Zone)

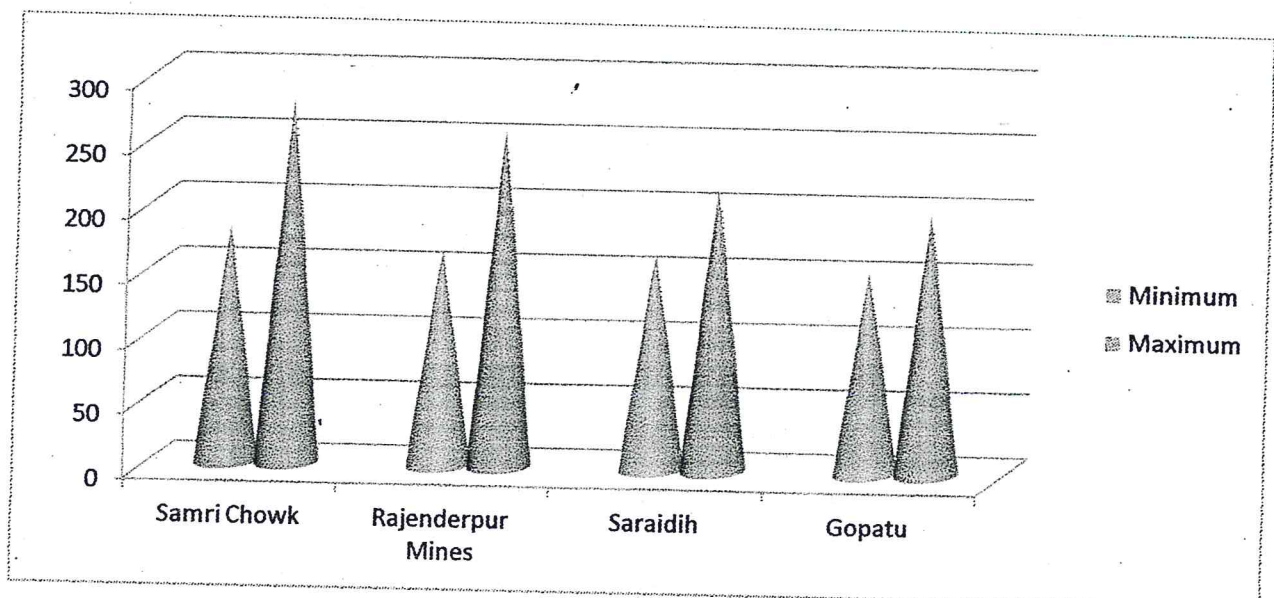
The background levels of SPM, RPM(PM_{10}), $PM_{2.5}$, SO_2 , NO_x , Pb, Hg, As and Cr measured are required to compute Ambient Air Quality. The sampling locations are selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum, Maximum concentration, Arithmetic mean (AM), Geometric mean (GM) and 98 Percentile are presented in tabular form (Table 6).

1.7.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the month of January to March 2014 are presented in detail in Table 3. 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)/NAAQ for residential and rural zone.

Suspended Particulate Matter-SPM

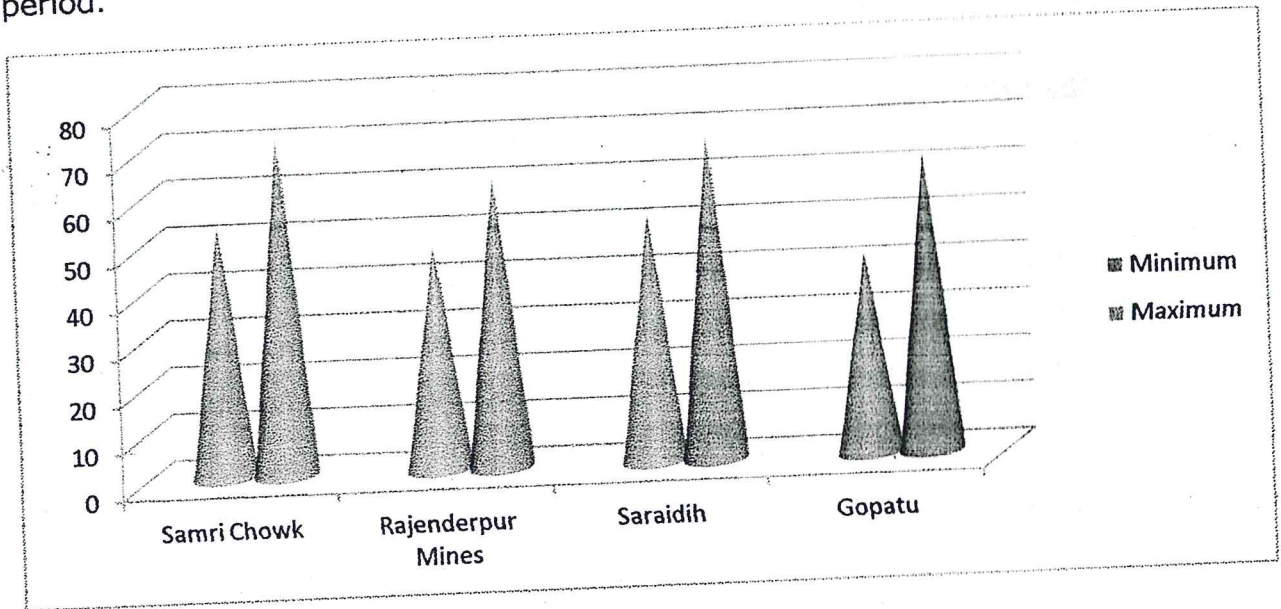
The statistical analysis of SPM is presented in Table 6 for the mining area. The minimum and maximum values varied between 157 to 281 $\mu g/m^3$ respectively during study period at all the 4 locations. The average values ranged between 173 to 255 $\mu g/m^3$ and 98th percentile values ranged between 182 to 281 $\mu g/m^3$ in the study area.





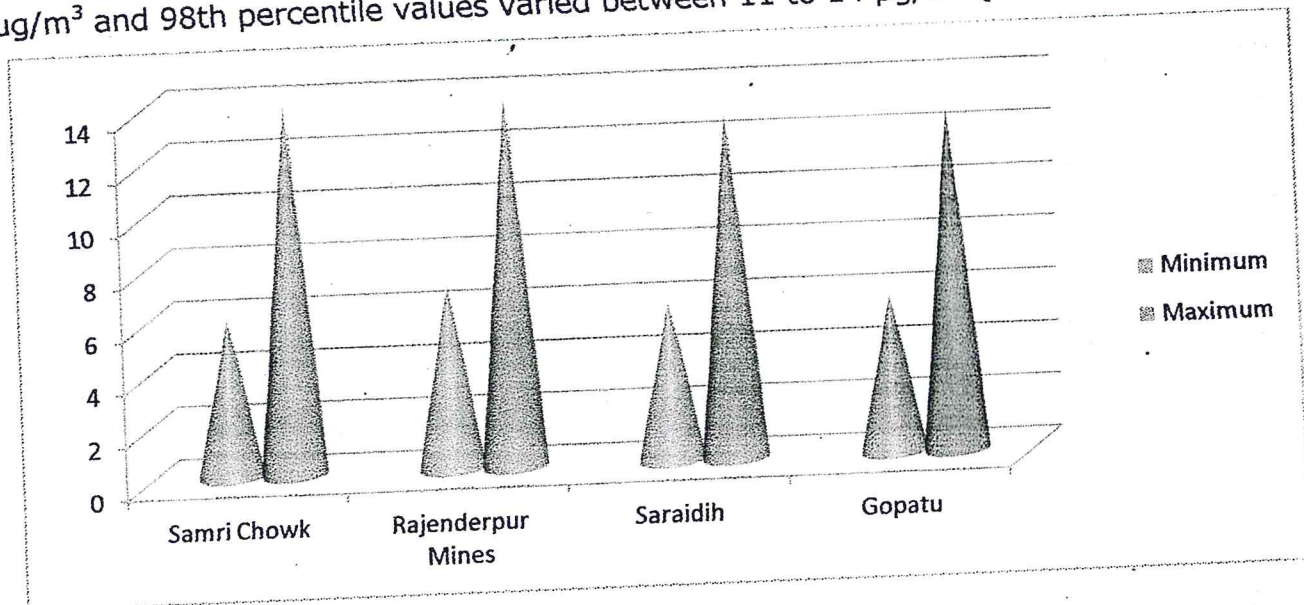
Particulate Matter-RSPM

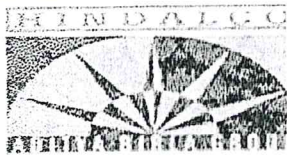
The minimum and maximum values of RSPM varied between 43 to 72 $\mu\text{g}/\text{m}^3$ respectively (**Table 7**). The average values varied between 50 to 67 $\mu\text{g}/\text{m}^3$. The 98th percentile values varied between 54 to 72 $\mu\text{g}/\text{m}^3$ in the mining area. The overall values of SPM and RSPM were well within the CPCB limits prescribe for industrial and residential area in the study area during the study period.



Sulphur Dioxide (SO₂)

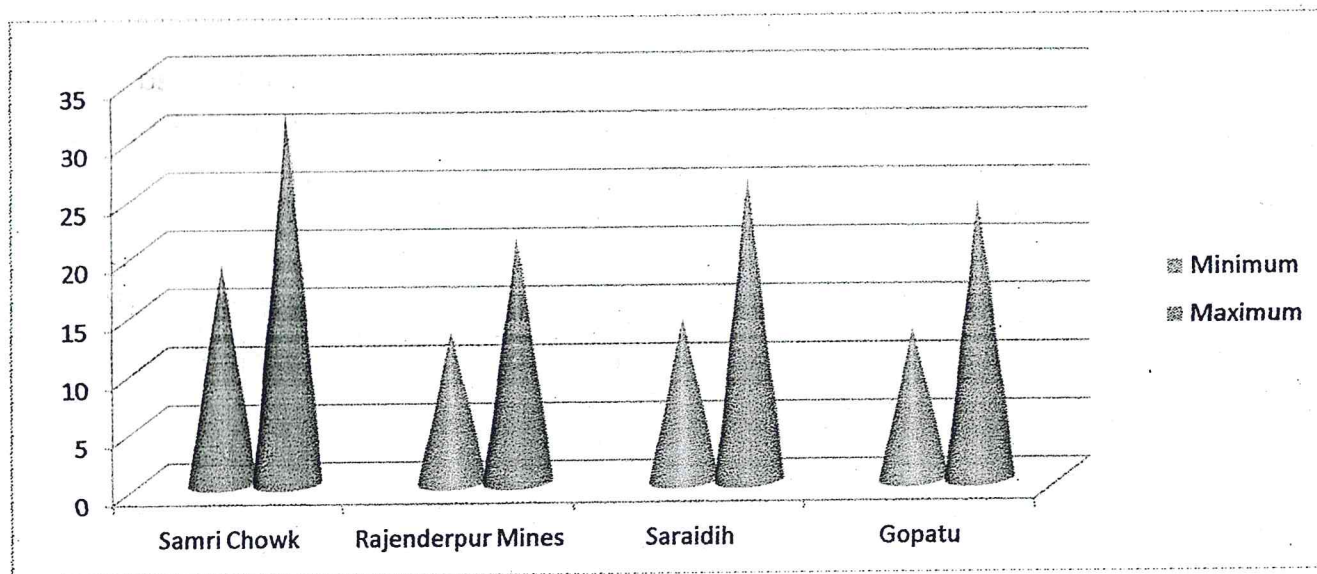
The minimum and maximum values of SO₂ concentrations varied between 6 to 14 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 9 to 12 $\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 11 to 14 $\mu\text{g}/\text{m}^3$ (**Table 9**).





Nitrogen Oxide (NO_x)

The minimum and maximum values of NO_x concentrations varied between 13 to 32 µg/m³ respectively. The average values range between 17 to 28 µg/m³ and 98th percentile values varied between 19 to 32 µg/m³ (**Table 10**).



Lead (Pb)

The minimum and maximum Lead detected between <0.0005 to 0.048 µg/m³ respectively. The average Lead detected between <0.0005 to 0.038 µg/m³ and 98th percentile values varied between <0.0005 to 0.051 µg/m³ in the study region (**Table 11**).

Mercury (Hg)

The maximum concentrations of Hg varied 0.043 µg/m³ respectively. The average concentration varied 0.036 µg/m³ 98th percentiles values varied 0.043 µg/m³ in the study region. (**Table 12**).

Arsenic (As)

The maximum concentrations of As varied 1.16 µg/m³ respectively. The average concentration varied 0.94 µg/m³ and 98th percentiles values varied 1.16 µg/m³ in the study region (**Table 13**).



Chromium (Cr)

Chromium was not detected at any of the locations in SPM samples as well as RSPM Samples.

The Dust fall rate during the month of January-2014 was observed 31.7 and 19.8 month MT/km²/month in the Mining area Piprapat and Tatijharia village respectively. **(Table14)**.

Overall the ambient air concentrations of SPM, PM 10(RPM), PM2.5, SO₂, NO_x, Pb, Hg, and As were well within the limits of concentrations promulgated by CPCB, New Delhi in the study area.



1.8 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (January-February-March 2014) indicates that the wind was blowing predominantly from (N), during study period, for 80.0% hours wind was found to be calm. The details of wind pattern in the form of wind frequency distribution are presented in table 5. The wind rose diagram and graphical illustration is presented in **Fig.1 & 2** respectively.

Table.5
Wind Frequency Distribution Data

Wind Direction	Speed m/s						Total
	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 -11.1	>= 11.1	
348.75-11.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.003738	0.003738
11.25 -33.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
33.75 - 56.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
56.25-78.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
78.75-101.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
101.25 - 123.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
123.75 - 146.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
146.25-168.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
168.75- 191.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
191.25 - 213.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
213.75-236.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
236.25 - 258.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
258.75 - 281.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
281.25 - 303.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
303.75 - 326.25	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
326.25 - 348.75	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sub Total	0.000000	0.000000	0.000000	0.000000	0.000000	0.003738	0.003003
Calms							0.800300
Missing/Incomplete							0.196697
Total							1.000000

SUMMARY OF WIND PATTERN

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
January-February-March -2014	N (0.3 %)	-	80.0 %

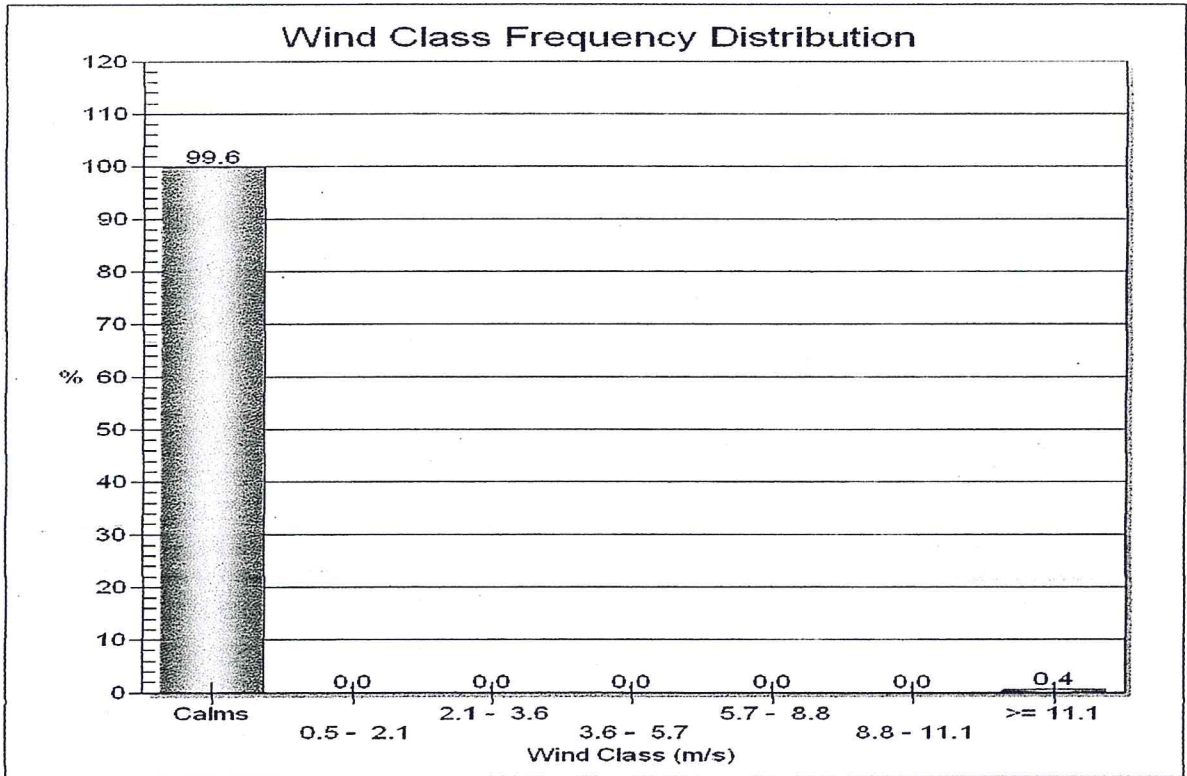


Fig.01 Wind Class Frequency Distribution

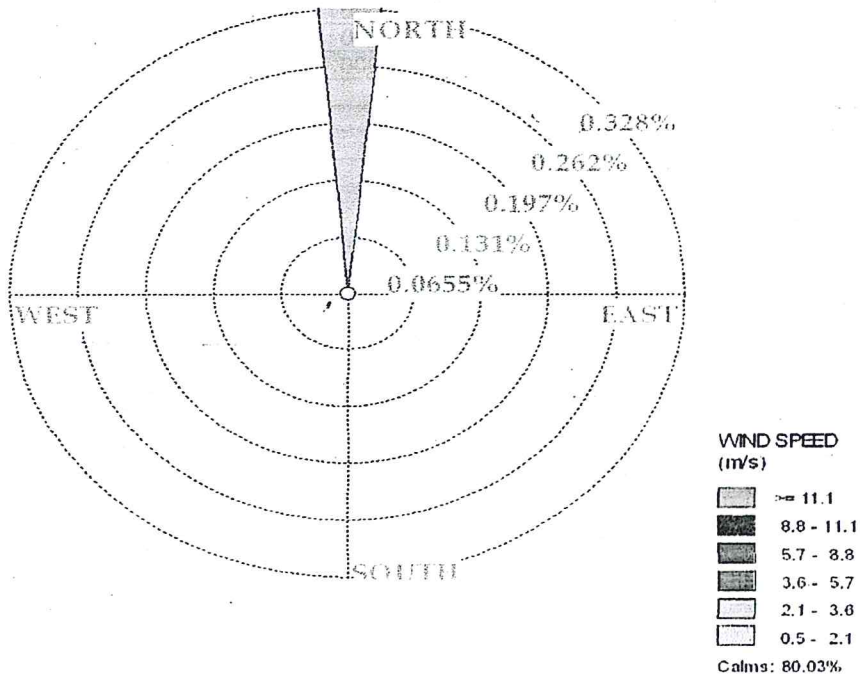


Fig.02 Wind Rose Diagram (January-February-March 2014)



1.6 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 three locations namely mining area Tatijharia mines, Gopatu and Rajenderpur mines in each month is 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 24 hours.

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 as for Industrial area as 75dB(A) and 70dB(A) for day and night respectively as given in **(Table 15)**.



Instrument used for monitoring

Noise levels were measured using integrated sound level meter manufactured by Envirotech made in India (Model no. SLM-100). This instrument is capable of measuring the Sound Pressure Level (SPL), Leq.

1.7 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 Tatijharia, Samri, Betpani, Gopatu and surface water sample from nallahs nearby Gopatu village. The physico-chemical analysis of ground and surface water samples collected during study period reported as average of three month given in **(Table 16 & 17)**. The overall water quality found to be below the stipulated standards of IS 10500-2012 for ground water and found to be fit for drinking purpose for tested parameters. Surface water quality is satisfactory as per IS 2296 Class C-1982 limits for surface water. Thus the impacts due to mining activities in each month have been found to be insignificant.

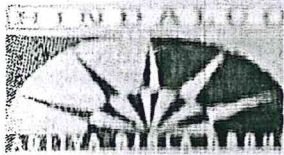


Table 6

Statistical analysis of SPM

Unit : $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Mining Area (Piaprat Mines)	January-2014	287	318	303	303	318
	February-2014	291	357	324	324	357
	March-2014	264	298	281	281	298
Tatijharla East/Nr. weighbridge	January-2014	304	367	336	336	367
	February-2014	287	349	318	318	349
	March-2014	291	354	323	323	354
Virhorepat	January-2014	212	268	240	240	268
	February-2014	198	239	219	219	239
	March-2014	204	186	195	195	186
Tatijharla (West)	January-2014	241	267	254	254	267
	February-2014	257	281	269	269	281
	March-2014	249	301	275	275	301
Buffer Zone :-						
Samri Chowk	January-2014	201	257	229	229	257
	February-2014	229	281	255	255	281
	March-2014	183	219	201	201	219
Rajenderpur Mines	January-2014	201	247	224	224	247
	February-2014	168	189	179	179	189
	March-2014	217	261	239	239	261
Saraidih	January-2014	173	209	191	191	209
	February-2014	168	218	193	193	218
	March-2014	181	204	193	193	204
Gopatu	January-2014	163	182	173	173	182
	February-2014	157	191	174	174	191
	March-2014	169	201	185	185	201



Table 7

Statistical analysis of RSPM

Unit : $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Mining Area (Piprapat Mines)	January-2014	73	84	79	79	84
	February-2014	64	73	69	69	73
	March-2014	68	81	75	75	81
Tatijharia East/weighbridge	January-2014	61	72	67	67	72
	February-2014	57	68	63	63	68
	March-2014	64	76	70	70	76
Virhorepat	January-2014	57	71	64	64	71
	February-2014	54	62	58	58	62
	March-2014	47	59	53	53	59
Tatijharia (West)	January-2014	63	74	69	69	74
	February-2014	67	72	70	70	72
	March-2014	58	67	63	63	67
Buffer Zone :-						
Samri Chowk	January-2014	57	68	63	63	68
	February-2014	61	72	67	67	72
	March-2014	54	63	59	59	63
Rajenderpur Mines	January-2014	48	57	53	53	57
	February-2014	51	62	57	57	62
	March-2014	49	54	52	52	54
Saraidih	January-2014	61	69	65	65	69
	February-2014	58	64	61	61	64
	March-2014	53	59	56	56	59
Gopatu	January-2014	43	57	50	50	57
	February-2014	49	64	57	57	64
	March-2014	51	62	57	57	62
CPCB Standard		100 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Table 8

Statistical analysis of PM 2.5

Unit : $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Mining Area	January-2014	21	34	28	28	34
	February-2014	19	31	25	25	31
	March-2014	16	28	22	22	28
CPCB Standard		60 $\mu\text{g}/\text{m}^3$ (24 hrs)				



Table 9

Statistical Analysis of SO₂

Location	Month & Year	Min.	Max.	A.M.	Unit: µg/m ³	
					G.M.	98%
Fugitive Emission (Core Zone):-						
Mining Area (Piprapat Mines)	January-2014	7	13	10	10	13
	February-2014	6	11	9	9	11
	March-2014	7	14	11	11	14
Tatijharia East/weighbridge	January-2014	9	16	13	13	16
	February-2014	8	14	11	11	14
	March-2014	7	13	10	10	13
Virhorepat	January-2014	6	11	9	9	11
	February-2014	6	9	8	8	9
	March-2014	7	12	10	10	12
Tatijharia (West)	January-2014	8	13	11	11	13
	February-2014	7	11	9	9	11
	March-2014	7	13	10	10	13
Buffer Zone :-						
Samri Chowk	January-2014	7	14	11	11	14
	February-2014	6	11	9	9	11
	March-2014	7	11	9	9	11
Rajenderpur Mines	October-2013	9	14	12	12	14
	November-2013	7	13	10	10	13
	December-2013	9	13	11	11	13
Saraidih	January-2014	6	11	9	9	11
	February-2014	7	11	9	9	11
	March-2014	6	13	10	10	13
Gopatu	January-2014	6	13	10	10	13
	February-2014	7	12	10	10	12
	March-2014	6	13	10	10	13
CPCB Standard				80 µg/m³ (24 hrs.)		

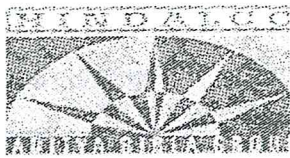


Table 10

Statistical Analysis of NO_x

Unit : $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Mining Area (Piprapat Mines)	January-2014	21	28	25	25	28
	February-2014	19	24	22	22	24
	March-2014	23	31	27	27	31
Tatijharia East/Nr.weighbridge	January-2014	28	32	30	30	32
	February-2014	26	29	28	28	29
	March-2014	23	26	25	25	26
Virhorepat	January-2014	16	19	18	18	19
	February-2014	18	24	21	21	24
	March-2014	16	21	19	19	21
Tatijharia (West)	January-2014	17	24	21	21	24
	February-2014	16	28	22	22	28
	March-2014	21	29	25	25	29
Buffer Zone :-						
Samri Chowk	January-2014	19	27	23	23	27
	February-2014	23	32	28	28	32
	March-2014	19	26	23	23	26
Rajenderpur Mines	January-2014	14	21	18	18	21
	February-2014	13	18	16	16	18
	March-2014	14	19	17	17	19
Saraidih	January-2014	16	24	20	20	24
	February-2014	14	23	19	19	23
	March-2014	16	26	21	21	26
Gopatu	January-2014	13	19	16	16	19
	February-2014	16	24	20	20	24
	December-2013	13	21	17	17	21
CPCB Standard		80 $\mu\text{g}/\text{m}^3$ (24 hrs)				



Table 11

Statistical Analysis of Pb

Unit: $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Fugitive Emission (Core Zone):-						
Mining Area (Piprapat Mines)	January-2014	0.032	0.041	0.037	0.037	0.041
	February-2014	0.038	0.073	0.056	0.056	0.073
	March-2014	0.029	0.067	0.048	0.048	0.067
Tatijharia East/ Nr. weighbridge	January-2014	0.024	0.031	0.028	0.028	0.031
	February-2014	0.028	0.047	0.038	0.038	0.047
	March-2014	0.021	0.034	0.028	0.028	0.034
Virhorepat	January-2014	0.027	0.031	0.029	0.029	0.031
	February-2014	0.029	0.028	0.029	0.029	0.028
	March-2014	0.031	0.048	0.040	0.040	0.048
Tatijharia (West)	January-2014	0.042	0.071	0.057	0.057	0.071
	February-2014	0.039	0.067	0.053	0.053	0.067
	March-2014	0.041	0.069	0.055	0.055	0.069
Buffer Zone :-						
Samri Chowk	January-2014	0.024	0.051	0.038	0.038	0.051
	February-2014	0.019	0.043	0.031	0.031	0.043
	March-2014	0.021	0.048	0.035	0.035	0.048
Rajenderpur Mines	January-2014	0.027	0.034	0.031	0.031	0.034
	February-2014	0.031	0.042	0.037	0.037	0.042
	March-2014	0.029	0.032	0.031	0.031	0.032
Saraidih	January-2014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	February-2014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	March-2014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Gopatu	January-2014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	February-2014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
	March-2014	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
CPCB Standard		1.0 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Table 12

Statistical Analysis of Hg

Unit: $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Mining Area (Piprapat Mines)	January-2014	0.014	0.021	0.018	0.018	0.021
	February-2014	0.016	0.038	0.027	0.027	0.038
	March-2014	0.016	0.034	0.025	0.025	0.034
Tatijharia East/Nr.weighbridge	January-2014	0.023	0.041	0.032	0.032	0.041
	February-2014	0.019	0.028	0.024	0.024	0.028
	March-2014	0.025	0.046	0.036	0.036	0.046
Virhorepat	January-2014	0.017	0.027	0.022	0.022	0.027
	February-2014	0.023	0.029	0.026	0.026	0.029
	March-2014	0.021	0.034	0.028	0.028	0.034
Tatijharia (West)	January-2014	0.027	0.032	0.030	0.030	0.032
	February-2014	0.031	0.051	0.041	0.041	0.051
	March-2014	0.024	0.039	0.032	0.032	0.039
Buffer Zone :-						
Samri Chowk	January-2014	0.016	0.024	0.020	0.020	0.024
	February-2014	0.019	0.028	0.024	0.024	0.028
	March-2014	0.017	0.024	0.021	0.021	0.024
Rajenderpur Mines	January-2014	0.031	0.039	0.035	0.035	0.039
	February-2014	0.028	0.034	0.031	0.031	0.034
	March-2014	0.029	0.043	0.036	0.036	0.043
Saraidih	January-2014	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2014	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2014	<0.01	<0.01	<0.01	<0.01	<0.01
Gopatu	January-2014	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2014	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2014	<0.01	<0.01	<0.01	<0.01	<0.01



Table 13

Statistical Analysis of As

Unit: $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Fugitive Emission (Core Zone):-						
Mining Area (Piprapat Mines)	January-2014	0.47	0.68	0.58	0.58	0.68
	February-2014	0.29	0.51	0.40	0.40	0.51
	March-2014	0.42	0.59	0.51	0.51	0.59
Tatijharia East/weighbridge	January-2014	0.61	0.82	0.72	0.72	0.82
	February-2014	0.57	0.73	0.65	0.65	0.73
	March-2014	0.54	0.71	0.63	0.63	0.71
Virhorepat	January-2014	0.24	0.43	0.34	0.34	0.43
	February-2014	0.21	0.38	0.30	0.30	0.38
	March-2014	0.17	0.29	0.23	0.23	0.29
Tatijharia (West)	January-2014	0.36	0.48	0.42	0.42	0.48
	February-2014	0.32	0.51	0.42	0.42	0.51
	March-2014	0.41	0.57	0.49	0.49	0.57
Buffer Zone :-						
Samri Chowk	January-2014	0.24	0.53	0.39	0.39	0.53
	February-2014	0.37	0.69	0.53	0.53	0.69
	March-2014	0.31	0.63	0.47	0.47	0.63
Rajenderpur Mines	January-2014	0.68	1.03	0.86	0.86	1.03
	February-2014	0.72	1.16	0.94	0.94	1.16
	March-2014	0.63	0.91	0.77	0.77	0.91
Saraidih	January-2014	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2014	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2014	<0.1	<0.1	<0.1	<0.1	<0.1
Gopatu	January-2014	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2014	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2014	<0.1	<0.1	<0.1	<0.1	<0.1
CPCB Standard		06 $\mu\text{g}/\text{m}^3$ (Annual)				

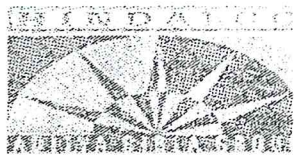


Table 14

Dust fall Rate (January-2014)

Sl.No.	Location	Rate (MT/km ² /month)
1	Mining Area(Piprapat Mines)	31.7
2	Tatijharia Village	19.8

Table 15

Noise Level Monitoring

Unit: dB(A) Leq

Sl. No.	Location	January-2014		February-2014		March-2014	
		Day	Night	Day	Night	Day	Night
1	Tatijharia East/ Weighbridge	72	64	69	58	71	63
2	Rajenderpur mine	67	59	71	64	64	57
3	Gopatu Village	51	42	48	39	52	43

CPCB Standards for Residential Area: 55 (Day time) 45 (Night time)
 Industrial Area: 75 (Day time) 70 (Night time)

Table 15-A

HEMM Spot Noise Level Monitoring

Unit: dB(A) Leq

Sl. No.	Location	January-2014		February-2014		March-2014	
		Min.	Max.	Min.	Max.	Min.	Max.
1	Mining Area (Piprapat Mines)	73.9	82.4	64.8	76.2	74.3	83.7



1.9 Ground Water Quality:-Most of the villages in the nearby plant area have hand pumps and wells, as most of the residents of these villages make use of this water for drinking and other domestic uses for TABLE NO.16

Table 16

Report on Chemical Examination of Ground Water

Location: GW1: Samari Colony

GW2: Kudag

GW3: Tatijharia

GW4: SamariChowk

Sr. No	Test Parameters	Units	Acceptable Limit IS:10500-2012	Results			
				GW1	GW2	GW3	GW4
1	Apparent Colour	Hazen units	5	4	3	4	2
2	Turbidity NTU	NTU	1	0.7	1.3	0.9	1.1
3	pH Value	-	6.5 to 8.5	7.41	7.93	7.78	7.21
4	Total Hardness	mg / l	200	186.07	173.87	174.61	169.28
5	Iron (as Fe)	mg / l	0.3	0.18	0.24	0.21	0.19
6	Chlorides (as Cl)	mg / l	250	61.7	39.8	47.3	38.1
7	TDS	mg / l	500	403	343	352	327
8	Calcium (as Ca)	mg / l	75	64.9	59.2	61.3	57.2
9	Magnesium (as Mg)	mg / l	30	5.8	6.3	5.2	6.4
10	Sulphate (as SO ₄)	mg / l	200	42.7	31.9	34.7	29.8
11	Nitrates (as NO ₃)	mg / l	45	5.7	4.9	3.8	3.6
12	Fluoride (as F)	mg / l	1'	0.4	0.3	0.6	0.3
13	Total Alkalinity	mg / l	200	118.4	109.2	132.7	121.9
14	Free Residual Chlorine	mg / l	Min.0.2	< 0.1	< 0.1	< 0.1	< 0.1
15	Electrical Conductivity at 25°C	µs/cm	-	718.9	612.4	629.4	583.4
16	Copper as(Cu)	mg / l	0.05	< 0.03	< 0.03	< 0.03	< 0.03
17	Manganese as (Mn)	mg / l	0.1	<0.05	< 0.05	< 0.05	< 0.05
18	Cadmium as (Cd)	mg / l	0.003	< 0.001	< 0.001	< 0.001	< 0.001
19	Selenium as (Se)	mg / l	0.01	< 0.001	< 0.001	< 0.001	< 0.001
20	Arsenic as (As)	mg / l	0.01	< 0.01	< 0.01	< 0.01	< 0.01
21	Mercury as (Hg)	mg / l	0.001	<0.0005	<0.0005	<0.0005	<0.0005
22	Lead as (Pb)	mg / l	0.05	< 0.01	< 0.01	0.01	< 0.01
23	Zinc as (Zn)	mg / l	5	< 0.1	< 0.1	< 0.1	< 0.1
24	Aluminum as (Al)	mg / l	0.03	0.006	0.002	0.004	0.003



Hindalco Industries Limited
Tatijharia Mining Environmental Status Report
for January-2014 to March-2014

Data Analysis

Sr. No	Test Parameters	Units	Acceptable Limit IS:10500-2012	Results			
				GW1	GW2	GW3	GW4
26	Chromium as (Cr ⁺⁶)	mg / l	0.05	< 0.03	< 0.03	< 0.03	< 0.03
27	Cyanide as (CN)	mg / l	0.05	< 0.005	< 0.005	< 0.005	< 0.005
28	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
29	Taste	-	Acceptable	-	-	-	-
30	Total Coliform	MPN/100 ml	Absent	< 1	< 1	< 1	< 1
31	Phenolic Compounds	mg / l	0.001	< 0.001	< 0.001	< 0.001	< 0.001
32	Mineral oil	mg / l	Absent	< 0.01	< 0.01	< 0.01	< 0.01
33	Total Chromium as Cr	mg / l	0.05	< 0.01	< 0.01	< 0.01	< 0.01

ND: Not Detected (< 0.001), Unob: Unobjectionable

Remark:-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.



Table 17

**Monthly Report on Chemical Examination of Surface Water
(Nallah Near Gopatu)**

S.No	Parameters	Unit	IS : 2296 Class 'C'	Results
				January-2014
1	pH Value	-	6.5 to 8.5	6.59
2	Total Hardness (CaCO ₃)	mg / l	\$	255
3	Iron as (Fe)	mg / l	50	12.8
4	Chlorides as (Cl)	mg / l	600	118.7
5	Electrical Conductivity	µS/cm	\$	657.17
6	Total Dissolved Solids (TDS)	mg / l	1500	380
7	Calcium as (Ca)	mg / l	\$	84
8	Magnesium as (Mg)	mg / l	\$	11
9	Sulphate as (SO ₄)	mg / l	400	149
10	Nitrates as (NO ₃)	mg / l	\$	8.7
11	Fluoride as (F)	mg / l	0.5	0.3
12	Alkalinity	mg / l	\$	67
13	Chemical Oxygen demand (COD)	mg / l	\$	38.7
14	BOD at 27°C for 3days	mg / l	3	10.6
15	Total Suspended Solid (TSS)	mg / l	\$	37

\$: Limits not specified

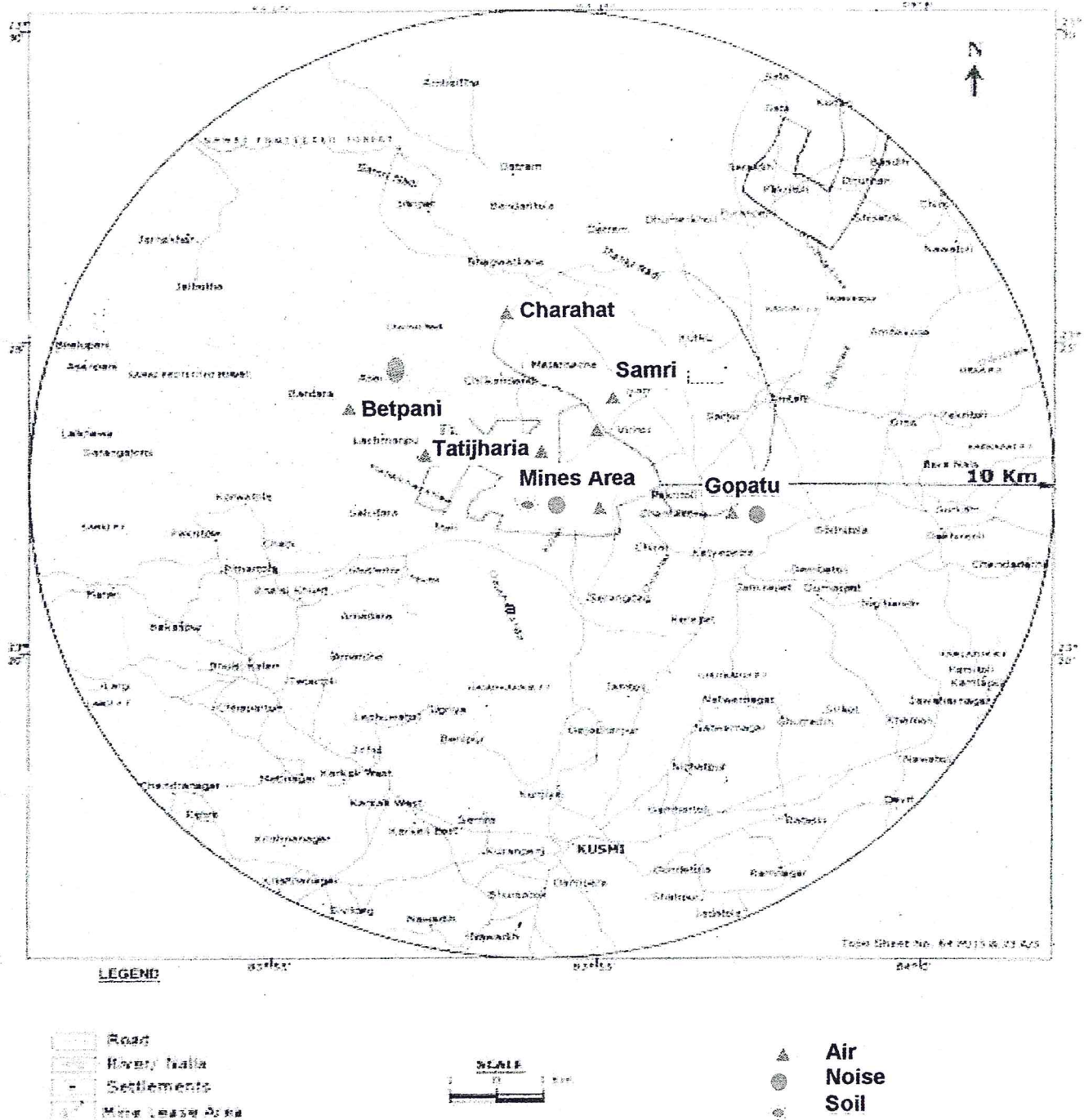


Table 18

Report on Soil Analysis, Tatijharia

Date of collection: January-2014. Sample Location: Tatijhariya village

Sr. No	Test Parameters	Measurement Unit	Results
1	pH	-	6.94 at 23°C
2	Electrical Conductivity at 25°C	µs/cm	379
3	Texture	-	Clay Loam
4	Sand	%	18.4
5	Silt	%	27.1
6	Clay	%	54.5
7	Bulk Density	g/cc	2.1
8	Porosity	%	17
9	Water Holding Capacity	%	53
10	Exchangeable Calcium as Ca	mg/kg	72
11	Exchangeable Magnesium as Mg	mg/kg	4.9
12	Exchangeable Sodium as Na	mg/kg	43.8
13	Available Potassium as K	kg/hect.	5.7
14	Available Phosphorous as P	kg/hect.	118
15	Available Nitrogen as N	kg/hect.	52.9
16	Organic Matter	%	0.64
17	Organic Carbon	%	0.41
18	Water Soluble Chloride as Cl ⁺	mg/kg	11.6
19	Water Soluble Sulphate as SO ₄	mg/kg	7.9
20	Sodium Absorption Ratio	-	5.83
21	CEC	meq/100 gm	46
22	Total Iron	%	5.92
23	Available Manganese	mg/kg	0.007
24	Available Zinc	mg/kg	0.005
25	Available Boron	mg/kg	0.003



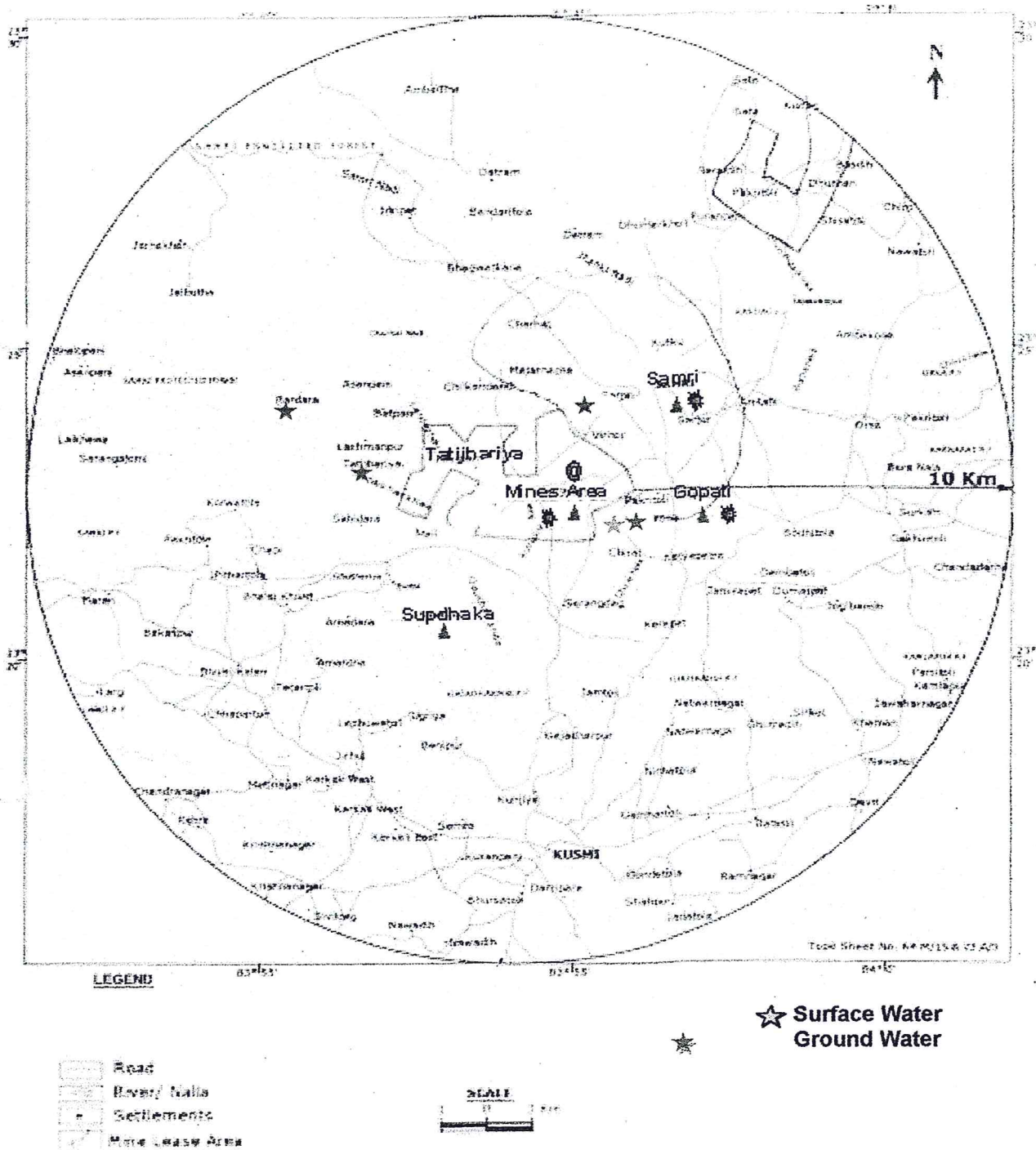


FIG 4: SAMPLING LOCATIONS FOR WATER

Lease	Production Capacity approved by MoEF (in Lakh Tonnes)	Production (April - 2013 to March -2014 (in Tonnes)
Samri	5.0	450449.000
Tatijharia	4.0	339284.000
Kudag	0.6	51724.000



(M. K. Nayak)
Agent of mines
Samri mines Division
Hindalco Industries Ltd

TATIJHARIA LEASE

Particulars	Tatijharia Lease
Approved lease area	1218.762 Ha.
Total Mined out up to the year (2013-14)	83.7712 Ha.
Total Reclaimed up to the year (2013-14)	72.8732 Ha.
Total afforestation in reclaimed land up to the year (2013-14)	23.56 Ha.
Total nos. of plants up to the year (2013-14)	57725
% of survival of plants	74 %
Mined out during April 2012 to March 2014	7.1650 Ha.
Reclaimed during April 2013 to March 2014	7.6190 Ha.
Afforestation (2013-14)	4875
Afforestation in 2013-14 (Ha.)	2.000 Ha.


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 Hindalco Industries Ltd

Annexure-VII

Actual Expenditure incurred in Environment Management Plan:-

Composite cost during the F.Y. 2013-14 for environment protection & pollution control by Samri Mines division, it includes Samri Bauxite Mine , Tatijharia Bauxite Mine & Kudag Bauxite Mine of Chhattisgarh state.

SI No-	Environment Protection Measures	Actual Cost (Lacs) (F.Y. 2013-14)
1	Pollution Control	3.20
2	Environment Monitoring	3.10
3	Green Belt	10.80
4	Reclamation/Rehabilitation of mined out area	--
5	Rural Development (This include capital cost of on going construction of 2.5km ring road , Building for 6 Bed hospital & Primary School)	237.85
6	Total	254.95

- Environment monitoring jobs has been out sourced to Annacon Lab, recognized by MoEF (GOI) & NABL etc.
- One centralized nursery has been established at Samri mines among three leases viz, Samri, Tatijharia & Kudag.
- Reclamation and rehabilitation is part of mining operation. Mined out area has been backfilled by using mines rejects, laterite, morrum and followed top of surface by top soil. As per type of the land we decide for cultivation or planting species. Cost of reclamation /rehabilitation already included in the mining operation.


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