

Ref: HIL/TAT/CR/MoEF/44-

09.05.2017.

To,
The Addl. Principal Chief Conservator of Forest (Central),
MoEF Regional Office (Western Zone)
Kendriya Paryavaran Bhawan, Link Road-3, Ravisankar Nagar
Bhopal-462016 (M P)

Sub:- Status of compliance of EC condition (Half yearly status of compliance report) of Tatijharia Bauxite Mine (Lease area- 1218.762 Ha.) of Hindalco Industries Limited of Chhattisgarh state from October-2016 to March-2017.

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 of Tatijharia Bauxite Mine, Lease area -1218.762 Ha, of Hindalco Industries Limited, P.O- Kusmi, Dist- Balrampur- Ramanujganj, Chhattisgarh state, PIN-497224 from October-2016 to March-2017.

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)

Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

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. Environment Status Report from Jan-2017 to March-2017 enclosed as annexure -III
4. Renewal copy of Consent to Operate from CECB enclosed as annexure -IV
5. Yearly Production report enclosed as annexure-V.
6. Status report of mined out, reclaimed and afforested land as annexure-VI.
7. Actual expenditure incurred in protection of environment from October-2016 to March-2017 as annexure-VII.

HINDALCO INDUSTRIES LIMITED
Samri Mines, Division, Baba Chowk
At & Post - Kusmi, PIN : 497 224,
Distt - Balrampur-Ramanujganj (C.G.), INDIA
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REGISTERED OFFICE
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Dr. Annie Besant Road,
Worli, Mumbai 400 030
Telephone +91 22 6662 6666

Website www.hindalco.com
E-mail hindalco@adityabirla.com
Corporate Identity No. - L27020MH1958LC011238

04.05.2017.

**Status of Compliance from October-2016 to March-2017 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.- Annexure-A
- (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- B).
- (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 and also plantation on available land are being taken to prevent erosion of soil.
- (vii) 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.
- (viii) We undertake that no natural water course is obstructed during mining operation.
- (ix) Controlled blasting is in practiced in the mine. Dust extractors are being used during drilling operations. Cord relay & effective blast design are


**Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.**

used to control blast vibration and fly rocks. Blasting is carried out only in day hours.

- (x) 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.
- (xi) The ground water table does not intersect during our mining operation because of shallow depth of mining
- (xii) 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.
- (xiii) Regular monitoring of ground water quality is being carried out. The analysis reports are being submitted to Regional Office, CECB, Ambikapur and other regulating authority.
- (xiv) Till date three rain water harvesting ponds has been made at lease area.
- (xv) We are not drawing ground water for industrial use, if required, the permission will be taken from competent authority.
- (xvi) No endanger fauna is present in mines area however all possible measures is taken to prevent ecological status of project area.
- (xvii) 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.
- (xviii) 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. We have undergone through initial & periodical test of all workers employed in the mines by the certified team. The records related to initial and periodical medical examination of all workmen is maintained.
- (xix) We accept the condition.


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

- (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.

Encl. : As Above

कार्यालय प्रधान मुख्य वन संरक्षक (वन्यप्राणी प्रबंधन एवं जैव विविधता
संरक्षण सह मुख्य वन्यप्राणी अभिरक्षक), छत्तीसगढ़
अरण्य भवन, मेडिकल कॉलेज रोड, रायपुर
(Ph 0771-2552228, Fax 0771-2552227)

ईमेल - pccfwl@sify.com

क्रमांक/व.प्रा./प्रबंध-12/13/2967

रायपुर दिनांक 07/10/2013

प्रति,

संचालक,
इन्वायरनमेंट क्लियरेंस सेल
भारत सरकार, वन एवं पर्यावरण मंत्रालय,
पर्यावरण भवन, सी.जी.ओ. कॉम्प्लेक्स,
लोधी रोड, नई दिल्ली-111003

विषय :- छत्तीसगढ़ के बलरामपुर जिले (तत्कालीन सरगुजा जिला) में स्थित सामरी बॉक्साइट
माईन्स, कुदाग बॉक्साइट माईन्स एवं टाटीझरिया बॉक्साइट माईन्स की क्षमता बढ़ाये हेतु
इन्वायरनमेंट क्लियरेंस।

- संदर्भ:- 1. पर्यावरण व वन मंत्रालय, भारत सरकार का पत्र क्रमांक J-11015/353/2007-IA.II(M) दिनांक
27 जुलाई 2007.
2. पर्यावरण व वन मंत्रालय, भारत सरकार का पत्र क्रमांक J-11015/337/2007-IA.II(M) दिनांक
27 जुलाई 2007.
3. पर्यावरण व वन मंत्रालय, भारत सरकार का पत्र क्रमांक J-11015/337/2007-IA.II(M) दिनांक
9 अगस्त 2007.

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कृपया आपके उपरोक्त संदर्भित पत्रों का अवलोकन करने का कष्ट करें। जिसके द्वारा बलरामपुर जिले
(पुराने सरगुजा जिले) के सामरी बॉक्साइट खुली खदान (1 LTPA) की क्षमता बढ़ाकर (5LTPA) करने, कुदाग बॉक्साइट
खदान (0.4 LTPA) की क्षमता बढ़ाकर (0.6 LTPA) करने तथा टाटीझरिया बॉक्साइट खदान (0.5 TPA) की क्षमता बढ़ाकर
(4 TPA) करने के परियोजना प्रस्ताव के संबंध में वन्य प्राणी (संरक्षण) अधिनियम, 1972 के तहत अनुसूची-1 के वन्यप्राणियों
हेतु "वन्य प्राणी संरक्षण, व प्रबंधन योजना" तैयार की जाकर इस कार्यालय की सहमति दिये जाने का लेख किया है।

- विषयांकित परियोजना हेतु खदान के लीज के अनुबंध दिसंबर 1996 एवं जून 1998 में हस्ताक्षरित
हुये थे। सामरी क्षेत्र में भारत सरकार पर्यावरण व वन मंत्रालय के आदेश क्रमांक J-11015/353/2007-
IA.II/M दिनांक 27 जुलाई, 2007 द्वारा 2146.746 हे. में, कुदाग क्षेत्र में भारत सरकार पर्यावरण व वन
मंत्रालय आदेश क्रमांक J-11015/354/2007-IA.II/M दिनांक 27 जुलाई 2007 द्वारा 377.116 हे. में, तथा
टाटीझरिया में भारत सरकार पर्यावरण व वन मंत्रालय के आदेश क्रमांक J-11015/337/2007-IA.II/M
दिनांक 9 अगस्त 2007 द्वारा 1218.762 हे. में बॉक्साइट खनन की स्वीकृति प्राप्त कर संस्था द्वारा खनन
का कार्य किया जा रहा है।

2. वर्तमान प्रस्ताव में उपरोक्त स्वीकृत खादानों की क्षमता सामरी के लिये 10 LPTA से बढ़ाकर 5.0 LPTA किया जाना, कुदाग के लिये 0.4 LPTA से बढ़ाकर 0.6 LPTA किया जाना एवं टाटीझरिया के लिये 50,000 TPA से बढ़ाकर 4,00,000 TPA किया जाना प्रस्तावित है। भारत सरकार पर्यावरण व वन मंत्रालय के द्वारा उपरोक्त वृद्धि हेतु प्रथम चरण की स्वीकृति क्रमशः आदेश क्रमांक J-11015/353/2007-IA.II/M दिनांक 27 जुलाई 2007, J-11015/354/2007-IA.II/M दिनांक 27 जुलाई 2007 एवं J-11015/337/2007-IA.II/M दिनांक 9 अगस्त 2007 द्वारा कुछ शर्तों के साथ दी गई है, जिसमें एक महत्वपूर्ण शर्त यह भी उल्लेखित है कि संबंधित क्षेत्र में वन्य प्राणी (संरक्षण) अधिनियम कं शैड्यूल 1 के पाये जाने वाले वन्य प्राणियों के संरक्षण हेतु प्रबंध योजना तैयार की जाकर राज्य के मुख्य वन्य जीव अभिरक्षक के अभिमत सहित प्रस्तुत किया जाये। जिसके पालन में संस्था द्वारा एक वन्य प्राणी संरक्षण योजना तैयार की गयी है।
3. खनन क्षमता बढ़ाने से संबंधित प्रस्तावित तीनों ही परियोजनाओं के एक दूसरे से 4 कि.मी. की परिधि में स्थित होने एवं सभी के बफर क्षेत्र ओवरलैपिंग होने के कारण सभी के लिये संयुक्त रूप से वन्य प्राणी संरक्षण व प्रबंधन योजना तैयार की जाकर महाप्रबंधक, (खादान), हिन्डालको इन्डस्ट्रीज के पत्र क्रमांक HIL/SAM/300/2013 दिनांक 2.03.2013 द्वारा प्रस्तुत किया गया है जिसका समग्र रूप से परीक्षण किया गया। प्रस्तावित परियोजनाओं के कोर क्षेत्र से 10 कि.मी. की परिधि में आने वाले ओवरलैपिंग बफर क्षेत्र में वन्य प्राणियों एवं उपलब्ध वनस्पतियों का सर्वे किया जाकर पाये गये स्पेसिज को परियोजना प्रस्ताव में अनेक्सर-4 के में उल्लेखित किया गया है।
4. उल्लेखित सूचि में वन्य प्राणी (संरक्षण) अधिनियम के शैड्यूल 1 के वन्य प्राणी नहीं पाये गये हैं। परंतु इस कार्यालय द्वारा वन संरक्षक (वन्य प्राणी), सरगुजा से विगत दस वर्षों में वन्य प्राणियों द्वारा की गई क्षति की जानकारी चाही गयी। वन संरक्षक ने अपने पत्र क्रमांक 749 दिनांक 24.05.2012 से यह जानकारी उपलब्ध कराया है कि उक्त क्षेत्र में हाथियों का वर्ष 2005 में दो बार, वर्ष 2006 में आठ बार, 2007 में एक बार, 2008 में दो बार, 2009 में सात बार आना जाना हुआ है। इसी प्रकार भालुओं के द्वारा वर्ष 2007-08 में आठ, वर्ष 2008-09 में पाँच, वर्ष 2009-10 में छः एवं 2010-11 में 4 जनहानि व जनघायल के प्रकरण तथा वर्ष 2007-08 तथा 2008-09 में तेंदुआ द्वारा पशु हानि के दो प्रकरण तथा लकड़बग्घे के कारण एक प्रकरण दर्ज किये गये हैं। इस प्रकार वन्य प्राणी (संरक्षण) अधिनियम के शैड्यूल 1 के उपरोक्त उल्लेखित वन्य प्राणियों के परियोजना क्षेत्र में आने जाने के प्रमाण पाये गये है। प्रस्तावित क्षेत्र से 6 से 7 कि.मी.की दूरी पर झारखंड राज्य में भेड़िया अभ्यारण्य भी स्थापित है। अतः संस्था द्वारा दस वर्षों के लिये वन्य प्राणी संरक्षण व प्रबंध योजना श्री पी. के. सेन पूर्व वन्य प्राणी अभिरक्षक, झारखंड से तैयार कराया जाकर प्रस्तुत किया गया है। जिसका समग्र व विस्तृत अध्ययन किया गया। प्रबंधन योजना में प्रस्तावित प्रबंधन संबंधित मुख्य गतिविधियों का विवरण निम्नानुसार है।
5. योजना में वन्य प्राणियों के लिये जलग्रहण क्षेत्र विकास, रहवास-विकास, पेयजल व्यवस्था, विभाग के क्षेत्रीय अमले के सहयोग से क्षेत्र में पेट्रोलिंग व मॉनिटरिंग, अग्नि सुरक्षा, ईको विकास की गतिविधियों, स्थानीय ग्रामीणों के लिये आजीविका सृजन, टीकाकरण, जनजागृति कार्यक्रम जैसी गतिविधियों का

III

समावेश करते हुये 04 वर्षों के लिये राशि रुपये 160 लाख प्रावधानित की गयी है। जिसका क्रियान्वयन वन विभाग के द्वारा किया जायेगा। प्रस्ताव में प्रावधानित बजट का विवरण निम्नानुसार है :-

| Sr. No. | Works to be done | Cost for Four years (Rs. In lakhs) | | | | | Remarks |
|--------------|---|------------------------------------|----------------------|----------------------|----------------------|---------------|--|
| | | 1 st Year | 2 nd Year | 3 rd Year | 4 th Year | Total | |
| 1 | Plantation including soil and moisture Conservation works as per norms of forest department surrounding the lease hold | 5.00 | 5.00 | 5.00 | 5.00 | 20.00 | |
| 2 | Silvicultural Operation on degraded forest Land and cut back in rooted waste | 2.00 | 2.00 | 2.00 | 2.00 | 8.00 | |
| 3 | Habitat Management Eradication of unwanted species in buffer Zone area, Fire Protection work including wages for fire watchman, Creation of Fire line etc. surrounding lease hold and in buffer area. | 2.50 | 2.50 | 2.50 | 2.50 | 10.00 | |
| 4 | Monitoring - One Staff of forest department to monitor movement of wild life, encroachment, illicit cutting, poaching, fire etc. including Salary of 1 staff | 3.00 | 3.00 | 3.00 | 3.00 | 12.00 | |
| 5 | Construction of water holes, their maintenance and patrolling (One per Annum) | 10.00 | 10.00 | 10.00 | 10.00 | 40.00 | |
| 6 | Eco-development activities like poultry, piggery, bee keeping etc. | 5.00 | 5.00 | 5.00 | 5.00 | 20.00 | |
| 7 | Vocational Training to weaker section, females, old persons and minors of the surrounding villages in three centre in the buffer Zone of the mining lease @ 50000/- per centre. | 3.00 | 3.00 | 3.00 | 3.00 | 12.00 | |
| 8 | Veterinary camp for immunization of Cattle with the help of block veterinary staff. | 2.00 | 2.00 | 2.00 | 2.00 | 8.00 | |
| 9 | Awareness Programme including Signages, distribution of Pamphlets related to wild life conservation etc. | 2.50 | 2.50 | 2.50 | 2.50 | 10.00 | |
| 10 | Provision for conservation of Biodiversity among flora and fauna of the area & Preparation of Biodiversity register . | 20.00 | 0.00 | 0.00 | 0.00 | 20.00 | The amount is to be deposited in the account of Biodiversity Board as this work is to be done by Bio-diversity management committees (BMC's) |
| Total | | 55.00 | 35.00 | 35.00 | 35.00 | 160.00 | |

- 6 वन्यप्राणी संरक्षण योजना की लागत रू. 160.00 लाख वर्तमान दरों पर है, परियोजना में देरी होने से यह लागत बढ़ेगी जिसमें प्राईस इन्डेक्स के हिसाब से वृद्धि होगी। परियोजना के क्रियान्वयन के समय जो भी लागत आयेगी वह परियोजना प्रस्तावकों को वन विभाग में एकमुश्त जमा करानी होगी। जिससे मूल्य वृद्धि के प्रभाव का समाप्त किया जा सके। वन विभाग एकमुश्त जमा की गई राशि से वन्यप्राणी संरक्षण योजना क्रियान्वित करेगा।
- 7 अनुमोदित वन्यप्राणी संरक्षण योजना की एक प्रति संलग्न प्रेषित है। कृपया वन्यप्राणी संरक्षण योजना में प्रावधानित राशि रू. 160.00 लाख एकमुश्त जमा कराने हेतु परियोजना प्रस्तावकों को आदेशित करने का कष्ट करें।

संलग्न:- उपरोक्तानुसार।

Aprakash
(रामप्रकाश) 01/10/13

प्रधान मुख्य वन संरक्षक (वन्यप्राणी)
छत्तीसगढ़, रायपुर

रायपुर दिनांक 01/10/2013

पृष्ठां क्रमांक/व.प्रा./प्रबंध-12/13/ 2968.

प्रतिलिपि :-

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Aprakash
प्रधान मुख्य वन संरक्षक (वन्यप्राणी) 01/10/13
छत्तीसगढ़, रायपुर

ANNEXURE-6
DETAILS OF FLORA & FAUNA

TABLE-1
DETAILS OF DOMINANT PLANT SPECIES IN MINE LEASE AREA (CORE ZONE)

| Name of the plant Species | Local Name | Family |
|---------------------------------|----------------|----------------|
| <i>Butea monosperma</i> | Palas | Fabaceae |
| <i>Acacia Arabica</i> | Babul | Mimosaceae |
| <i>Leucena leucophloe</i> | Sabubal | Mimosaceae |
| <i>Mangifera indica</i> | Aam | Anacardiaceae |
| <i>Citrus lemon</i> | Nimbu | Rutaceae |
| <i>Emblica officinalis</i> | Amla | Euphorbiaceae |
| <i>Ficus hispida</i> | Jungli anjir | Moraceae |
| <i>Spondias cythera</i> | Kathjamun | Myrtaceae |
| <i>Terminalia catapa</i> | Badam | Combretaceae |
| <i>Apluda mutica</i> | Grass | Poaceae |
| <i>Chloris dolichosta</i> | Grass | Poaceae |
| <i>Dichanthium annulatum</i> | Grass | Poaceae |
| <i>Inpurta cylendrica</i> | Grass | Poaceae |
| <i>Themeda quadrivalvis</i> | Grass | Poaceae |
| <i>Aristida adscensionsis</i> | Grass | Poaceae |
| <i>Eragrostis biferia</i> | Grass | Poaceae |
| <i>Eragrostis tenella</i> | Grass | Poaceae |
| <i>Setaria glauca</i> | Grass | Cyperaceae |
| <i>Thysanolaena maxima</i> | Grass | Graminae |
| <i>Parthenium hysterophorus</i> | Congress grass | Compositae |
| <i>Cassia tora</i> | - | Caesalpinaceae |
| <i>Delonix regia</i> | Kachnar | Caesalpinaceae |
| <i>Dalbergia Sissoo</i> | Sisoo | Caesalpinaceae |

TABLE-2
FLORA/VEGETATION IN STUDY AREA (BUFFER ZONE)

| Sr. No. | Technical Name | Family | Life Form |
|--|--------------------------------|----------------|-----------------|
| I. Agricultural Crops | | | |
| 1 | <i>Hordium vulgare</i> | Poaceae | Hemicryptophyte |
| 2 | Sorghum vulgare | Poaceae | Hemicryptophyte |
| 3 | <i>Triticum vulgare</i> | Poaceae | Hemicryptophyte |
| 4 | <i>Zea mays</i> | Poaceae | Hemicryptophyte |
| 5 | <i>Oryza sativa</i> | Poaceae | Hemicryptophyte |
| 6 | <i>Pennisetum typhoideum</i> | Poaceae | Hemicryptophyte |
| II. Commercial Crops (including Vegetables) | | | |
| 7 | <i>Abelmoschus indicus</i> | Malvaceae | Therophyte |
| 8 | <i>Allium cepa</i> | Liliaceae | Geophyte |
| 9 | <i>Allium sativum</i> | Liliaceae | Geophyte |
| 10 | <i>Annona squamosa</i> | Annonaceae | Phanerophyte |
| 11 | <i>Arachis hypogea</i> | Fabaceae | Geophyte |
| 12 | <i>Catharanthes pusillus</i> | Compositae | Therophyte |
| 13 | Cicer arietinum | Fabaceae | Hemicryptophyte |
| 14 | <i>Citrus lemon</i> | Ruataceae | Therophyte |
| 15 | <i>Colocasia esculenta</i> | Areaceae | Geophyte |
| 16 | <i>Coreandrum sativum</i> | Umbelliferae | Hemicryptophyte |
| 17 | <i>Daucus carota</i> | Umbelliferae | Geophyte |
| 18 | <i>Lycopersicum esculentus</i> | Solanaceae | Therophyte |
| 19 | <i>Mangifera indica</i> | Anacardiaceae | Phanerophyte |
| 20 | <i>Memordia charantia</i> | Cucurbitaceae | Therophyte |
| 21 | <i>Pisum sativum</i> | Fabaceae | Therophyte |
| 22 | <i>Psidium guava</i> | Myrtaceae | Phanerophyte |
| 23 | <i>Solanum tuberosum</i> | Solanaceae | Geophyte |
| 24 | <i>Litchi chinensis</i> | Sapindaceae | Phanerophyte |
| III. Plantations | | | |
| 25 | <i>Bauhinia-cornbosa</i> | Caesalpinaceae | Phanerophyte |
| 26 | <i>Acacia nilotica</i> | Mimosaceae | Phanerophyte |
| 27 | <i>Albizia lebbeck</i> | Mimosaceae | Phanerophyte |
| 28 | <i>Albizia odorattissima</i> | Mimosaceae | Phanerophyte |
| 29 | <i>Albizia procera</i> | Mimosaceae | Phanerophyte |

| Sr. No. | Technical Name | Family | Life Form |
|---|--------------------------------|----------------|--------------|
| 30 | <i>Azadirachta indica</i> | Meliaceae | Phanerophyte |
| 31 | <i>Bauhinia variegata</i> | Caesalpinaceae | Phanerophyte |
| 32 | <i>Bauhinia purpuria</i> | Caesalpinaceae | Phanerophyte |
| 33 | <i>Bambusa arundanaceae</i> | Poaceae | Phanerophyte |
| 34 | <i>Butea monosperma</i> | Caesalpinaceae | Phanerophyte |
| 35 | <i>Butea frondosa</i> | Caesalpinaceae | Phanerophyte |
| 36 | <i>Eucalyptus sp</i> | Myrtaceae | Phanerophyte |
| 37 | <i>Delonix regia</i> | Caesalpinaceae | Phanerophyte |
| 38 | <i>Leucena leucophloe</i> | Caesalpinaceae | Phanerophyte |
| IV. Natural Vegetation/Forest Type | | | |
| 39 | <i>Abrus precatorius</i> | Fabaceae | Therophyte |
| 40 | <i>Abutilon indicum</i> | Malvaceae | Phanerophyte |
| 41 | <i>Acacia Arabica</i> | Mimosaceae | Phanerophyte |
| 42 | <i>Acacia auriculiformis</i> | Mimosaceae | Phanerophyte |
| 43 | <i>Acacia catechu</i> | Mimosaceae | Phanerophyte |
| 44 | <i>Acacia intinsia</i> | Mimosaceae | Phanerophyte |
| 45 | <i>Acacia fernacea</i> | Mimosaceae | Phanerophyte |
| 46 | <i>Acacia leucophloe</i> | Mimosaceae | Phanerophyte |
| 47 | <i>Acalypha lanceolata</i> | Euphorbiaceae | Therophyte |
| 48 | <i>Acanthospermum hispidum</i> | Compositae | Therophyte |
| 49 | <i>Achyranthes aspera</i> | Amaranthaceae | Therophyte |
| 50 | <i>Adathoda vasica</i> | Acanthaceae | Therophyte |
| 51 | <i>Adina cordifolia</i> | Rubiaceae | Phanerophyte |
| 52 | <i>Aegle marmelos</i> | Rutaceae | Phanerophyte |
| 53 | <i>Aerva lanata</i> | Compositae | Therophyte |
| 54 | <i>Ageratum conyzoides</i> | Compositae | Therophyte |
| 55 | <i>Ailanthus excelsa</i> | Simaroubaceae | Phanerophyte |
| 56 | <i>Alangium salivus</i> | Alangiceae | Phanerophyte |
| 57 | <i>Albizia odoratissima</i> | Caesalpinaceae | Phanerophyte |
| 58 | <i>Albizia procera</i> | Caesalpinaceae | Phanerophyte |
| 59 | <i>Alstonia scholaris</i> | Apocyanaceae | Phanerophyte |
| 60 | <i>Alternanthera sessilis</i> | Amaranthaceae | Therophyte |
| 61 | <i>Alysicarpus hamosus</i> | Fabaceae | Therophyte |
| 62 | <i>Anogeissus latifolia</i> | Combretaceae | Phanerophyte |
| 63 | <i>Anogeissus serica</i> | Combretaceae | Phanerophyte |
| 64 | <i>Argemone mexicana</i> | Papevaraceae | Phanerophyte |
| 65 | <i>Azadirachta indica</i> | Meliaceae | Phanerophyte |
| 66 | <i>Barleria prionoites</i> | Acanthaceae | Therophyte |
| 67 | <i>Bidens biternata</i> | Compositae | Therophyte |
| 68 | <i>Blepharis asperima</i> | Acanthaceae | Phanerophyte |
| 69 | <i>Blepharis madaraspatens</i> | Acanthaceae | Therophyte |
| 70 | <i>Blumea lacera</i> | Compositae | Therophyte |
| 71 | <i>Boerheavia chinensis</i> | Nyctaginaceae | Therophyte |
| 72 | <i>Boerheavia diffusa</i> | Nyctaginaceae | Therophyte |
| 73 | <i>Bombax ceiba</i> | Bombacaceae | Phanerophyte |
| 74 | <i>Borreria hispida</i> | Rubiaceae | Therophyte |
| 75 | <i>Borreria stricta</i> | Rubiaceae | Therophyte |
| 76 | <i>Boswellia serrata</i> | Burseraceae | Phanerophyte |
| 77 | <i>Brassica camprestris</i> | Cruciferae | Therophyte |
| 78 | <i>Bridelia retusa</i> | Euphorbiaceae | Phanerophyte |
| 79 | <i>Bridelia superba</i> | Euphorbiaceae | Phanerophyte |
| 80 | <i>Caesalpina pulcherima</i> | Caesalpinaceae | Phanerophyte |
| 81 | <i>Calotropis procera</i> | Asclpiadaceae | Phanerophyte |
| 82 | <i>Canthium diddymum</i> | Rubiaceae | Phanerophyte |
| 83 | <i>Capparis aphylla</i> | Capparidaceae | Therophyte |
| 84 | <i>Capparis deciduas</i> | Capparidaceae | Phanerophyte |
| 85 | <i>Carissa carandus</i> | Apocyanaceae | Phanerophyte |
| 86 | <i>Carissa spinarium</i> | Apocyanaceae | Phanerophyte |
| 87 | <i>Casearia graveolens</i> | Samydiaceae | Phanerophyte |
| 88 | <i>Cassia absus</i> | Caesalpinaceae | Phanerophyte |
| 89 | <i>Cassia absus</i> | Caesalpinaceae | Therophyte |
| 90 | <i>Cassia auriculata</i> | Caesalpinaceae | Therophyte |
| 91 | <i>Cassia occidentalis</i> | Caesalpinaceae | Therophyte |
| 92 | <i>Cassia tora</i> | Caesalpinaceae | Phanerophyte |
| 93 | <i>Cestrum diurnum</i> | Rubiaceae | Theophyte |
| 94 | <i>Cestrum noctrunum</i> | Rubiaceae | Therophyte |

| Sr. No. | Technical Name | Family | Life Form |
|---------|-----------------------------------|----------------|-----------------|
| 95 | <i>Chloris variegata</i> | Poaceae | Therophyte |
| 96 | <i>Cissus quadrangularis</i> | Vitaceae | Therophyte |
| 97 | <i>Citrus limon</i> | Rutaceae | Phanerophyte |
| 98 | <i>Cleome gynandra</i> | Capparidaceae | Therophyte |
| 99 | <i>Combretum ovalifolium</i> | Rubiaceae | Phanerophyte |
| 100 | <i>Cordia myxa</i> | Rubiaceae | Phanerophyte |
| 101 | <i>Crotalaria medicagenia</i> | Fabaceae | Therophyte |
| 102 | <i>Croton bonplandinum</i> | Amaryllidaceae | Therophyte |
| 103 | <i>Cuscuta reflexa</i> | Cuscutaceae | Epiphyte |
| 104 | <i>Datura fastuosa</i> | Solanaceae | Therophyte |
| 105 | <i>Datura metal</i> | Solanaceae | Therophyte |
| 106 | <i>Desmodium triflorum</i> | Asclepiadaceae | Therophyte |
| 107 | <i>Diospyros melanoxyton</i> | Lythraceae | Phanerophyte |
| 108 | <i>Diospyros Montana</i> | Lythraceae | Phanerophyte |
| 109 | <i>Echinops echinatus</i> | Compositae | Therophyte |
| 110 | <i>Eclipta prostrate</i> | Compositae | Hemicryptophyte |
| 111 | <i>Embllica officinale</i> | Euphorbiaceae | Phanerophyte |
| 112 | <i>Emilia lajerium</i> | Compositae | Hemicryptophyte |
| 113 | <i>Erythrina indica</i> | Papillionaceae | Phanerophyte |
| 114 | <i>Euphorbia geniculata</i> | Euphorbiaceae | Therophyte |
| 115 | <i>Euphorbia hirta</i> | Euphorbiaceae | Therophyte |
| 116 | <i>Euphorbia hyperocifolia</i> | Euphorbiaceae | Therophyte |
| 117 | <i>Euphorbia neruri</i> | Euphorbiaceae | Therophyte |
| 118 | <i>Euphorbia nivula</i> | Euphorbiaceae | Therophyte |
| 119 | <i>Euphorbia piluliflora</i> | Euphorbiaceae | Hemicryptophyte |
| 120 | <i>Euphorbia tricauli</i> | Euphorbiaceae | Hemicryptophyte |
| 121 | <i>Evolvulus alsinoides</i> | Convolvulaceae | Therophyte |
| 122 | <i>Evolvulus numularis</i> | Convolvulaceae | Therophyte |
| 123 | <i>Feronia elephantum</i> | Rutaceae | Phanerophyte |
| 124 | <i>Ficus benghalensis</i> | Moraceae | Phanerophyte |
| 125 | <i>Ficus carica</i> | Moraceae | Phanerophyte |
| 126 | <i>Ficus glomerata</i> | Moraceae | Phanerophyte |
| 127 | <i>Ficus hispida</i> | Moraceae | Phanerophyte |
| 128 | <i>Ficus racemosus</i> | Moraceae | Phanerophyte |
| 129 | <i>Ficus religiosia</i> | Moraceae | Phanerophyte |
| 130 | <i>Ficvus gibbosa</i> | Moraceae | Phanerophyte |
| 131 | <i>Gardenia latifolia</i> | Rubiaceae | Phanerophyte |
| 132 | <i>Gardenia lucida</i> | Rubiaceae | Phanerophyte |
| 133 | <i>Garuga pinnata</i> | Burseraceae | Phanerophyte |
| 134 | <i>Glossocardia bosvellia</i> | Compositae | Hemicryptophyte |
| 135 | <i>Gmellina arborea</i> | Rubiaceae | Phanerophyte |
| 136 | <i>Gomphrena globosa</i> | Amaranthaceae | Therophyte |
| 137 | <i>Gossypium herbaceum</i> | Malvaceae | Therophyte |
| 138 | <i>Grewia abutifolia</i> | Tiliaceae | Phanerophyte |
| 139 | <i>Grewia salivifolia</i> | Tiliaceae | Phanerophyte |
| 140 | <i>Grewia subinaqualis</i> | Tiliaceae | Phanerophyte |
| 141 | <i>Gynandropis gynandra</i> | Capparidaceae | Hemicryptophyte |
| 142 | <i>Helictris isora</i> | Rubiaceae | Phanerophyte |
| 143 | <i>Heliotropium indicum</i> | Rubiaceae | Hemicryptophyte |
| 144 | <i>Heliotropium ovalifolium</i> | Rubiaceae | Hemicryptophyte |
| 145 | <i>Hemidesmus indicus</i> | Asclepiadaceae | Phanerophyte |
| 146 | <i>Hibiscus caesus</i> | Malvaceae | Hemicryptophyte |
| 147 | <i>Holarrhena antidycenterica</i> | Asclepiadaceae | Phanerophyte |
| 148 | <i>Holostemma annularia</i> | Asclepiadaceae | Phanerophyte |
| 149 | <i>Hygrophylla auriculata</i> | Acanthaceae | Hemicryptophyte |
| 150 | <i>Hyptis suavalens</i> | Labiatae | Therophyte |
| 151 | <i>Ichnocarpus frutens</i> | Poaceae | Hemicryptophyte |
| 152 | <i>Impatiens balasamania</i> | Balsaminaceae | Therophyte |
| 153 | <i>Indigofera hirsute</i> | Caesalpinaceae | Therophyte |
| 154 | <i>Indigofera limnacea</i> | Caesalpinaceae | Therophyte |
| 155 | <i>Indigofera tinctoria</i> | Caesalpinaceae | Therophyte |
| 156 | <i>Ipomea aquatica</i> | Convolvulaceae | Hydrophyte |
| 157 | <i>Ipomea coccinea</i> | Convolvulaceae | Therophyte |
| 158 | <i>Ipomea tuba</i> | Convolvulaceae | Hemicryptophyte |
| 159 | <i>Ixora arborea</i> | Rubiaceae | Phanerophyte |
| 160 | <i>Ixora parviflora</i> | Rubiaceae | Phanerophyte |

| Sr. No. | Technical Name | Family | Life Form |
|---------|----------------------------------|------------------|-----------------|
| 161 | <i>Ixora singapuriensis</i> | Rubiaceae | Phanerophyte |
| 162 | <i>Jasminum arborens</i> | Oleaceae | Phanerophyte |
| 163 | <i>Jatropha gossypifolia</i> | Euphorbiaceae | Therophyte |
| 164 | <i>Jussiaea suffruticosa</i> | Onagraceae | Hydrophyte |
| 165 | <i>Justia diffusa</i> | Acanthaceae | Therophyte |
| 166 | <i>Justicia diffusa</i> | Acanthaceae | Therophyte |
| 167 | <i>Lactuca punctata</i> | Compositae | Therophyte |
| 168 | <i>Lannea coramandalica</i> | Anacardiaceae | Phanerophyte |
| 169 | <i>Lannea grandis</i> | Anacardiaceae | Phanerophyte |
| 170 | <i>Lannea procumbens</i> | Anacardiaceae | Therophyte |
| 171 | <i>Lantana camara</i> | Verbinaceae | Phanerophyte |
| 172 | <i>Lawsonia inermis</i> | Lythraceae | Phanerophyte |
| 173 | <i>Lepidogathis cristata</i> | Acanthaceae | Therophyte |
| 174 | <i>Leptodenia reticulata</i> | Asclepiadaceae | Phanerophyte |
| 175 | <i>Leucas aspera</i> | Labiatae | Therophyte |
| 176 | <i>Leucas longifolia</i> | Labiatae | Therophyte |
| 177 | <i>Leucas longifolia</i> | Labiatae | Therophyte |
| 178 | <i>Leucena leucophloe</i> | Caesalpinaceae | Phanerophyte |
| 179 | <i>Linderbergia indica</i> | Scrophulariaceae | Therophyte |
| 180 | <i>Lindenbergia ciliata</i> | Scrophulariaceae | Therophyte |
| 181 | <i>Lophophora tridinatus</i> | Scrophulariaceae | Geophyte |
| 182 | <i>Luffa acutangularia</i> | Cucurbitaceae | Therophyte |
| 183 | <i>Lycopersicum esculentus</i> | Solanaceae | Therophyte |
| 184 | <i>Madhuca latifolia</i> | Sapotaceae | Phanerophyte |
| 185 | <i>Mallotus philippinus</i> | Euphorbiaceae | Phanerophyte |
| 186 | <i>Malvastrum coramandalicum</i> | Malvaceae | Therophyte |
| 187 | <i>Mangifera indica</i> | Anacardiaceae | Phanerophyte |
| 188 | <i>Marselia quadrifolia</i> | Marseliaceae | Phanerophyte |
| 189 | <i>Melia azadirachta</i> | Meliaceae | Phanerophyte |
| 190 | <i>Memordica diocea</i> | Cucurbitaceae | Therophyte |
| 191 | <i>Merremia emerginata</i> | Convolvulaceae | Therophyte |
| 192 | <i>Michaelia champaca</i> | Annonaceae | Phanerophyte |
| 193 | <i>Millingtonia hartensis</i> | Bignoniaceae | Phanerophyte |
| 194 | <i>Mimosa hamata</i> | Mimosaceae | Therophyte |
| 195 | <i>Mitragyna parviflora</i> | Rubiaceae | Phanerophyte |
| 196 | <i>Mollugo cerviana</i> | Aizoaceae | Therophyte |
| 197 | <i>Mollugo hirta</i> | Aizoaceae | Therophyte |
| 198 | <i>Moringa oleifera</i> | Moringaceae | Phanerophyte |
| 199 | <i>Morus alba</i> | Moraceae | Phanerophyte |
| 200 | <i>Mucuna prurita</i> | Papilionaceae | Hemicryptophyte |
| 201 | <i>Murraya exotica</i> | Rutaceae | Phanerophyte |
| 202 | <i>Murraya koenigii</i> | Rutaceae | Phanerophyte |
| 203 | <i>Musa paradisiaca</i> | Musaceae | Therophyte |
| 204 | <i>Nymphia sp</i> | Magnoliaceae | Hydrophyte |
| 205 | <i>Ocimum americanum</i> | Labiatae | Therophyte |
| 206 | <i>Ocimum basilicum</i> | Labiatae | Therophyte |
| 207 | <i>Ocimum canum</i> | Labiatae | Therophyte |
| 208 | <i>Ocimum sanctum</i> | Labiatae | Therophyte |
| 209 | <i>Oldenlandia umbellata</i> | Convolvulaceae | Therophyte |
| 210 | <i>Oldenlandia corymbosa</i> | Rubiaceae | Therophyte |
| 211 | <i>Ooegonia oojensis</i> | Papilionaceae | Phanerophyte |
| 212 | <i>Opuntia dillinii</i> | Opuntiaceae | Therophyte |
| 213 | <i>Opuntia elator</i> | Cacataceae | Therophyte |
| 214 | <i>Oxalis corniculata</i> | Oxalidaceae | Therophyte |
| 215 | <i>Panicum milliria</i> | Poaceae | Hemicryptophyte |
| 216 | <i>Panicum notatum</i> | Poaceae | Hemicryptophyte |
| 217 | <i>Papaver somniferum</i> | Papaveraceae | Hemicryptophyte |
| 218 | <i>Parkinsonia aculata</i> | Mimosaceae | Phanerophyte |
| 219 | <i>Parthenium hysterophorus</i> | Compositae | Therophyte |
| 220 | <i>Paspalum strobilanthus</i> | Passifloraceae | Hemicryptophyte |
| 221 | <i>Passiflora foetida</i> | Passifloraceae | Phanerophyte |
| 222 | <i>Pavonia zeylanica</i> | Malvaceae | Phanerophyte |
| 223 | <i>Peltophorum ferrusinum</i> | Caesalpinaceae | Phanerophyte |
| 224 | <i>Phoenix aculis</i> | Palmae | Phanerophyte |
| 225 | <i>Phyllanthus asperulatus</i> | Euphorbiaceae | Phanerophyte |
| 226 | <i>Phyllanthus emblica</i> | Euphorbiaceae | Phanerophyte |

| Sr. No. | Technical Name | Family | Life Form |
|----------------------|----------------------------------|------------------|-----------------|
| 227 | <i>Phyllanthes niruri</i> | Euphorbiaceae | Therophyte |
| 228 | <i>Phyllanthes reticulatus</i> | Euphorbiaceae | Therophyte |
| 229 | <i>Physalis minima</i> | Solanaceae | Therophyte |
| 230 | <i>Pithocolobium dulce</i> | Mimosaceae | Phanerophyte |
| 231 | <i>Polyalthia longifolia</i> | Annonaceae | Phanerophyte |
| 232 | <i>Polygala ererptera</i> | Polygalaceae | Therophyte |
| 233 | <i>Pongamia pinnata</i> | Fabaceae | Phanerophyte |
| 234 | <i>Portulaca oleracea</i> | Portulacaceae | Therophyte |
| 235 | <i>Psidium guava</i> | Myrtaceae | Phanerophyte |
| 236 | <i>Punica granatum</i> | Puniaceae | Therophyte |
| 237 | <i>Randia dumetorum</i> | Rubiaceae | Phanerophyte |
| 238 | <i>Rosa indica</i> | Rosaceae | Therophyte |
| 239 | <i>Rosa machata</i> | Rosaceae | Therophyte |
| 240 | <i>Saccharum munja</i> | Poaceae | Hemicryptophyte |
| 241 | <i>Saccharum officinarum</i> | Poaceae | Therophyte |
| 242 | <i>Salmalia malabarica</i> | Salmaliaceae | Phanerophyte |
| 243 | <i>Sapindus emarginatus</i> | Sapindaceae | Phanerophyte |
| 244 | <i>Schleichera trijuga</i> | Combretaceae | Phanerophyte |
| 245 | <i>Schrebera sweitenoides</i> | Sapindaceae | Phanerophyte |
| 246 | <i>Schleichera oleosa</i> | Sapindaceae | Phanerophyte |
| 247 | <i>Sesamum indicum</i> | Pedaliaceae | Hemicryptophyte |
| 248 | <i>Shorea robusta</i> | Dipterocarpaceae | Phanerophyte |
| 249 | <i>Sida orientalis</i> | Malvaceae | Phanerophyte |
| 250 | <i>Sida vernanifolia</i> | Malvaceae | Hemicryptophyte |
| 251 | <i>Solanum nigrum</i> | Solanaceae | Therophyte |
| 252 | <i>Solanum xanthocarpum</i> | Solanaceae | Therophyte |
| 253 | <i>Sterculia villosa</i> | Tiliaceae | Therophyte |
| 254 | <i>Stereospermum chelinoides</i> | Bignoniaceae | Phanerophyte |
| 255 | <i>Sygygium cumini</i> | Myrtaceae | Phanerophyte |
| 256 | <i>Tamarindus indica</i> | Caesalpinaceae | Phanerophyte |
| 257 | <i>Tecomella undulate</i> | Bignoniaceae | Therophyte |
| 258 | <i>Tectona grandis</i> | Verbinaceae | Phanerophyte |
| 259 | <i>Tephrosia purpuria</i> | Fabaceae | Therophyte |
| 260 | <i>Terminalia bellarica</i> | Combretaceae | Phanerophyte |
| 261 | <i>Terminalia chebula</i> | Combretaceae | Phanerophyte |
| 262 | <i>Terminalia tomentosa</i> | Combretaceae | Phanerophyte |
| 263 | <i>Tinospora cordifolia</i> | Rhamnaceae | Therophyte |
| 264 | <i>Tragus biflorus</i> | Poaceae | Hemicryptophyte |
| 265 | <i>Tribulus terrestris</i> | Zygophyllaceae | Therophyte |
| 266 | <i>Tridax procumbens</i> | Compositae | Therophyte |
| 267 | <i>Triumferta pilosa</i> | Tiliaceae | |
| 268 | <i>Vernonia cinera</i> | Compositae | Therophyte |
| 269 | <i>Vicoa indica</i> | Compositae | Phanerophyte |
| 270 | <i>Vitex Negundo</i> | Verbinaceae | Phanerophyte |
| 271 | <i>Vitex negundo</i> | Verbinaceae | Therophyte |
| 272 | * <i>Vitis vermifera</i> | Vitaceae | Therophyte |
| 273 | <i>Vivevera zizanoides</i> | Poaceae | Therophyte |
| 274 | <i>Wrightia tomentosa</i> | Apocyanaceae | Phanerophyte |
| 275 | <i>Xanthium strumariumk</i> | Compositae | Therophyte |
| 276 | <i>Yucca gloriosa</i> | Agavaceae | Therophyte |
| 277 | <i>Zizyphus jujube</i> | Rhamnaceae | Phanerophyte |
| 278 | <i>Zizyphus mauritiana</i> | Rhamanaceae | Phanerophyte |
| V. Grasslands | | | |
| 279 | <i>Apluda mutica</i> | Poaceae | Hemicryptophyte |
| 280 | <i>Chloris dolichosta</i> | Poaceae | Hemicryptophyte |
| 281 | <i>Cyanodactylon sp</i> | Poaceae | Geophyte |
| 282 | <i>Dichanthium annulatum</i> | Poaceae | Hemicryptophyte |
| 283 | <i>Inpurta cylendrica</i> | Poaceae | Hemicryptophyte |
| 284 | <i>Sachharum spontanseum</i> | Poaceae | Hemicryptophyte |
| 285 | <i>Themeda quadrivalvis</i> | Poaceae | Hemicryptophyte |
| 286 | <i>Aristida adscensionsis</i> | Poaceae | Hemicryptophyte |
| 287 | <i>Cenchrus ciliaris</i> | Poaceae | Therophyte |
| 288 | <i>Cenchrus setifera</i> | Poaceae | Therophyte |
| 289 | <i>Cymbopogon jwarancusa</i> | Cyperaceae | Hemicryptophyte |
| 290 | <i>Cyperus aristatus</i> | Cyperaceae | Therophyte |
| 291 | <i>Cyperus triceps</i> | Cyperaceae | Therophyte |

| Sr. No. | Technical Name | Family | Life Form |
|---------|----------------------------------|---|-----------------|
| 292 | <i>Dactylectinium annualatum</i> | Poaceae | Therophyte |
| 293 | <i>Digetaria bicornis</i> | Poaceae | Hemicryptophyte |
| 294 | <i>Digetaria Segetaria</i> | Poaceae | Hemicryptophyte |
| 295 | <i>Eragrostis biferia</i> | Poaceae | Therophyte |
| 296 | <i>Eragrostis tenella</i> | Poaceae | Therophyte |
| 297 | <i>Ischaemum rugosum</i> | Poaceae | Hemicryptophyte |
| 298 | <i>Setaria glauca</i> | Cyperaceae | Hemicryptophyte |
| 299 | <i>Eulaliopsis binata</i> | Graminae | Hemicryptophyte |
| 300 | <i>Thysanolaena maxima</i> | Graminae | Hemicryptophyte |
| | Endangered plants | No endangered plant species observed during study period and also from records of Botanical Survey of India (Red data of Books of Indian Plants) | |

TABLE-3
FAUNA AND THEIR CONSERVATION STATUS FROM MINE LEASE AREA (CORE ZONE)

| Technical Name | English Name/ Local Name | Wild Life Protection Act (1972) Status |
|--------------------------------------|----------------------------------|---|
| Aves | | |
| <i>Phalacrocorax niger</i> | Little cormorant | Sch-IV |
| <i>Nycticorax nycticorax</i> | Night heron | Sch-IV |
| <i>Ardeola grayii grayii</i> | Paddy bird | Sch-IV |
| <i>Bubulcus ibis coromandus</i> | Cattle egret | Sch-IV |
| <i>Eudynamys scolopacea</i> | Indian koel | Sch-IV |
| <i>Meops philippinus philippinus</i> | Bluetailed bee-eater | Sch-IV |
| <i>Dinopium benghalense tehminae</i> | Malabar golden backed Woodpecker | Sch-IV |
| <i>Acridotheres tristis tristis</i> | Common myna | Sch-IV |
| <i>Nectarinia minima</i> | Small sunbird | Sch-IV |
| <i>Passer domesticus indicus</i> | Indian house sparrow | Sch-IV |
| Butterflies | | |
| <i>Hypolimnas bolina Lin.</i> | Great eggfly | - |
| <i>Euploea core Cramer</i> | Common crow | - |
| <i>Neptis hylas Moore</i> | Common sailor | - |
| <i>Eurema hecabe Lin.</i> | Common grass yellow | - |
| <i>Parantica aqlea Stoll.</i> | Glassy tiger | - |
| Mammals | | |
| <i>Funambulus palmarum</i> | Squirrel | Sch-IV |
| <i>Sus sucrofa</i> | Wild pig | Sch-III |
| <i>Herpestes edwardii</i> | Common mongoose | Sch-IV |
| <i>Vulpus benghalensis</i> | Wild fox | Sch-II |
| <i>Hystrix indica</i> | Porcupine | Sch-IV |

TABLE-4
FAUNA AND THEIR CONSERVATION STATUS IN STUDY AREA (BUFFER ZONE)

| Technical Name | English Name/Local Name | Wild Life Protection Act (1972) |
|---------------------------------------|----------------------------------|------------------------------------|
| Aves | | |
| <i>Phalacrocorax niger</i> | Little cormorant | Sch-IV |
| <i>Ardea purpurea manilensis</i> | Eastern purple heron | Sch-IV |
| <i>Nycticorax nycticorax</i> | Night heron | Sch-IV |
| <i>Ardeola grayii grayii</i> | Paddy bird | Sch-IV |
| <i>Dupetor flavicollis</i> | Black bittern | Sch-IV |
| <i>Ardea alba modesta</i> | Large egret | Sch-IV |
| <i>Bubulcus ibis coromandus</i> | Cattle egret | Sch-IV |
| <i>Milvus migrans govinda</i> | Common pariah kite | Sch-IV |
| <i>Haliastur indus indus</i> | Brahminy kite | Sch-IV |
| <i>Vanellus indicus indicus</i> | Redwattled lapwing | Sch-IV |
| <i>Tringa hypoleucos</i> | Common sandpiper | Sch-IV |
| <i>Gelochelidon nilotica nilotica</i> | Gullbilled tern | Sch-IV |
| <i>Eudynamys scolopacea</i> | Indian koel | Sch-IV |
| <i>Halcyon smyrnensis fusca</i> | Indian white breasted Kingfisher | Sch-IV |

Year wise /Lease wise Details of Afforestation

| Year | Kudag Bauxite Mines | | Samri Bauxite Mines | | Tatjharla Bauxite Mines | | Total | |
|--------------|---------------------|---------------|---------------------|---------------|-------------------------|---------------|----------------|----------------|
| | No. of Sapling | Area in hect. | No. of Sapling | Area in hect. | No. of Sapling | Area in hect. | No. of Sapling | Area in hect. |
| 1998-99 | 900 | 0.1 | 0 | 0 | 0 | 0 | 900 | 0.1 |
| 1999-00 | 7000 | 2.58 | 0 | 0 | 0 | 0 | 7000 | 2.58 |
| 2000-01 | 7500 | 3.21 | 0 | 0 | 0 | 0 | 7500 | 3.21 |
| 2001-02 | 10000 | 5.01 | 0 | 0 | 0 | 0 | 10000 | 5.01 |
| 2002-03 | 4000 | 1.56 | 3800 | 2.44 | 0 | 0 | 7800 | 4 |
| 2003-04 | 4200 | 2.57 | 5500 | 2.81 | 0 | 0 | 9700 | 5.38 |
| 2004-05 | 6750 | 2.9 | 8222 | 2.8 | 2000 | 1 | 16972 | 6.7 |
| 2005-06 | 800 | 0.5 | 11100 | 3.8 | 8700 | 3.4 | 20600 | 7.7 |
| 2006-07 | 4940 | 2 | 16510 | 6.884 | 8190 | 3.3 | 29640 | 12.184 |
| 2007-08 | 2950 | 1.3 | 18880 | 7.75 | 6390 | 2.5 | 28220 | 11.55 |
| 2008-09 | 32200 | 12.72 | 5000 | 2.47 | 3000 | 1.5 | 40200 | 16.69 |
| 2009-10 | 15700 | 6.20 | 15100 | 6.00 | 7850 | 3.20 | 38650 | 15.40 |
| 2010-11 | 1500 | 0.600 | 18325 | 7.200 | 8750 | 3.400 | 28575 | 11.200 |
| 2011-12 | 3015 | 1.200 | 11575 | 4.600 | 3370 | 1.360 | 17960 | 7.160 |
| 2012-13 | 1200 | 0.500 | 12400 | 5.000 | 4600 | 1.900 | 18200 | 7.400 |
| 2013-14 | 950 | 0.400 | 8700 | 3.500 | 4875 | 2.000 | 14525 | 5.900 |
| 2014-15 | 5575 | 2.230 | 12850 | 5.150 | 7750 | 3.100 | 26175 | 10.480 |
| 2015-16 | 4000 | 1.600 | 10139 | 4.050 | 7500 | 3.000 | 21639 | 8.650 |
| 2016-17 | 4390 | 2.800 | 9110 | 3.700 | 5950 | 2.400 | 19450 | 8.900 |
| Total | 117570 | 49.98 | 167211 | 68.154 | 78925 | 32.060 | 363706 | 150.194 |



Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

Annexure - II
(18)

Telegram : PARYAVARAN,
NEW DELHI
Telephone :
टेलिग्राम (द्विभाषी) :
Telex : (bi-lingual) : W-26195 DOE IN
FAX : 4360678

TATIJHARIA

भारत सरकार
पर्यावरण एवं वन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS
पर्यावरण भवन, नं० जी० प्रो० कॉम्प्लेक्स
PARYAVARAN BHAWAN, C.G.O. COMPLEX
लूही रोड, नई दिल्ली - 110003
Dated: 17th March, 1996.

No.3-2J/95-FC

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

Sfg
Suraj Gupta
R.Q.P.
R.Q.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

- i) Reclamation 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.
- ii) Demarcation of the mining area will be done on the ground at the project cost.
- iii) Forest land will not be used for construction of buildings etc. and any purpose other than those mentioned in the proposal.
- iv) Lease period shall remain coterminous with lease under MMD Act subject to maximum of 20 years.
- v) Free fuelwood will be provided to the labourers and staff working at the project site at the project cost.
- vi) Any other condition the State Govt. may impose.
- vii) 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.

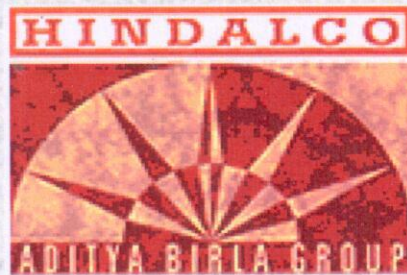
4.11.2016
(R.K. CHAUDHRY)
AIGF.

APPROVED

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

Duration: January-February-March-2017

Name of Industry:-



[Signature]
Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

M/s. Hindalco Industries Limited.,

Name of Laboratory:-



Recognised by MoEF (GOI) Notifn. No. D.L.33004/99 Dt.24.10.2007
NABL T-1550 (Chemical), T-1826 (Biological), T-2344 (Mechanical) dt.04/10/2016 valid up to 03.10.2018
Accredited under the QCI-NABET Scheme for EIA Consultant
BIS vide No.CL/CQAPD/OSL (7124116) dt.16.12.2011
Certified by ISO 9001:2008, ISO 14001:2004, ISO 18001:2007
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: labngp@anacon.in
info@anacon.in
Website: www.anaconlaboratories.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-2017 To March-2017.** 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.

Place : Nagpur

Date : March, 2017

for **ANACON LABORATORIES PVT. LTD.**



Stawf

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 level and preparation of monthly report (January-February-March-2017) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment and Forests (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 1218.762hec. 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. The 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 ^o 21' 02"N to 23 ^o 24' 15"N |
| 3. | Longitude | 83 ^o 54' 50"E to 83 ^o 56' 30"E |
| 4. | Elevation | 1282-m above Mean Sea Level |
| 5. | Climatic Conditions (as per IMD, Ambikapur) | Annual maximum temperature : 30.3 ^o C Annual minimum temperature : 17.7 ^o 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 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 for the control of pollution since the efficiency of control measures can only be determined through 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 the last few 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 (1218.762 hec.)

| S.No. | Fugitive Emission (Core Zone) | S.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 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 to March 2017. 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 to March-2017 as per CPC 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 - 1.5 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 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 to March-2017. 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/ m³) |
|--------------|-------------------------------|--|---------------------------|---|
| 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 (Core Zone)

The summary of Fugitive Emission monitoring results for the month of January March-2017 are presented in detail in **Table 3.0**. 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.

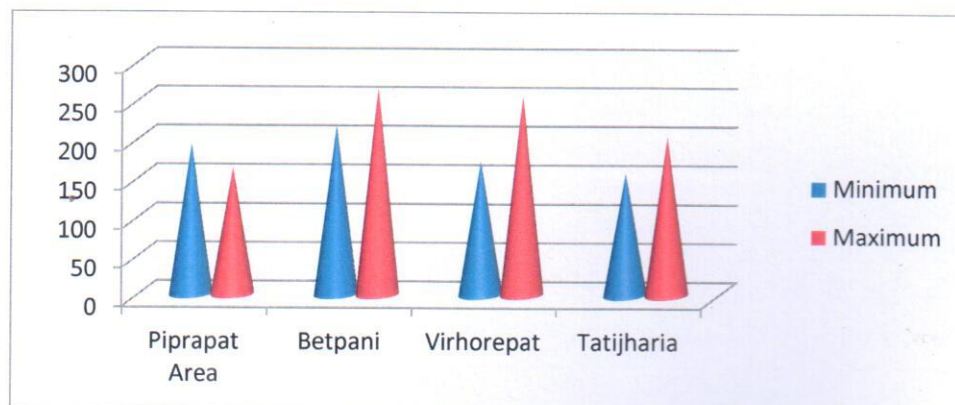
1.6.1 Presentation of Results.

Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 158 $\mu\text{g}/\text{m}^3$ and 267 $\mu\text{g}/\text{m}^3$ respectively. The average concentrations were ranged between 165 to 250 $\mu\text{g}/\text{m}^3$. and 98th percentile values ranged between 172 to 250 $\mu\text{g}/\text{m}^3$ in the study area (**Table 6**).

Graphical Presentation Of Fugitive Emission Monitoring

SPM

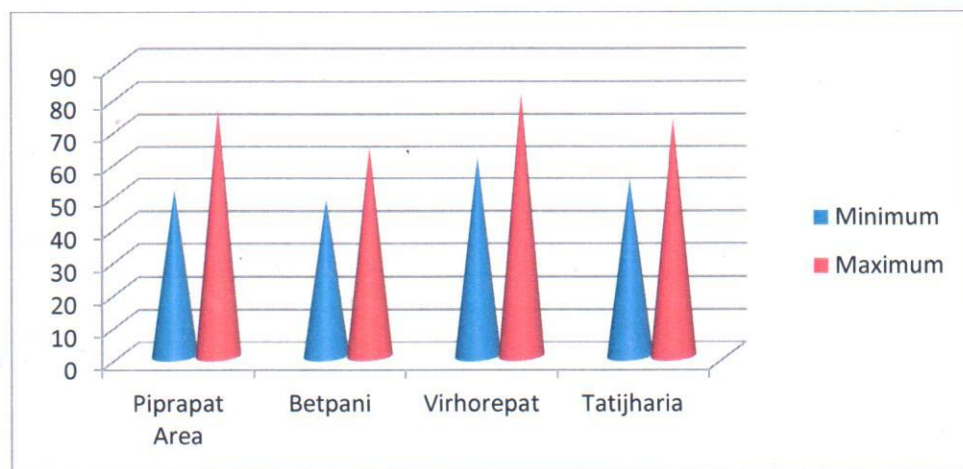


Respirable Suspended Particulate Matter –RSPM

The minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 79 $\mu\text{g}/\text{m}^3$ respectively. The average values were observed to be in the range of 52 to 7 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 56 to 81 $\mu\text{g}/\text{m}^3$ in the study area (**Table 7**)

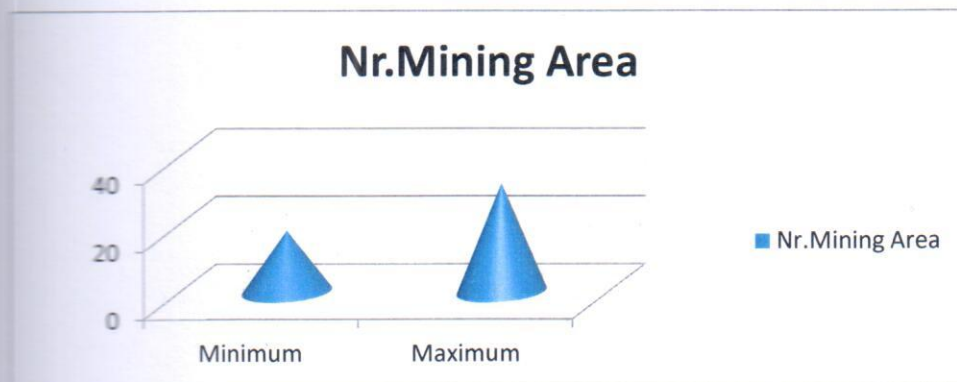
Graphical Presentation Of Fugitive Emission Monitoring

RSPM



Particulate Matter -PM_{2.5}

The minimum and maximum values of PM_{2.5} concentrations varied between 18 to 32 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 22 to 27 $\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 26 to 32 $\mu\text{g}/\text{m}^3$ (**Table 8**).

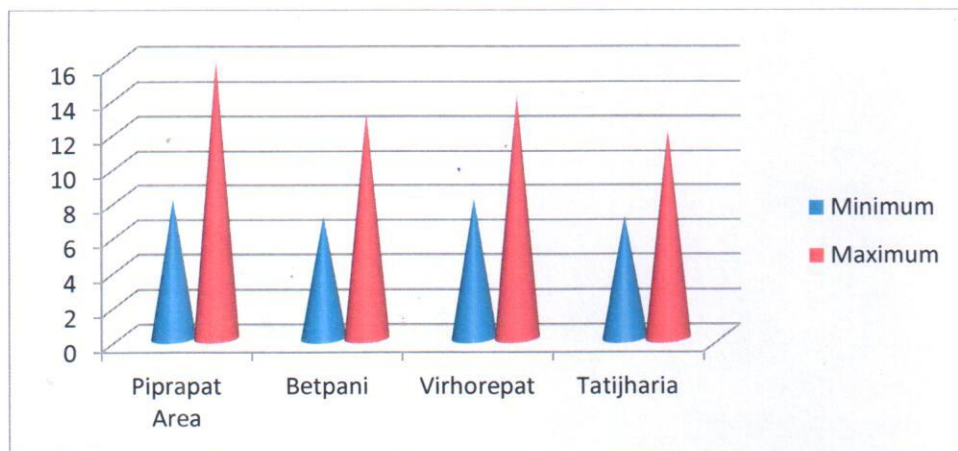


Sulphur Dioxide (SO₂)

The minimum and maximum SO₂ concentrations were recorded as 7 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**).

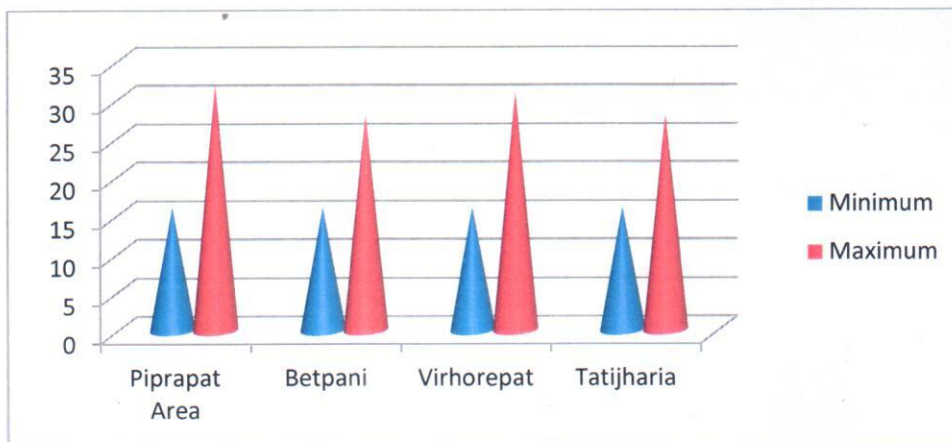
Graphical Presentation Of Fugitive Emission Monitoring

SO₂



Nitrogen Oxide (NO_x)

The minimum and maximum NO_x concentrations were recorded as 16 µg/m³ and 32 µg/m³ respectively. The average concentrations were ranged between 20 to 28 µg/m³ and 98th percentile values varied between 24 to 32 µg/m³ (**Table 10**).



Lead (Pb)

m³ and
13 µg/

The minimum and maximum Lead detected between 0.016 to 0.064 µg/m³ respectively. The average Lead detected between 0.019 to 0.048 µg/m³ & 98th percentile values varied between 0.021 to 0.063 µg/m³ in the study region. **(Table 11).**

Mercury (Hg)

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

(Table 12).

Arsenic (As)

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

(Table 13).

Chromium (Cr)

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

m³ and
percer

1.7 Ambient Air Quality (Buffer Zone)

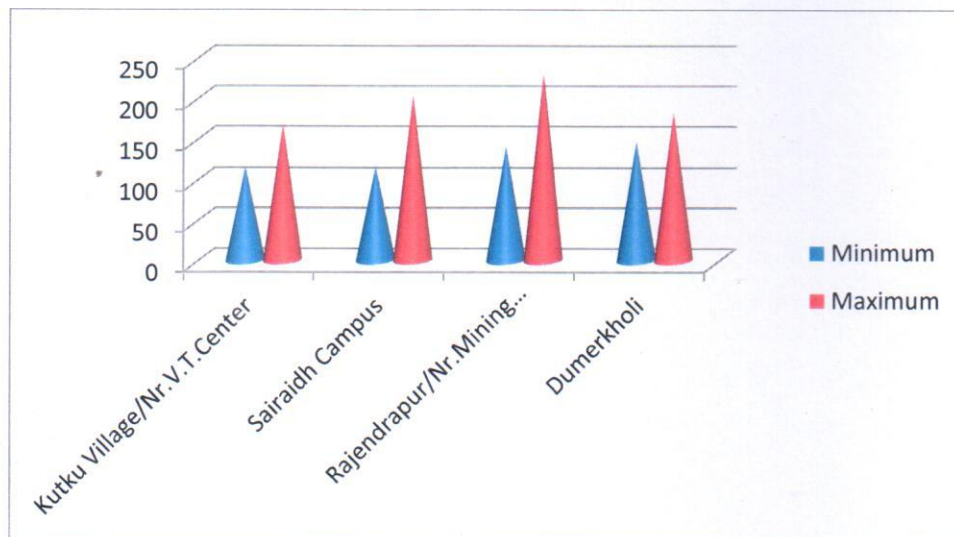
The background levels of SPM, RPM(PM₁₀), PM_{2.5}, SO₂, NO_x, Pb, Hg, As and Cr measured are required to compute Ambient Air Quality. The sampling locations selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum, Maximum concentration, Arithmetic mean (AM), 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-2017 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.

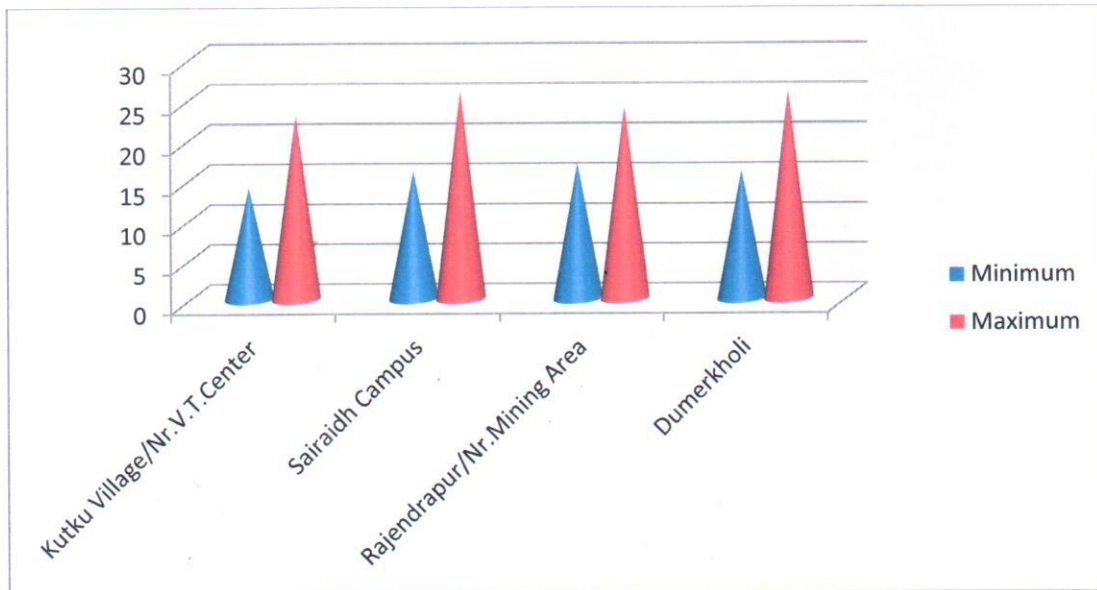
Suspended Particulate Matter-SPM

The statistical analysis of SPM is presented in **Table 6** for the mining area. The minimum and maximum values varied between 116 to 231 µg/m³ respectively during study period at all the 4 locations. The average values ranged between 152 to 194 µg/m³ and 98th percentile values ranged between 152 to 217 µg/m³ in the study area.



Nitrogen Oxide (NO_x)

The minimum and maximum values of NO_x concentrations varied between 14 to 30 µg/m³ respectively. The average values range between 16 to 22 µg/m³ and 98th percentile values varied between 19 to 26 µg/m³ (**Table 10**).



Lead (Pb)

Lead (Pb) was not detected at any of the locations in SPM samples as well as RSPM Samples.

(**Table 11**).

Mercury (Hg)

Mercury (Hg) was not detected at any of the locations in SPM samples as well as RSPM Samples.

(**Table 12**).



Arsenic (As)

en 14 to
h perce

Arsenic (As) was not detected at any of the locations in SPM samples as well as RSPM Samples.

(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 to March-2017 was observed 23.6 and 18.6 month MT/km²/month in the Piprapat/Near Mining Area and Tatijharia Village respectively. **(Table14).**

well as P

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.

es as well



1.8 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (**Jan-Feb-March-2017**) indicates that the wind blowing predominantly from (NE and SW) directions, during study period, for 2.01 % wind was found to be calm. The details of wind pattern in the form of wind frequency distribution are presented in **table 1**. The wind rose diagram and graphical illustration is presented in **Figures 1 & 2** respectively.

Table.1
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 | 1.5850 | 1.0086 | 0 | 0 | 0 | 0 | 2.5 |
| 2 | 11.25 - 33.75 | 7.3487 | 2.8818 | 0 | 0 | 0 | 0 | 10.2 |
| 3 | 33.75 - 56.25 | 9.0778 | 2.1614 | 0 | 0 | 0 | 0 | 11.2 |
| 4 | 56.25 - 78.75 | 5.0432 | 0.8646 | 0 | 0 | 0 | 0 | 5.9 |
| 5 | 78.75 - 101.25 | 3.3141 | 0.2882 | 0 | 0 | 0 | 0 | 3.6 |
| 6 | 101.25 - 123.75 | 2.8818 | 1.4409 | 0 | 0.2882 | 0 | 0 | 4.6 |
| 7 | 123.75 - 146.25 | 5.1873 | 1.4409 | 0 | 0 | 0 | 0 | 6.6 |
| 8 | 146.25 - 168.75 | 3.6023 | 0.4323 | 0 | 0 | 0 | 0 | 4.0 |
| 9 | 168.75 - 191.25 | 2.5937 | 0.7205 | 0 | 0 | 0 | 0 | 3.3 |
| 10 | 191.25 - 213.75 | 1.5850 | 2.3055 | 0 | 0 | 0 | 0 | 3.8 |
| 11 | 213.75 - 236.25 | 4.6110 | 5.3314 | 0.8646 | 0.1441 | 0 | 0 | 10.9 |
| 12 | 236.25 - 258.75 | 3.6023 | 6.4841 | 1.0086 | 0.1441 | 0 | 0 | 11.2 |
| 13 | 258.75 - 281.25 | 2.5937 | 2.5937 | 1.8732 | 0 | 0 | 0 | 7.0 |
| 14 | 281.25 - 303.75 | 1.5850 | 1.4409 | 0 | 0 | 0 | 0 | 3.0 |
| 15 | 303.75 - 326.25 | 2.3055 | 2.7378 | 0 | 0 | 0 | 0 | 5.0 |
| 16 | 326.25 - 348.75 | 2.5937 | 1.7291 | 0.1441 | 0.1441 | 0 | 0 | 4.4 |
| | Sub-Total | 59.5101 | 33.8617 | 3.8905 | 0.7205 | 0 | 0 | 97.7 |
| | Calms | | | | | | | 2.3 |
| | Missing/Incomplete | | | | | | | 0.0 |
| | Total | | | | | | | 100.0 |

SUMMARY OF WIND PATTERN

| Season | First Predominant Wind Direction | Second Predominant Wind Direction | Calm Conc |
|-----------------------------|----------------------------------|-----------------------------------|-----------|
| January-February-March-2017 | NE(59.5%) | SW (33.9%) | 2.01 % |

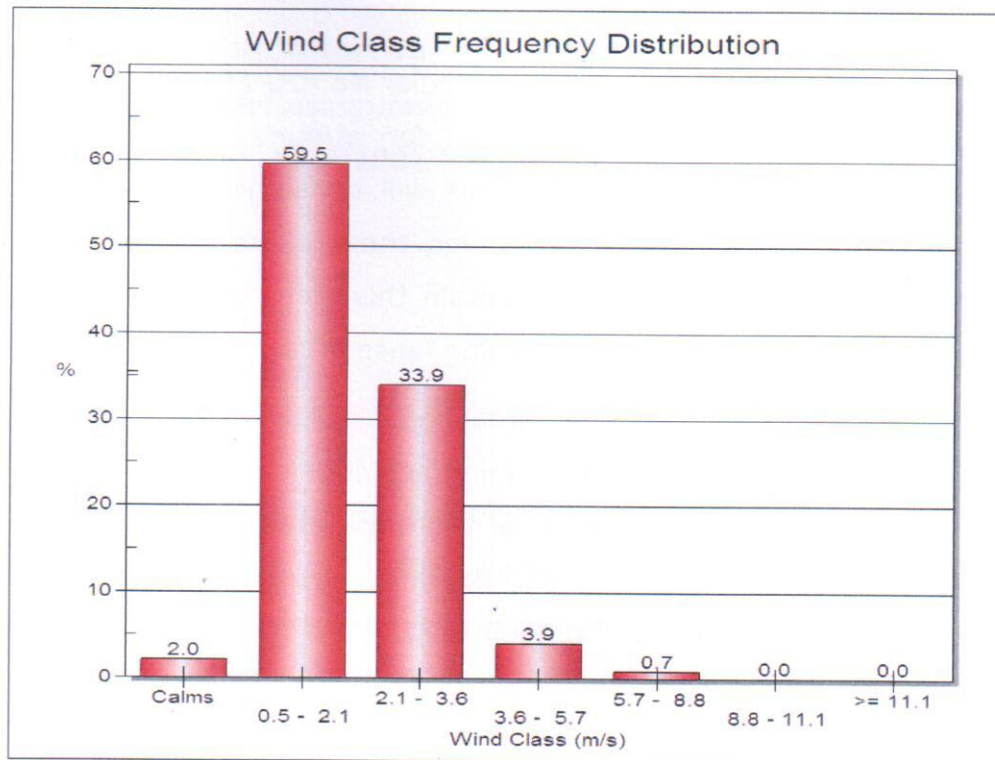


Figure.01: Wind Class Frequency Distribution

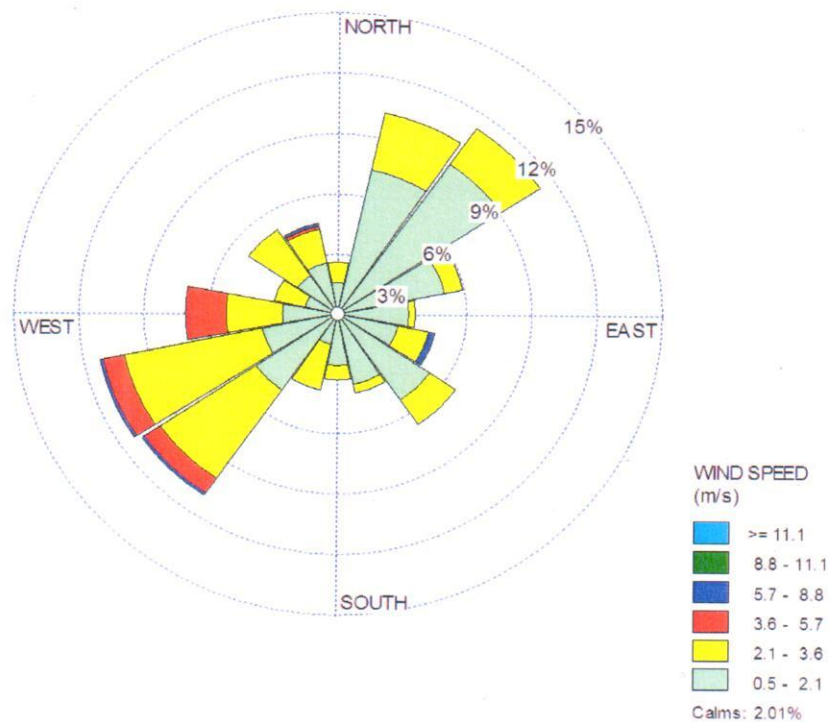


Figure.02: Wind Rose Diagram (Jan-Feb-March-2017)

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 will 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 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 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 eight locations. The readings were taken for every hour for 24 hours. The day noise levels have been monitored during 10 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 **(Table 15)**.



Instrument used for monitoring

Noise levels were measured using integrated sound level meter manufactured by Envirotec 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 piprapat/Nr. mining area and surface water sample from nallahs nearby mining area. The physico-chemical analysis of ground and surface water samples collected during study period reported as average of three months 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 10500-2012 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

| Location | Month & Year | Min. | Max. | A.M. | G.M. | 98% |
|---|---------------|------|------|------|------|-----|
| Unit : μg | | | | | | |
| Fugitive Emission (Core Zone):- | | | | | | |
| Piprapat /Nr.Mining Area | January-2017 | 217 | 239 | 228 | 228 | 239 |
| | February-2017 | 194 | 216 | 205 | 205 | 216 |
| | March-2017 | 237 | 263 | 250 | 250 | 262 |
| Betpani | January-2017 | 218 | 259 | 239 | 239 | 258 |
| | February-2017 | 231 | 267 | 249 | 249 | 266 |
| | March-2017 | 239 | 252 | 246 | 246 | 252 |
| Virhorepat | January-2017 | 173 | 204 | 189 | 189 | 203 |
| | February-2017 | 192 | 218 | 205 | 205 | 217 |
| | March-2017 | 207 | 256 | 232 | 232 | 255 |
| Tatijharia Village/Nr.Weigh Bridge | January-2017 | 158 | 172 | 165 | 165 | 172 |
| | February-2017 | 161 | 182 | 172 | 172 | 182 |
| | March-2017 | 169 | 204 | 187 | 187 | 203 |
| Buffer Zone :- | | | | | | |
| Kutku Village/ Nr.V.T.Center | January-2017 | 116 | 157 | 137 | 137 | 156 |
| | February-2017 | 131 | 168 | 150 | 150 | 167 |
| | March-2017 | 139 | 164 | 152 | 152 | 164 |
| Sairaidh Campus | January-2017 | 116 | 147 | 132 | 132 | 146 |
| | February-2017 | 121 | 153 | 137 | 137 | 152 |
| | March-2017 | 146 | 204 | 175 | 175 | 203 |
| Rajendrapur/ Nr.Mining Area | January-2017 | 152 | 218 | 185 | 185 | 217 |
| | February-2017 | 141 | 167 | 154 | 154 | 166 |
| | March-2017 | 157 | 231 | 194 | 194 | 230 |
| Dumerkholi/ Nr.Mining Area | January-2017 | 151 | 179 | 165 | 165 | 178 |
| | February-2017 | 147 | 163 | 155 | 155 | 163 |
| | March-2017 | 158 | 182 | 170 | 170 | 182 |

Conclusion (A):-

- 1)Piprapat /Nr.Mining Lease Area Core Zone:** For the Months of Jan-Feb-March-2017 Average of SPM is $228 \mu\text{g}/\text{m}^3$.
- 2)Betpani Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $245 \mu\text{g}/\text{m}^3$.
- 3)Virhorepat Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $209 \mu\text{g}/\text{m}^3$.
- 4)Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $175 \mu\text{g}/\text{m}^3$.
 - The Average Concentration of SPM within the Core Zone of Tatijharia Lease is $214 \mu\text{g}/\text{m}^3$.

Conclusion (B):-

- 1) Kutku Village/ Nr.V.T.Center Lease Area Buffer Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $148 \mu\text{g}/\text{m}^3$.
- 2) Sairaidh Campus Lease Area Buffer Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $148 \mu\text{g}/\text{m}^3$.
- 3) Rajendrapur/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $178 \mu\text{g}/\text{m}^3$.
- 4) Dumerkholi/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $163 \mu\text{g}/\text{m}^3$.
 - The Average Concentration of SPM within the Buffer Zone of Tatijharia Lease is $159 \mu\text{g}/\text{m}^3$.

Monthwise Summary of Statistical Analysis of SPM

1.8 Fugitive Emission (Core Zone):-

1.8.1 Presentation of Results.

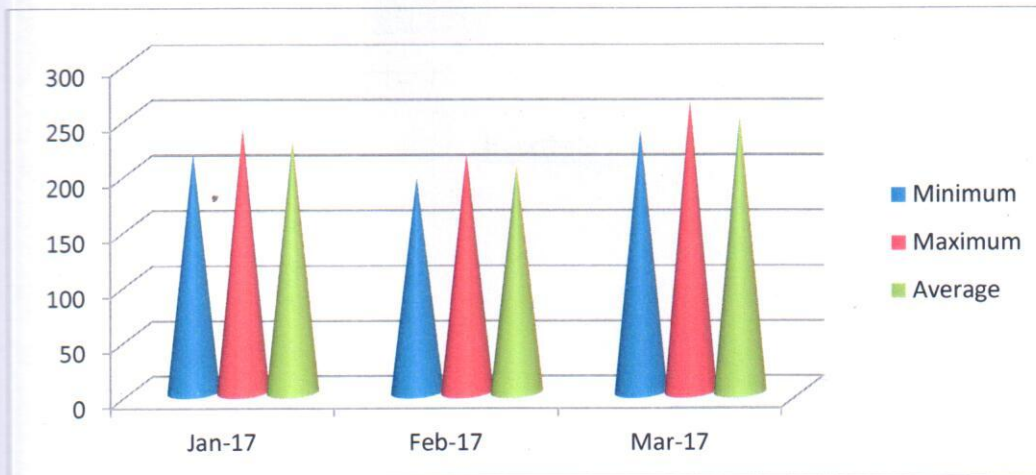
The summary of Statistical Analysis of SPM results for the month of January to March-2017 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Pipapat / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for SPM were recorded as 217 $\mu\text{g}/\text{m}^3$ and 239 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 228 $\mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for SPM were recorded as 194 $\mu\text{g}/\text{m}^3$ and 216 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 205 $\mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for SPM were recorded as 237 $\mu\text{g}/\text{m}^3$ and 263 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 250 $\mu\text{g}/\text{m}^3$.



Graph :- Pipapat / Nr.Mining Area

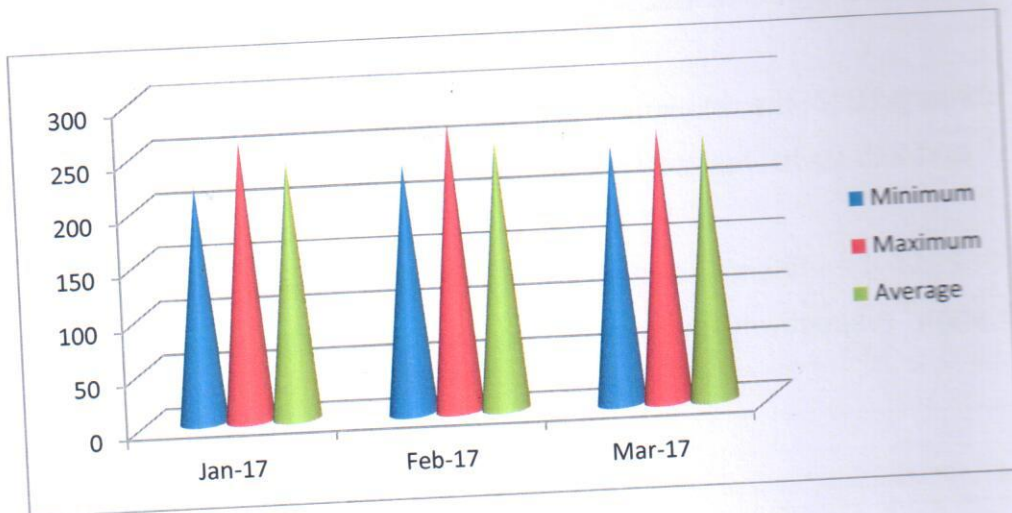


Betpani

For the Month of January-2017 the minimum and maximum concentrations for SPM were recorded as $218 \mu\text{g}/\text{m}^3$ and $259 \mu\text{g}/\text{m}^3$ respectively and average concentration of $239 \mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for SPM were recorded as $231 \mu\text{g}/\text{m}^3$ and $267 \mu\text{g}/\text{m}^3$ respectively and average concentration of $249 \mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for SPM were recorded as $239 \mu\text{g}/\text{m}^3$ and $252 \mu\text{g}/\text{m}^3$ respectively and average concentration of $246 \mu\text{g}/\text{m}^3$.



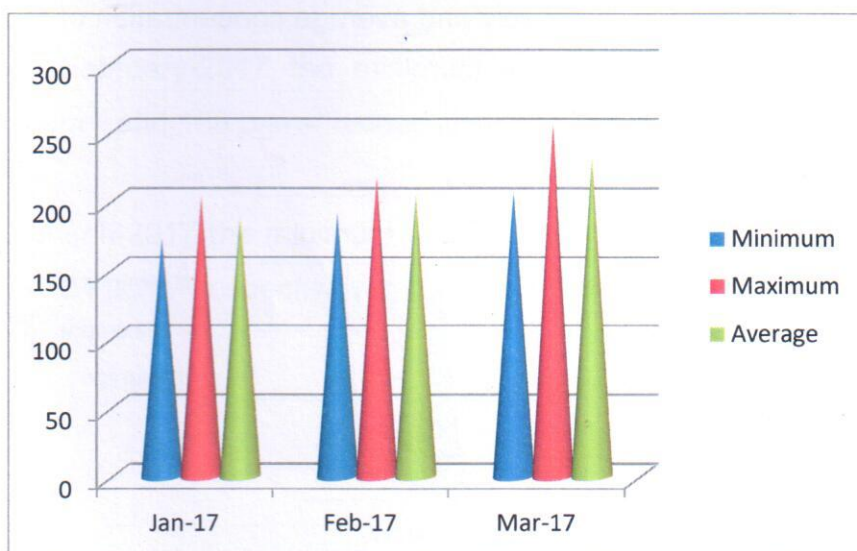
Graph:- Betpani

Virhorepat

For the Month of January-2017 the minimum and maximum concentrations for SPM were recorded as $173 \mu\text{g}/\text{m}^3$ and $204 \mu\text{g}/\text{m}^3$ respectively and average concentration of $189 \mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for SPM were recorded as $192 \mu\text{g}/\text{m}^3$ and $218 \mu\text{g}/\text{m}^3$ respectively and average concentration of $205 \mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for SPM were recorded as $207 \mu\text{g}/\text{m}^3$ and $256 \mu\text{g}/\text{m}^3$ respectively and average concentration of $232 \mu\text{g}/\text{m}^3$.



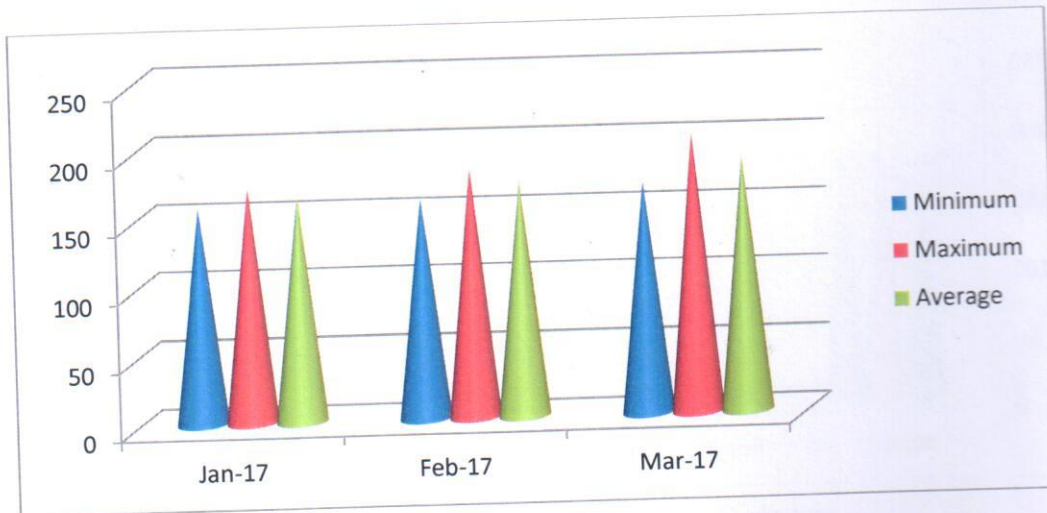
Graph:- Virhorepat

Tatijharia Village/Nr.Weigh Bridge

For the Month of January-2017 the minimum and maximum concentrations for SPM recorded as $158 \mu\text{g}/\text{m}^3$ and $172 \mu\text{g}/\text{m}^3$ respectively and average concentration of $165 \mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for SPM recorded as $161 \mu\text{g}/\text{m}^3$ and $182 \mu\text{g}/\text{m}^3$ respectively and average concentration of $172 \mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for SPM were recorded as $169 \mu\text{g}/\text{m}^3$ and $204 \mu\text{g}/\text{m}^3$ respectively and average concentration of $187 \mu\text{g}/\text{m}^3$.



Graph:- Tatijharia Village/Nr.Weigh Bridge

1.9 Fugitive Emission (Buffer Zone):-

1.9.1 Presentation of Results.

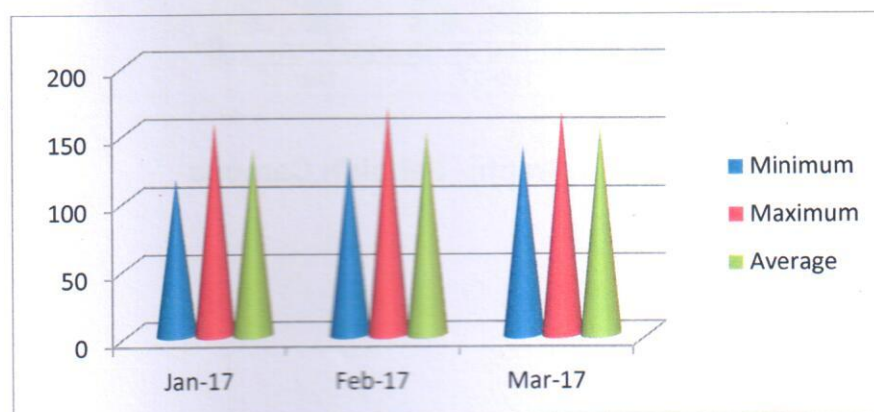
The summary of Statistical Analysis of SPM results for the month of January to March-2017 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Kutku Village / Nr. V.T.Center

For the Month of January-2017 the minimum and maximum concentrations for SPM were recorded as 116 $\mu\text{g}/\text{m}^3$ and 157 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 137 $\mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for SPM were recorded as 131 $\mu\text{g}/\text{m}^3$ and 168 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 150 $\mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for SPM were recorded as 139 $\mu\text{g}/\text{m}^3$ and 164 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 152 $\mu\text{g}/\text{m}^3$.



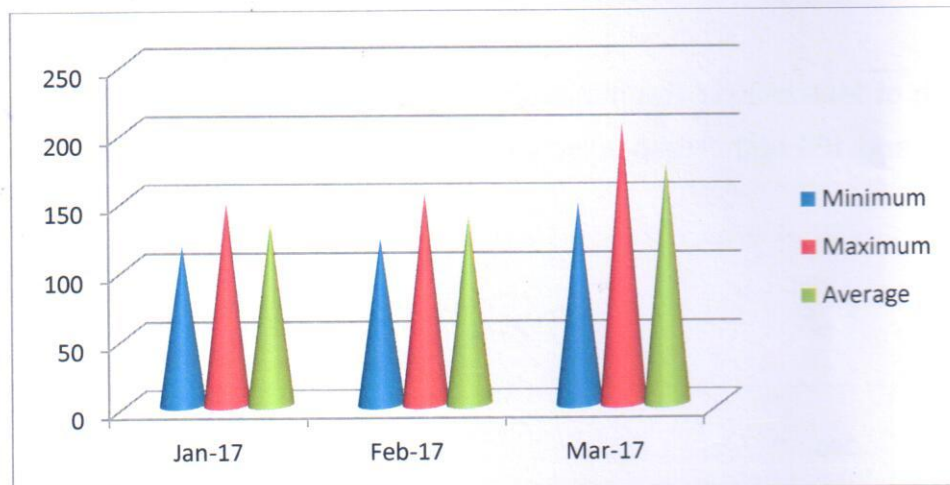
Graph:- Kutku Village / Nr. V.T.Center

Sairaidh Campus

For the Month of January-2017 the minimum and maximum concentrations for SPM recorded as $116 \mu\text{g}/\text{m}^3$ and $147 \mu\text{g}/\text{m}^3$ respectively and average concentration of $132 \mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for SPM recorded as $121 \mu\text{g}/\text{m}^3$ and $153 \mu\text{g}/\text{m}^3$ respectively and average concentration of $137 \mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for SPM were recorded as $146 \mu\text{g}/\text{m}^3$ and $204 \mu\text{g}/\text{m}^3$ respectively and average concentration of $175 \mu\text{g}/\text{m}^3$.



Graph:- Sairaidh Campus

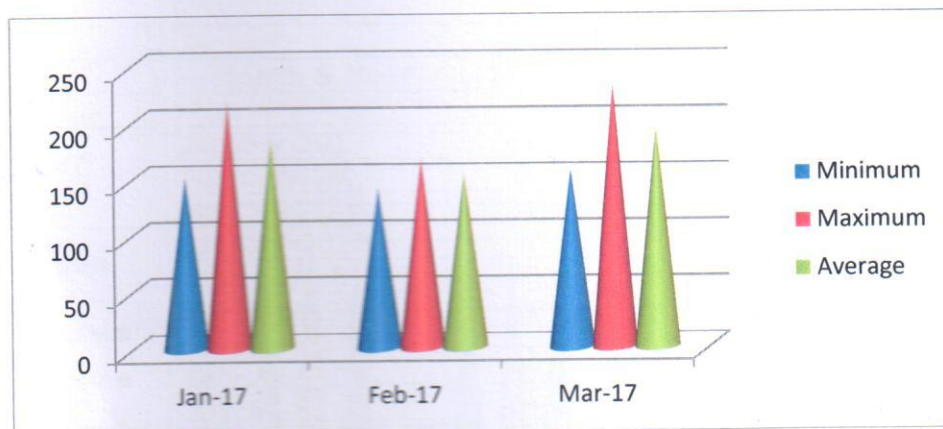


Rajendrapur / Nr.Mining Area

SPM w
 ug/m³.
 For the Month of January-2017 the minimum and maximum concentrations for SPM were recorded as 152 $\mu\text{g}/\text{m}^3$ and 218 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 185 $\mu\text{g}/\text{m}^3$.

SPM w
 ug/m³.
 For the Month of February-2017 the minimum and maximum concentrations for SPM were recorded as 141 $\mu\text{g}/\text{m}^3$ and 167 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 154 $\mu\text{g}/\text{m}^3$.

ere recor
 For the Month of March-2017 the minimum and maximum concentrations for SPM were recorded as 157 $\mu\text{g}/\text{m}^3$ and 231 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 194 $\mu\text{g}/\text{m}^3$.



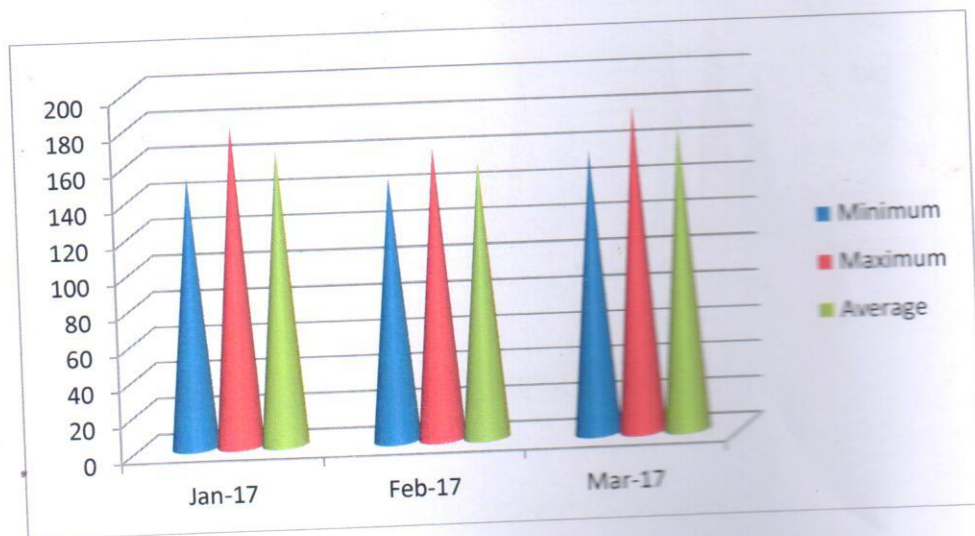
Graph:- Rajendrapur / Nr.Mining Area

Dumerkholi / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for SPM were recorded as $151 \mu\text{g}/\text{m}^3$ and $179 \mu\text{g}/\text{m}^3$ respectively and average concentration of $165 \mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for SPM were recorded as $147 \mu\text{g}/\text{m}^3$ and $163 \mu\text{g}/\text{m}^3$ respectively and average concentration of $155 \mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for SPM were recorded as $158 \mu\text{g}/\text{m}^3$ and $182 \mu\text{g}/\text{m}^3$ respectively and average concentration of $170 \mu\text{g}/\text{m}^3$.



Graph:- Dumerkholi / Nr.Mining Area



Table 7
Statistical analysis of RSPM

| Location | Month & Year | Min. | Max. | A.M. | G.M. | Unit : $\mu\text{g}/\text{m}^3$ |
|---|---------------|------|------|---|------|---------------------------------|
| | | | | | | 98% |
| Fugitive Emission (Core Zone):- | | | | | | |
| Piprapat /Nr.Mining Area | January-2017 | 56 | 69 | 63 | 63 | 69 |
| | February-2017 | 51 | 62 | 57 | 57 | 62 |
| | March-2017 | 62 | 76 | 69 | 69 | 76 |
| Betpani | January-2017 | 51 | 59 | 55 | 55 | 59 |
| | February-2017 | 48 | 56 | 52 | 52 | 56 |
| | March-2017 | 53 | 64 | 59 | 59 | 64 |
| Virhorepat | January-2017 | 61 | 72 | 67 | 67 | 72 |
| | February-2017 | 64 | 79 | 72 | 72 | 79 |
| | March-2017 | 68 | 81 | 75 | 75 | 81 |
| Tatijharia Village/Nr.Weigh Bridge | January-2017 | 59 | 68 | 64 | 64 | 68 |
| | February-2017 | 54 | 61 | 58 | 58 | 61 |
| | March-2017 | 63 | 73 | 68 | 68 | 73 |
| | | | | 100 $\mu\text{g}/\text{m}^3$ (24 hrs) | | |

| Location | Month & Year | Min. | Max. | A.M. | G.M. | 98% |
|-------------------------------------|---------------|------|------|---|------|-----|
| | | | | | | |
| Buffer Zone :- | | | | | | |
| Kutku Village/ Nr.V.T.Center | January-2017 | 49 | 56 | 53 | 53 | 56 |
| | February-2017 | 46 | 52 | 49 | 49 | 52 |
| | March-2017 | 51 | 63 | 57 | 57 | 63 |
| Sairaidh Campus | January-2017 | 47 | 59 | 53 | 53 | 59 |
| | February-2017 | 49 | 56 | 53 | 53 | 56 |
| | March-2017 | 51 | 63 | 57 | 57 | 63 |
| Rajendrapur/ Nr.Mining Area | January-2017 | 52 | 61 | 57 | 57 | 61 |
| | February-2017 | 47 | 58 | 53 | 53 | 58 |
| | March-2017 | 51 | 64 | 58 | 58 | 64 |
| Dumerkholi/ Nr.Mining Area | January-2017 | 53 | 68 | 61 | 61 | 68 |
| | February-2017 | 49 | 64 | 57 | 57 | 64 |
| | March-2017 | 46 | 58 | 52 | 52 | 58 |
| CPCB Standard | | | | 100 $\mu\text{g}/\text{m}^3$ (24 hrs) | | |

Conclusion (A):-
Piprapat /Nr.Mining Lease Area Core Zone: For the Months of Jan-Feb-March-2017 Average of RSPM is $63 \mu\text{g}/\text{m}^3$.
Betpani Lease Area Core Zone:- For the Months of Jan-Feb-March-2017 Average of RSPM is $55 \mu\text{g}/\text{m}^3$.
Virhorepat Lease Area Core Zone:- For the Months of Jan-Feb-March-2017 Average of RSPM is $71 \mu\text{g}/\text{m}^3$.
Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone :- For the Months of Jan-Feb-March-2017 Average of RSPM is $63 \mu\text{g}/\text{m}^3$
 The Average Concentration of RSPM within the Core Zone of Tatijharia Lease is $63 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion (B):-
Kutku Village/ Nr.V.T.Center Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2017 Average of RSPM is $53 \mu\text{g}/\text{m}^3$.
Sairaidh Campus Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2017 Average of RSPM is $54 \mu\text{g}/\text{m}^3$.
Rajendrapur/ Nr.Mining Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2017 Average of RSPM is $56 \mu\text{g}/\text{m}^3$.
Dumerkholi/ Nr.Mining Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2017 Average of RSPM is $57 \mu\text{g}/\text{m}^3$.
 The Average Concentration of RSPM within the Buffer Zone of Tatijharia Lease is $55 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Monthwise Summary of Statistical Analysis of RSPM

2.0 Fugitive Emission (Core Zone):-

2.0.1 Presentation of Results.

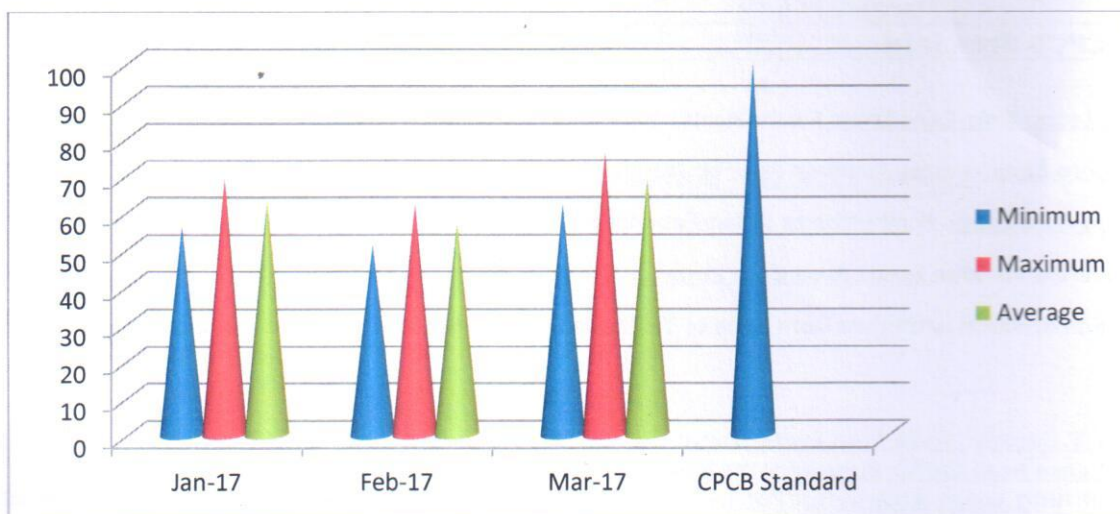
The summary of Statistical Analysis of RSPM results for the month of January-February-March 2017 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Piprapat / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 56 $\mu\text{g}/\text{m}^3$ and 69 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 63 $\mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 62 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 57 $\mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 62 $\mu\text{g}/\text{m}^3$ and 76 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 69 $\mu\text{g}/\text{m}^3$.



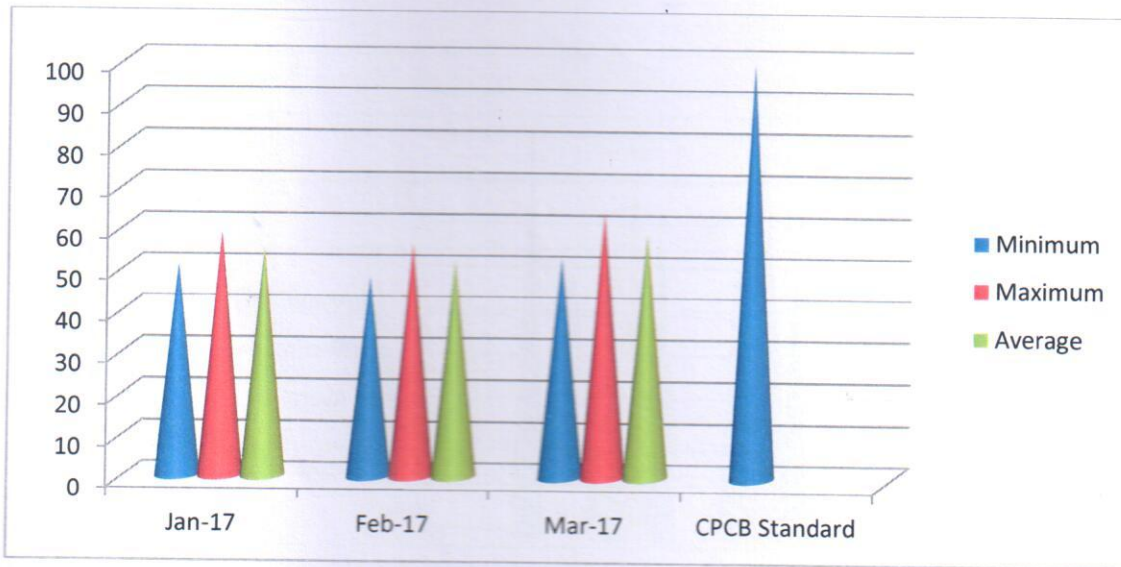
Graph :- Piprapat / Nr.Mining Area

Betpani

For the Month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 59 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 55 $\mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 48 $\mu\text{g}/\text{m}^3$ and 56 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 52 $\mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 53 $\mu\text{g}/\text{m}^3$ and 64 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 59 $\mu\text{g}/\text{m}^3$.



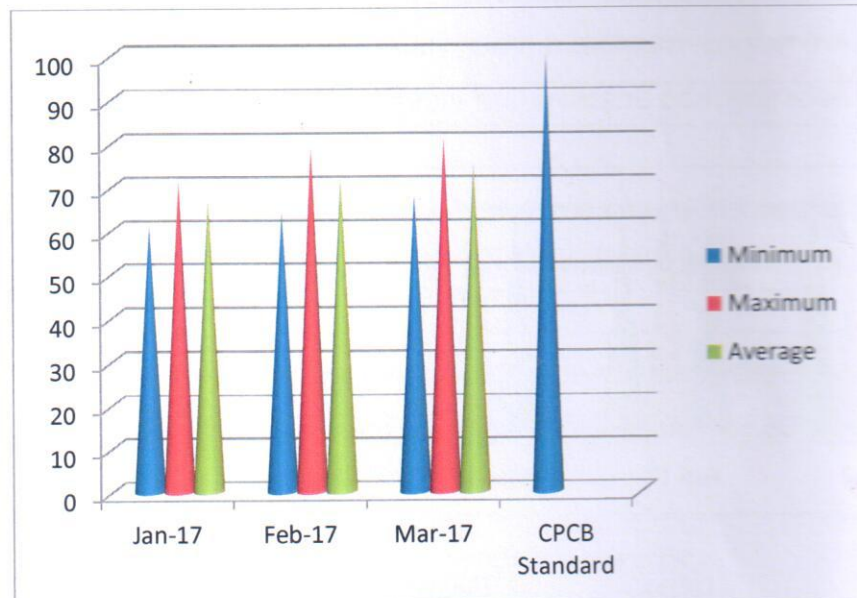
Graph:- Betpani

Virhorepat

For the Month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 61 $\mu\text{g}/\text{m}^3$ and 72 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 67 $\mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 64 $\mu\text{g}/\text{m}^3$ and 79 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 72 $\mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 68 $\mu\text{g}/\text{m}^3$ and 81 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 75 $\mu\text{g}/\text{m}^3$.



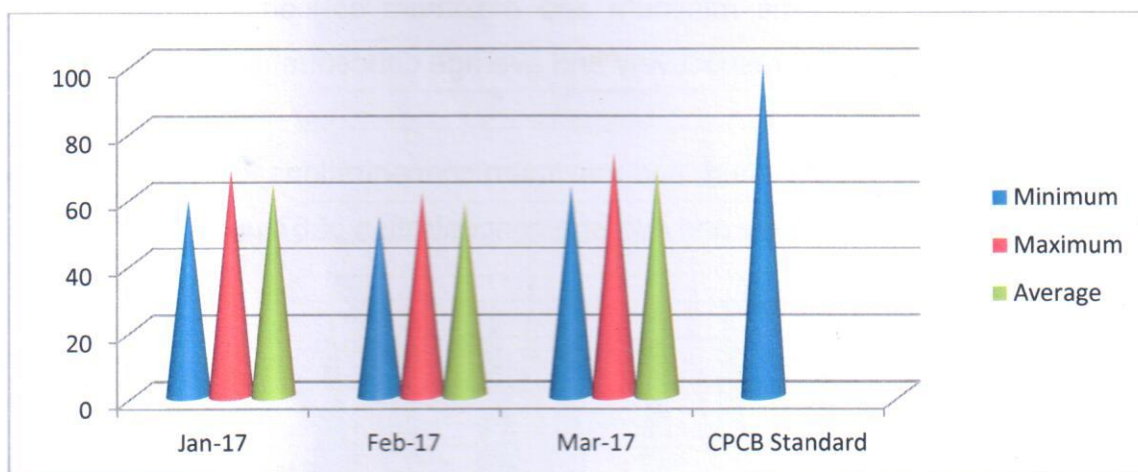
Graph:- Virhorepat

Tatijharia Village/Nr.Weigh Bridge

For the Month of January-2017 the minimum and maximum concentrations for RSPM were recorded as $59 \mu\text{g}/\text{m}^3$ and $68 \mu\text{g}/\text{m}^3$ respectively and average concentration of $64 \mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for RSPM were recorded as $54 \mu\text{g}/\text{m}^3$ and $61 \mu\text{g}/\text{m}^3$ respectively and average concentration of $58 \mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for RSPM were recorded as $63 \mu\text{g}/\text{m}^3$ and $73 \mu\text{g}/\text{m}^3$ respectively and average concentration of $68 \mu\text{g}/\text{m}^3$.



Graph:- Tatijharia Village/Nr.Weigh Bridge

2.1 Fugitive Emission (Buffer Zone):-

2.1.1 Presentation of Results.

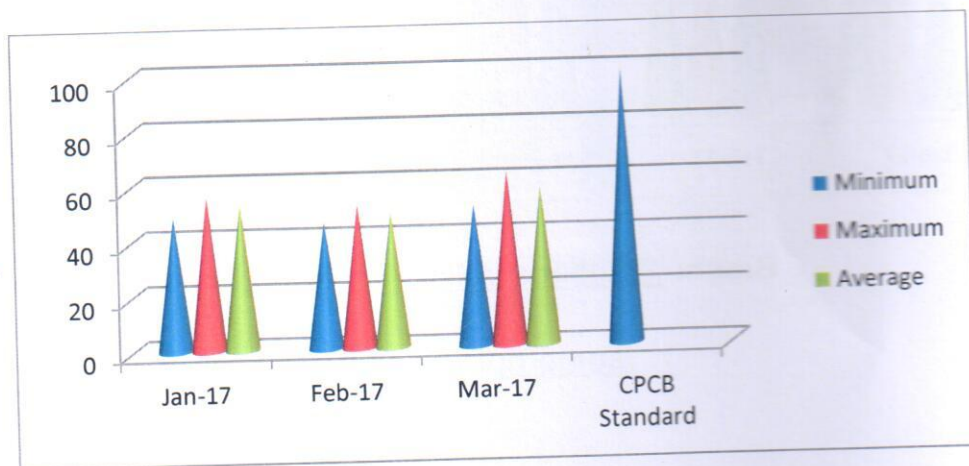
The summary of Statistical Analysis of RSPM results for the month of January-February-March 2017 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Kutku Village / Nr. V.T.Center

For the Month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 49 $\mu\text{g}/\text{m}^3$ and 56 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 53 $\mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 46 $\mu\text{g}/\text{m}^3$ and 52 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 49 $\mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 63 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 57 $\mu\text{g}/\text{m}^3$.



Graph:- Kutku Village / Nr. V.T.Center

Sairaidh Campus

For the Month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 47 $\mu\text{g}/\text{m}^3$ and 59 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 53 $\mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 49 $\mu\text{g}/\text{m}^3$ and 56 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 53 $\mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 63 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 57 $\mu\text{g}/\text{m}^3$.



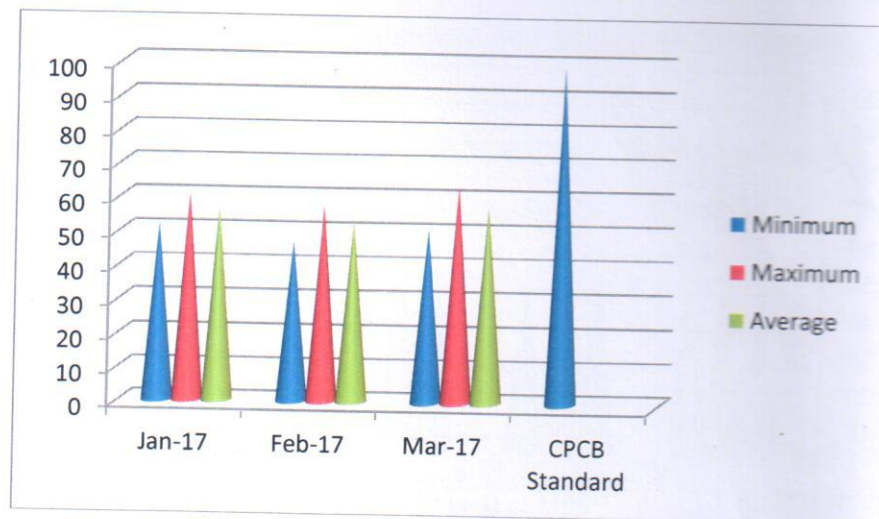
Graph:- Sairaidh Campus

Rajendrapur / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 52 $\mu\text{g}/\text{m}^3$ and 61 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 57 $\mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 47 $\mu\text{g}/\text{m}^3$ and 58 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 53 $\mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 64 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 58 $\mu\text{g}/\text{m}^3$.



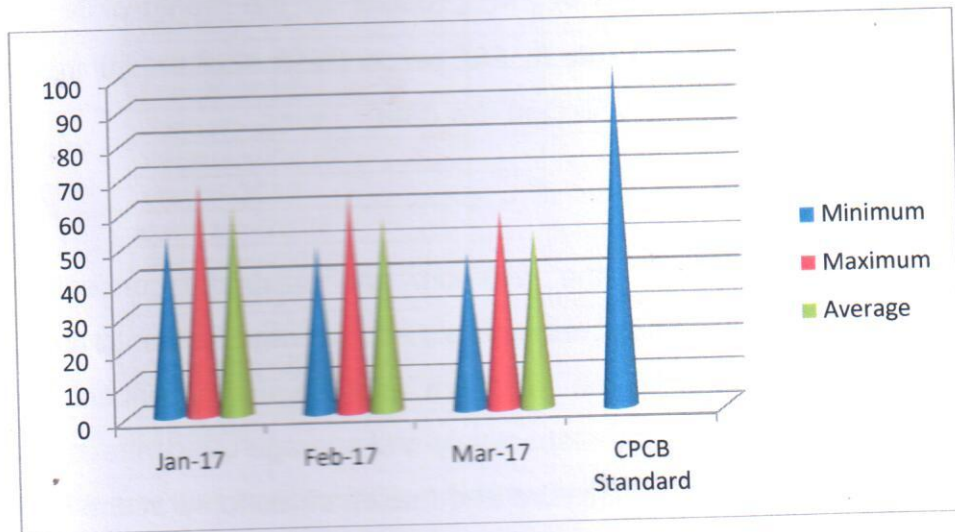
Graph:- Rajendrapur / Nr.Mining Area

Dumerkholi / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for RSPM were recorded as $53 \mu\text{g}/\text{m}^3$ and $68 \mu\text{g}/\text{m}^3$ respectively and average concentration of $61 \mu\text{g}/\text{m}^3$.

For the Month of February-2017 the minimum and maximum concentrations for RSPM were recorded as $49 \mu\text{g}/\text{m}^3$ and $64 \mu\text{g}/\text{m}^3$ respectively and average concentration of $57 \mu\text{g}/\text{m}^3$.

For the Month of March-2017 the minimum and maximum concentrations for RSPM were recorded as $46 \mu\text{g}/\text{m}^3$ and $58 \mu\text{g}/\text{m}^3$ respectively and average concentration of $52 \mu\text{g}/\text{m}^3$.



Graph:- Dumerkholi / Nr.Mining Area

Table 8
Statistical analysis of PM 2.5

| Location | Month & Year | Min. | Max. | A.M. | G.M. | Unit : $\mu\text{g}/\text{m}^3$ | |
|----------------------|---------------|------|------|------|------|---------------------------------|--|
| | | | | | | 98% | |
| Nr.Mining Area | January-2017 | 18 | 26 | 22 | 22 | 26 | |
| | February-2017 | 21 | 32 | 27 | 27 | 32 | |
| | March-2017 | 19 | 31 | 25 | 25 | 31 | |
| CPCB Standard | | | | | | | 60 $\mu\text{g}/\text{m}^3$ (24 hrs) |

Note :- All the Values are in CPCB Limit

Conclusion:- The Average Concentration of $\text{PM}_{2.5}$ within Tatijharia Lease during this period (January-February-March-2017) is $25 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Monthwise Summary of Statistical Analysis of $\text{PM}_{2.5}$

2.2 Presentation of Results.

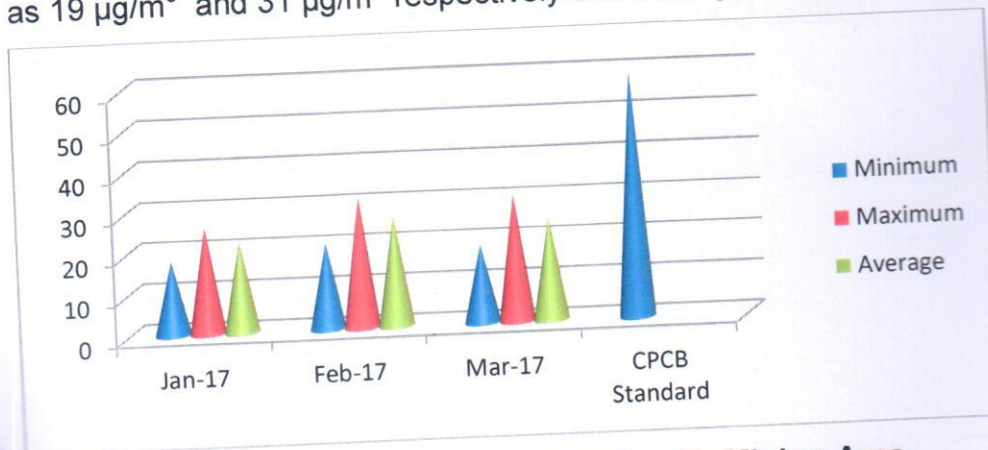
The summary of Statistical Analysis of $\text{PM}_{2.5}$ results for the month of January-February-March-2017 are presented in detail in **Table 8**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data.

Nr. Mining Area

For the month of January-2017 the minimum and maximum concentrations for $\text{PM}_{2.5}$ were recorded as $18 \mu\text{g}/\text{m}^3$ and $26 \mu\text{g}/\text{m}^3$ respectively and average concentration of $22 \mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for $\text{PM}_{2.5}$ were recorded as $21 \mu\text{g}/\text{m}^3$ and $32 \mu\text{g}/\text{m}^3$ respectively and average concentration of $27 \mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for $\text{PM}_{2.5}$ were recorded as $19 \mu\text{g}/\text{m}^3$ and $31 \mu\text{g}/\text{m}^3$ respectively and average concentration of $25 \mu\text{g}/\text{m}^3$.



Graph :- Nr.Mining Area



Table 9
Statistical Analysis of SO₂

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

| Location | Month & Year | Min. | Max. | A.M. | G.M. | 98% |
|---|---------------|--|------|------|------|-----|
| Fugitive Emission (Core Zone):- | | | | | | |
| Piprapat/ Nr.Mining Area | January-2017 | 9 | 14 | 12 | 12 | 14 |
| | February-2017 | 8 | 16 | 12 | 12 | 16 |
| | March-2017 | 9 | 12 | 11 | 11 | 12 |
| Betpani | January-2017 | 7 | 9 | 8 | 8 | 9 |
| | February-2017 | 8 | 13 | 11 | 11 | 13 |
| | March-2017 | 7 | 11 | 9 | 9 | 11 |
| Virhorepat | January-2017 | 11 | 14 | 13 | 13 | 14 |
| | February-2017 | 9 | 12 | 11 | 11 | 12 |
| | March-2017 | 8 | 11 | 10 | 10 | 11 |
| Tatijharia Village/Nr.Weigh Bridge | January-2017 | 7 | 9 | 8 | 8 | 9 |
| | February-2017 | 9 | 12 | 11 | 11 | 12 |
| | March-2017 | 7 | 11 | 9 | 9 | 11 |
| CPCB Standard | | 80 $\mu\text{g}/\text{m}^3$ (24 hrs) | | | | |

| Location | Month & Year | Min. | Max. | A.M. | G.M. | 98% |
|-------------------------------------|---------------|--|------|------|------|-----|
| Buffer Zone :- | | | | | | |
| Kutku Village/ Nr.V.T.Center | January-2017 | 6 | 8 | 7 | 7 | 8 |
| | February-2017 | 7 | 9 | 8 | 8 | 9 |
| | March-2017 | 6 | 9 | 8 | 8 | 9 |
| Sairaidh Campus | January-2017 | 8 | 12 | 10 | 10 | 12 |
| | February-2017 | 7 | 11 | 9 | 9 | 11 |
| | March-2017 | 8 | 12 | 10 | 10 | 12 |
| Rajendrapur/ Nr.Mining Area | January-2017 | 7 | 9 | 8 | 8 | 9 |
| | February-2017 | 7 | 11 | 9 | 9 | 11 |
| | March-2017 | 9 | 13 | 11 | 11 | 13 |
| Dumerkholi/ Nr.Mining Area | January-2017 | 8 | 12 | 10 | 10 | 12 |
| | February-2017 | 7 | 11 | 9 | 9 | 11 |
| | March-2017 | 8 | 13 | 11 | 11 | 13 |
| CPCB Standard | | 80 $\mu\text{g}/\text{m}^3$ (24 hrs) | | | | |

Conclusion: (A)

- 1)Piprapat /Nr.Mining Lease Area Core Zone:** For the Months of Jan-Feb-Mar-2017 Average of SO₂ is 12 $\mu\text{g}/\text{m}^3$.
- 2)Betpani Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2017 Average of SO₂ is 9 $\mu\text{g}/\text{m}^3$.
- 3)Virhorepat Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2017 Average of SO₂ is 11 $\mu\text{g}/\text{m}^3$.
- 4)Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone :-** For the Months of Jan-Feb-Mar-2017 Average of SO₂ is 9 $\mu\text{g}/\text{m}^3$.

• The Average Concentration of SO₂ within the Core Zone of Tatijharia Lease during this period (Jan-Feb-Mar-2017) is 10 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion: (B)

- Kutku Village/ Nr.V.T.Center Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2017 Average of SO₂ is 8 $\mu\text{g}/\text{m}^3$.
- Sairaidh Campus Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2017 Average of SO₂ is 10 $\mu\text{g}/\text{m}^3$.
- Rajendrapur/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2017 Average of SO₂ is 9 $\mu\text{g}/\text{m}^3$.
- Dumerkholi/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jan-Feb-Mar-2017 Average of SO₂ is 10 $\mu\text{g}/\text{m}^3$.

• The Average Concentration of SO₂ within the Buffer Zone of Tatijharia Lease during this period (Jan-Feb-Mar-2017) is 9 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Monthwise Summary of Statistical Analysis of SO₂

2.3 Fugitive Emission (Core Zone):-

2.3.1 Presentation of Results.

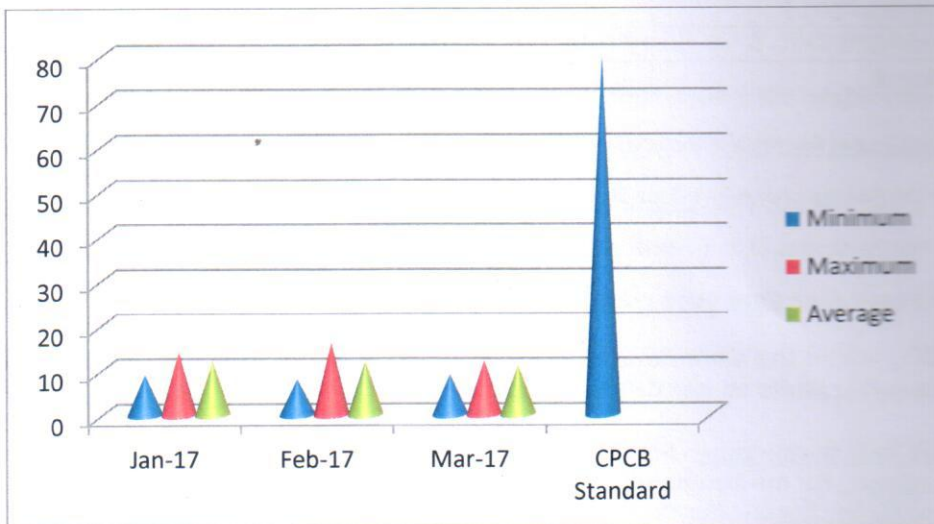
The summary of Statistical Analysis of SO₂ results for the month of January-February-March 2017 are presented in detail in **Table 9**. 98th percentile, maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Piprapat / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 14 µg/m³ respectively and average concentration of 12 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 16 µg/m³ respectively and average concentration of 12 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 12 µg/m³ respectively and average concentration of 11 µg/m³.



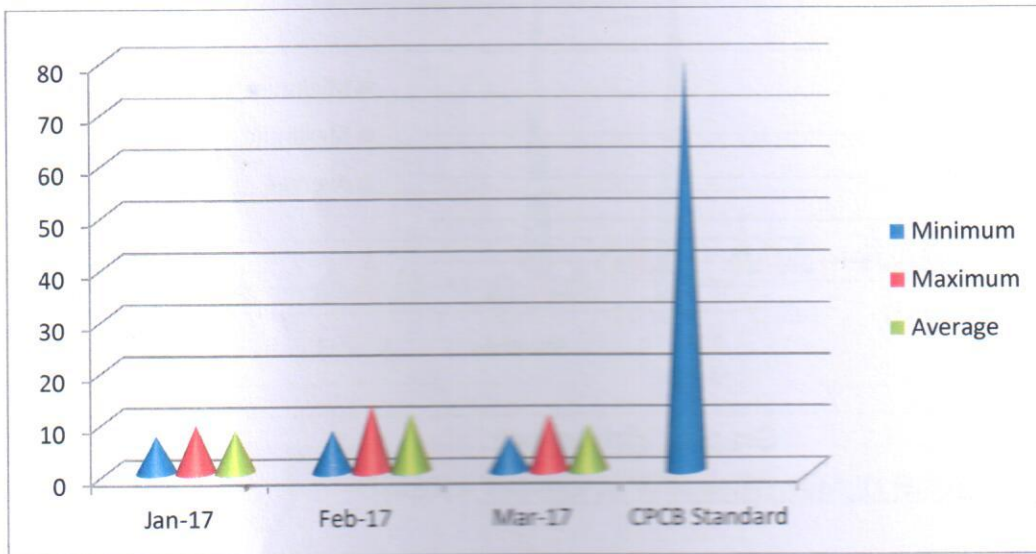
Graph :- Piprapat / Nr.Mining Area

Betpani

For the Month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 13 µg/m³ respectively and average concentration of 11 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.



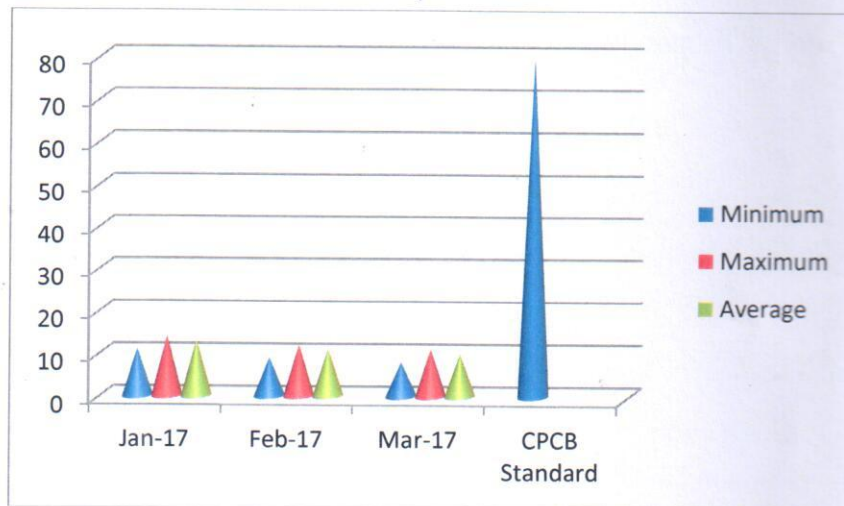
Graph:- Betpani

Virhorepat

For the Month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 11 µg/m³ and 14 µg/m³ respectively and average concentration of 13 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 12 µg/m³ respectively and average concentration of 11 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.



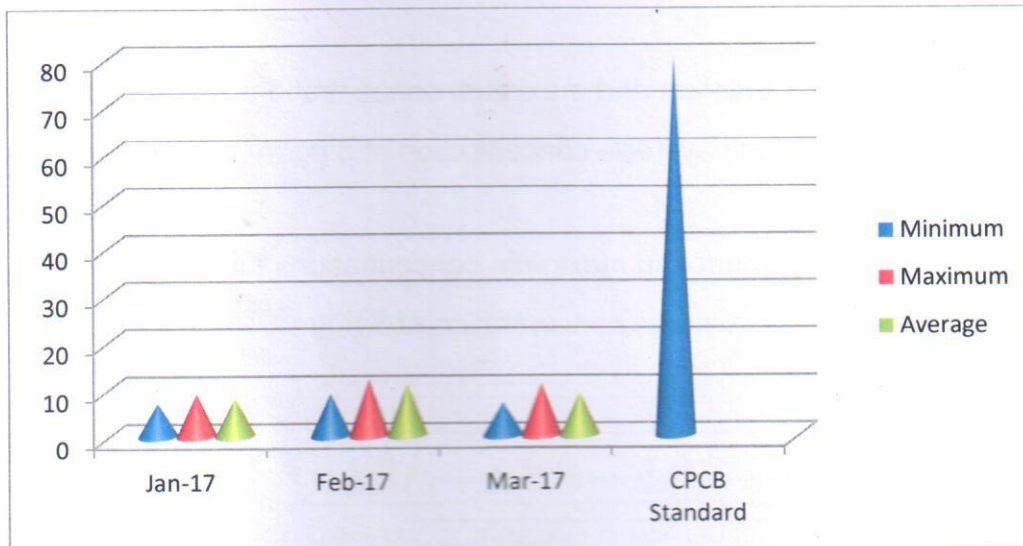
Graph:- Virhorepat

Tatijharia Village/Nr.Weigh Bridge

For the Month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 12 µg/m³ respectively and average concentration of 11 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.



Graph:- Tatijharia Village/Nr.Weigh Bridge

2.4 Fugitive Emission (Buffer Zone):-

2.4.1 Presentation of Results.

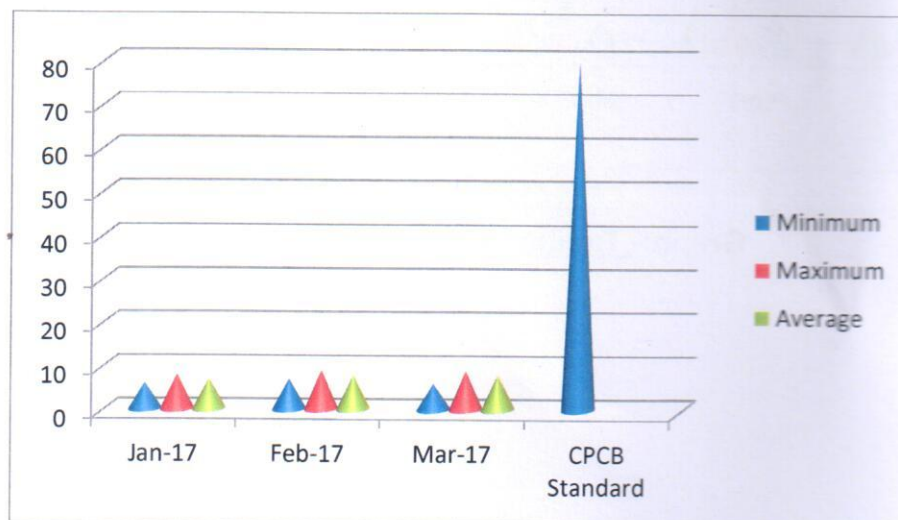
The summary of Statistical Analysis of SO₂ results for the month of January-February-March 2017 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Kutku Village / Nr. V.T.Center

For the Month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 8 µg/m³ respectively and average concentration of 7 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.



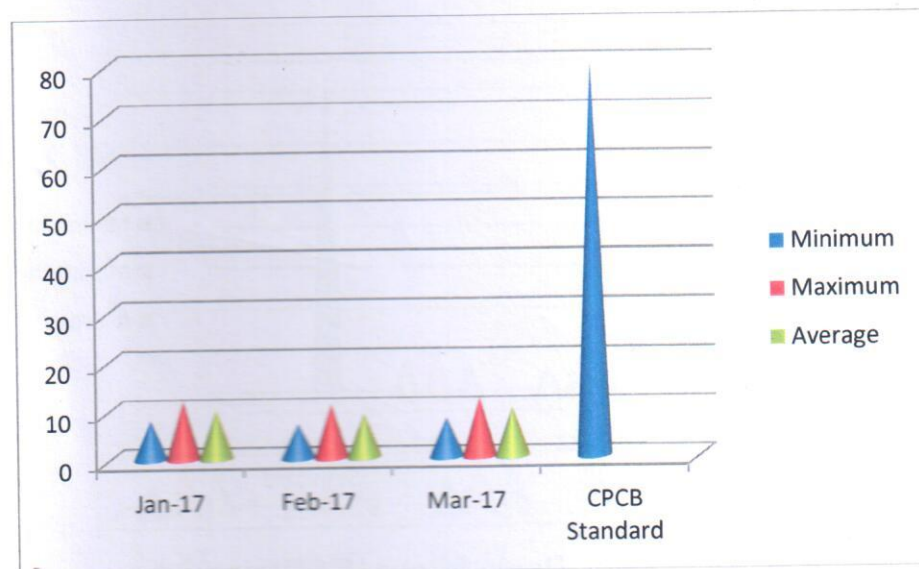
Graph:- Kutku Village / Nr. V.T.Center

Sairaidh Campus

For the Month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 12 µg/m³ respectively and average concentration of 10 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 12 µg/m³ respectively and average concentration of 10 µg/m³.



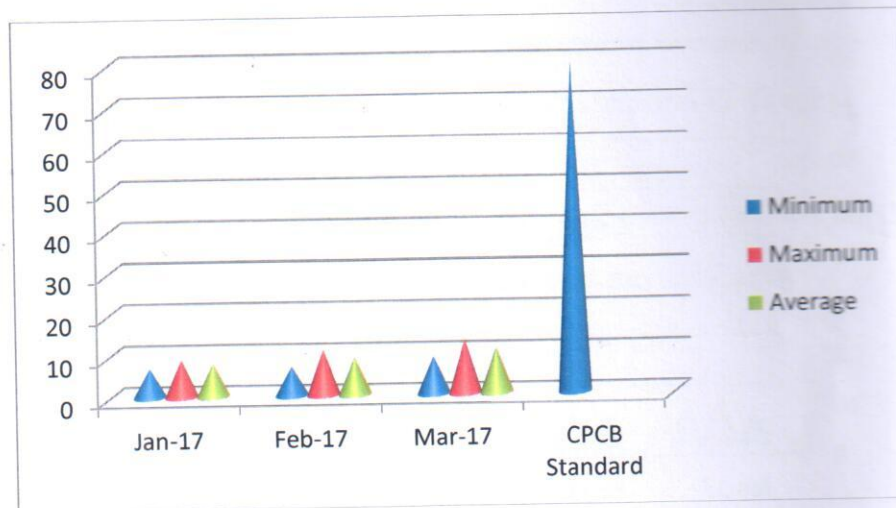
Graph:- Sairaidh Campus

Rajendrapur / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 13 µg/m³ respectively and average concentration of 11 µg/m³.



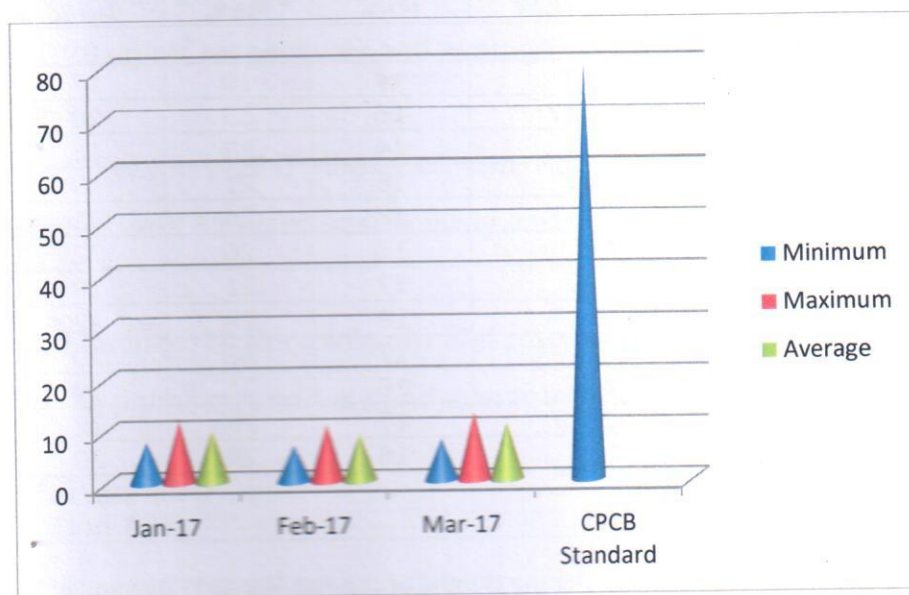
Graph:- Rajendrapur / Nr.Mining Area

Dumerkholi / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 12 µg/m³ respectively and average concentration of 10 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 13 µg/m³ respectively and average concentration of 11 µg/m³.



Graph:- Dumerkholi / Nr.Mining Area

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):- | | | | | | |
| Piprapat/ Nr.Mining Area | January-2017 | 16 | 28 | 22 | 22 | 28 |
| | February-2017 | 19 | 31 | 25 | 25 | 31 |
| | March-2017 | 24 | 32 | 28 | 28 | 32 |
| Betpani | January-2017 | 16 | 24 | 20 | 20 | 24 |
| | February-2017 | 18 | 27 | 23 | 23 | 27 |
| | March-2017 | 21 | 28 | 25 | 25 | 28 |
| Virhorepat | January-2017 | 16 | 24 | 20 | 20 | 24 |
| | February-2017 | 19 | 26 | 23 | 23 | 26 |
| | March-2017 | 18 | 31 | 25 | 25 | 31 |
| Tatijharia Village/Nr.Weigh Bridge | January-2017 | 16 | 28 | 22 | 22 | 28 |
| | February-2017 | 21 | 27 | 24 | 24 | 27 |
| | March-2017 | 23 | 28 | 26 | 26 | 28 |
| CPCB Standard | | 80 $\mu\text{g}/\text{m}^3$ (24 hrs) | | | | |

| Location | Month & Year | Min. | Max. | A.M. | G.M. | 98% |
|---|---------------|--|------|------|------|-----|
| Buffer Zone :- | | | | | | |
| Kutku Village/ Nr.V.T.Center | January-2017 | 14 | 19 | 17 | 17 | 19 |
| | February-2017 | 16 | 23 | 20 | 20 | 23 |
| | March-2017 | 14 | 18 | 16 | 16 | 18 |
| Sairaidh Campus | January-2017 | 16 | 21 | 19 | 19 | 21 |
| | February-2017 | 18 | 24 | 21 | 21 | 24 |
| | March-2017 | 18 | 26 | 22 | 22 | 26 |
| Rajendrapur/ Nr.Mining Area | January-2017 | 17 | 21 | 19 | 19 | 21 |
| | February-2017 | 19 | 24 | 22 | 22 | 24 |
| | March-2017 | 17 | 23 | 20 | 20 | 23 |
| Dumerkholi/ Nr.Mining Area | January-2017 | 16 | 21 | 19 | 19 | 21 |
| | February-2017 | 17 | 26 | 22 | 22 | 26 |
| | March-2017 | 16 | 24 | 20 | 20 | 24 |
| CPCB Standard | | 80 $\mu\text{g}/\text{m}^3$ (24 hrs) | | | | |

Conclusion (A):-

Piprapat /Nr.Mining Lease Area Core Zone: For the Months of Jan-Feb-Mar-2017 Average of NO_x is 25 $\mu\text{g}/\text{m}^3$.

Betpani Lease Area Core Zone:- For the Months of Jan-Feb-Mar-2017 Average of NO_x is 23 $\mu\text{g}/\text{m}^3$.

Virhorepat Lease Area Core Zone:- For the Months of Jan-Feb-Mar-2017 Average of NO_x is 23 $\mu\text{g}/\text{m}^3$.

Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone :- For the Months of Jan-Feb-Mar-2017 Average of NO_x is 24 $\mu\text{g}/\text{m}^3$.

- The Average Concentration of NO_x within the Core Zone of Tatijharia Lease during this period (Jan-Feb-Mar-2017) is 24 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion (B):-

1)Kutku Village/ Nr.V.T.Center Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2017 Average of NO_x is 18 $\mu\text{g}/\text{m}^3$.

2)Sairaidh Campus Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2017 Average of NO_x is 21 $\mu\text{g}/\text{m}^3$.

3)Rajendrapur/ Nr.Mining Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2017 Average of NO_x is 20 $\mu\text{g}/\text{m}^3$.

4)Dumerkholi/ Nr.Mining Lease Area Buffer Zone:- For the Months of Jan-Feb-Mar-2017 Average of NO_x is 20 $\mu\text{g}/\text{m}^3$.

- The Average Concentration of NO_x within the Buffer Zone of Tatijharia Lease during this period (Jan-Feb-Mar-2017) is 20 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Monthwise Summary of Statistical Analysis of NO_x

2.5 Fugitive Emission (Core Zone):-

2.5.1 Presentation of Results.

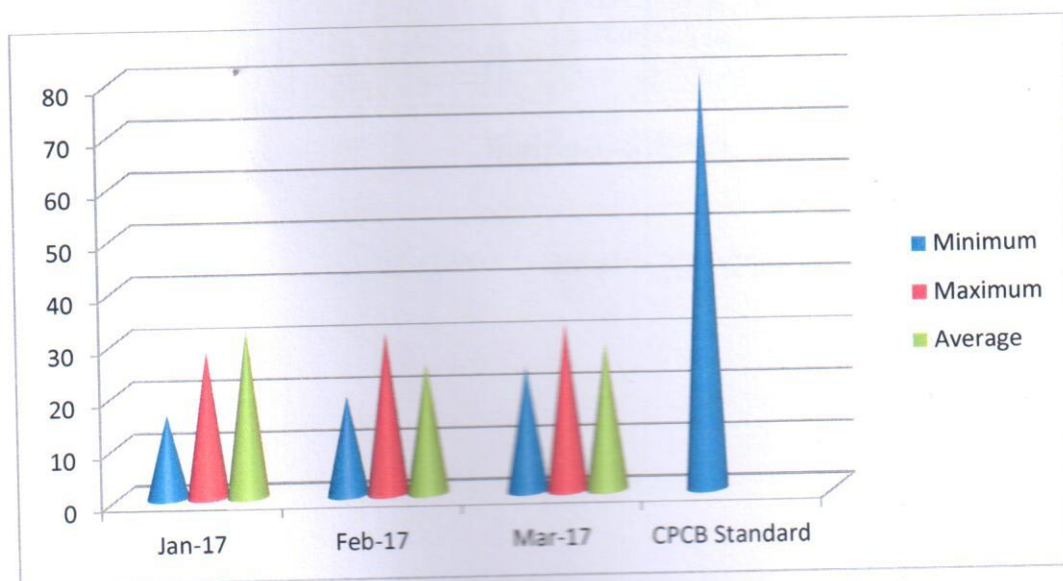
The summary of Statistical Analysis of NO_x results for the month of January-February-March-2017 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Piprapat / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 28 µg/m³ respectively and average concentration of 22 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 31 µg/m³ respectively and average concentration of 25 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for NO_x were recorded as 24 µg/m³ and 32 µg/m³ respectively and average concentration of 28 µg/m³.



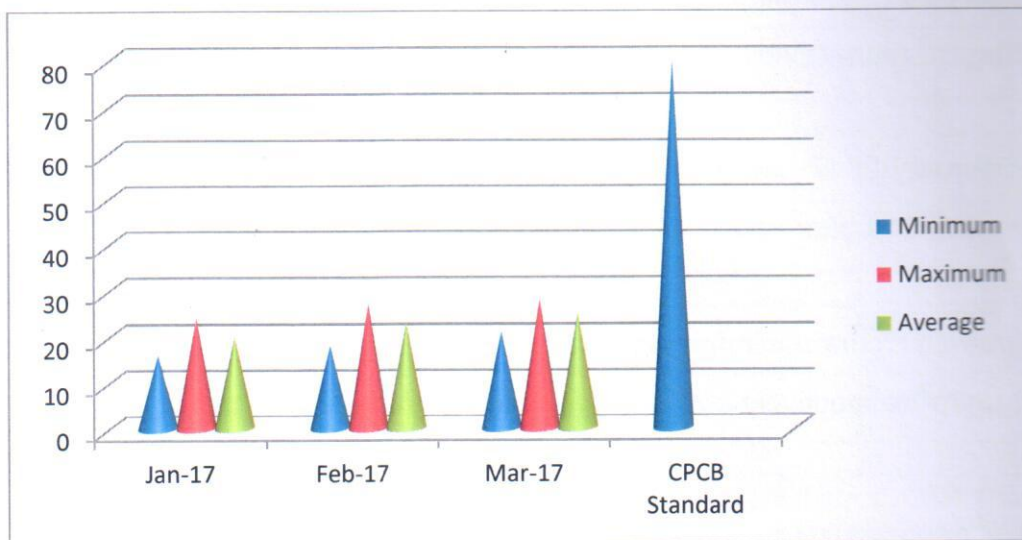
Graph :- Piprapat / Nr.Mining Area

Betpani

For the Month of January-2017 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 24 µg/m³ respectively and average concentration of 20 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 27 µg/m³ respectively and average concentration of 23 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for NO_x were recorded as 21 µg/m³ and 28 µg/m³ respectively and average concentration of 25 µg/m³.



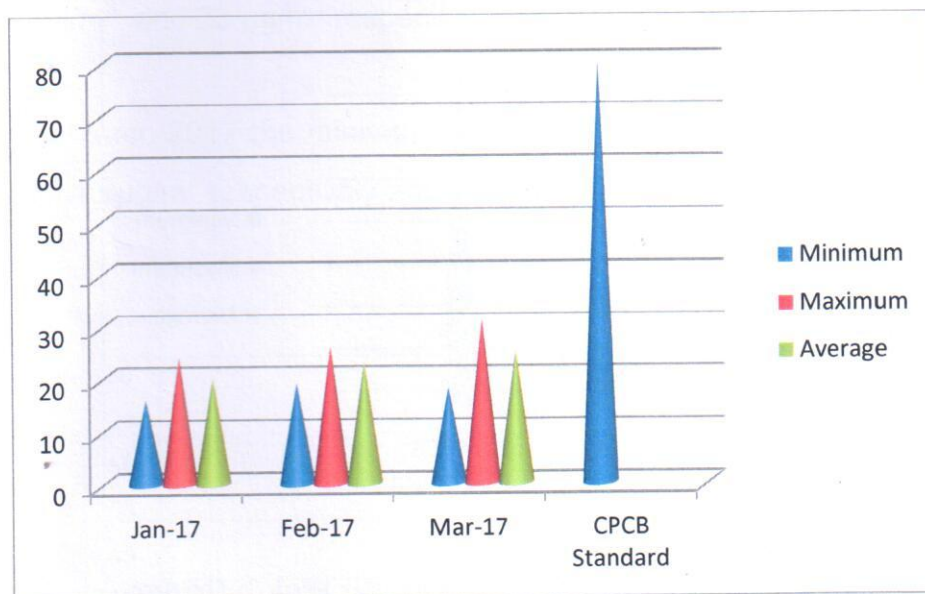
Graph:- Betpani

Virhorepat

For the Month of January-2017 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 24 µg/m³ respectively and average concentration of 20 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 26 µg/m³ respectively and average concentration of 23 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 31 µg/m³ respectively and average concentration of 25 µg/m³.



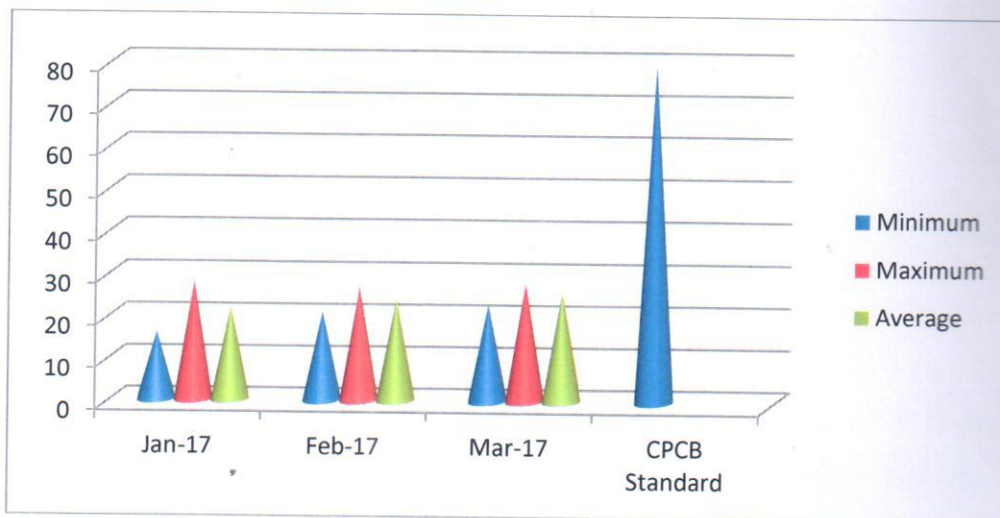
Graph:- Virhorepat

Tatijharia Village/Nr.Weigh Bridge

For the Month of January-2017 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 28 µg/m³ respectively and average concentration of 22 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 21 µg/m³ and 27 µg/m³ respectively and average concentration of 24 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for NO_x were recorded as 23 µg/m³ and 28 µg/m³ respectively and average concentration of 26 µg/m³.



Graph:- Tatijharia Village/Nr.Weigh Bridge

2.6 Fugitive Emission (Buffer Zone):-

2.6.1 Presentation of Results.

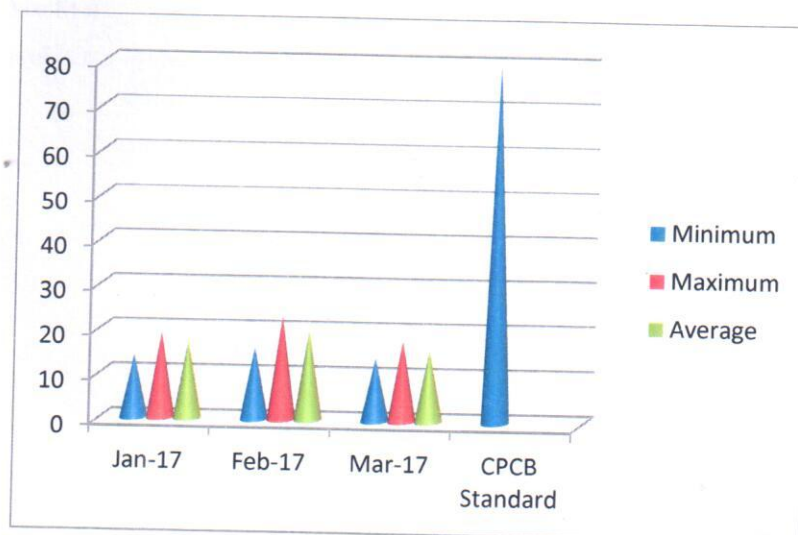
The summary of Statistical Analysis of NO_x results for the month of January-2017 to March-2017 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Kutku Village / Nr. V.T.Center

For the Month of January-2017 the minimum and maximum concentrations for NO_x were recorded as 14 µg/m³ and 19 µg/m³ respectively and average concentration of 17 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 23 µg/m³ respectively and average concentration of 20 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for NO_x were recorded as 14 µg/m³ and 18 µg/m³ respectively and average concentration of 16 µg/m³.



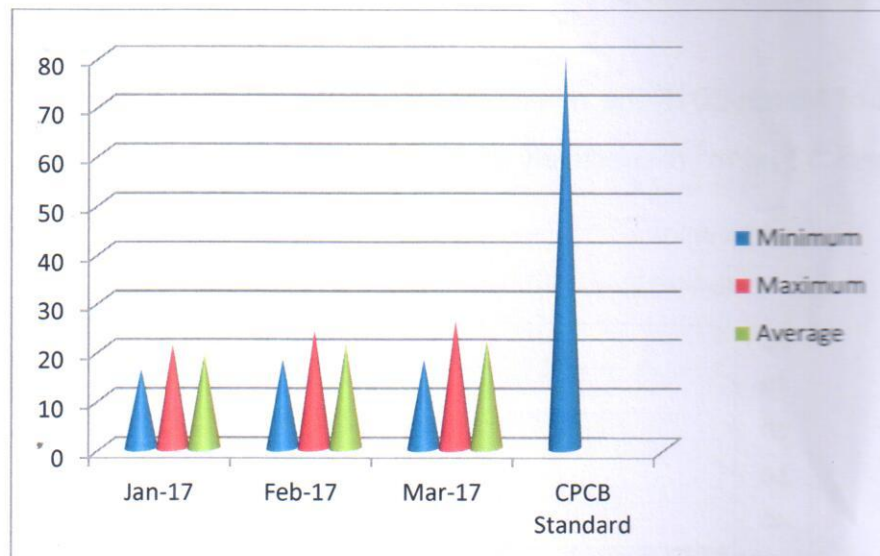
Graph:- Kutku Village / Nr. V.T.Center

Sairaidh Campus

For the Month of January-2017 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 21 µg/m³ respectively and average concentration of 19 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 24 µg/m³ respectively and average concentration of 21 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 26 µg/m³ respectively and average concentration of 22 µg/m³.



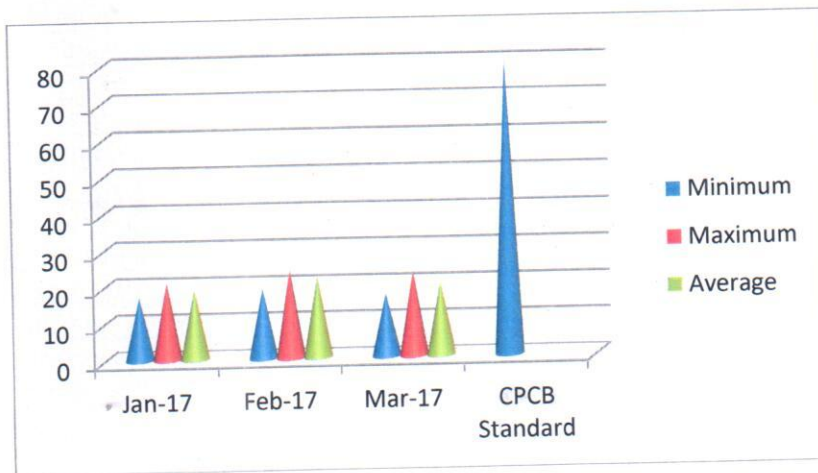
Graph:- Sairaidh Campus

Rajendrapur / Nr.Mining Area

For the Month of January-2017 the minimum and maximum concentrations for NO_x were recorded as 17 µg/m³ and 21 µg/m³ respectively and average concentration of 19 µg/m³.

For the Month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 24 µg/m³ respectively and average concentration of 22 µg/m³.

For the Month of March-2017 the minimum and maximum concentrations for NO_x were recorded as 17 µg/m³ and 23 µg/m³ respectively and average concentration of 20 µg/m³.



Graph:- Rajendrapur / Nr.Mining Area

Table 12
Statistical Analysis of Hg

Unit: µg/m³

| Location | Month & Year | Min. | Max. | A.M. | G.M. | 98% |
|---|---------------|------|------|------|------|-----|
| Fugitive Emission (Core Zone):- | | | | | | |
| Piprapat/ Nr.Mining Area | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Betpani | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Virhorepat | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Tatijharia Village/Nr.Weigh Bridge | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Buffer Zone :- | | | | | | |
| Kutku Village/ Nr.V.T.Center | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Sairaidh Campus | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Rajendrapur/ Nr.Mining Area | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Dumerkholi/ Nr.Mining Area | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| CPCB Standard | | --- | | | | |

Conclusion: (A)

The Average Concentration of Hg within the Core Zone of Tatijharia Lease during this period (January-February-March-2017) is Not Detected.and it is within permissible limits as per CPCB Standard.

Conclusion: (B)

The Average Concentration of Hg within the Buffer Zone of Tatijharia Lease during this period (January-February-March-2017) is Not Detected.and it is within permissible limits as per CPCB Standard.

Table 13

Statistical Analysis of As

Unit: ng/m³

| Location | Month & Year | Min. | Max. | A.M. | G.M. | 98% |
|---|---------------|------|------|---|------|-----|
| Core Zone Emission (Core Zone):- | | | | | | |
| Piprapat/ Nr.Mining Area | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Betpani | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Virhorepat | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Tatijharia Lease/Nr.Weigh Bridge | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| CPCB Standard | | | | 06 ng/m³ (Annual) | | |

| Location | Month & Year | Min. | Max. | A.M. | G.M. | 98% |
|---|---------------|------|------|---|------|-----|
| Buffer Zone :- | | | | | | |
| Kutku Village/ Nr.V.T.Center | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Sairaidh Campus | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Rajendrapur/ Nr.Mining Area | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| Dumerkholi/ Nr.Mining Area | January-2017 | ND | ND | ND | ND | ND |
| | February-2017 | ND | ND | ND | ND | ND |
| | March-2017 | ND | ND | ND | ND | ND |
| CPCB Standard | | | | 06 ng/m³ (Annual) | | |

Conclusion: (A)

The Average Concentration of As within the Core Zone of Tatijharia Lease during this period (January-February-March-2017) is Not Detected and it is within permissible limits as per CPCB Standard.

Conclusion: (B)

The Average Concentration of As within the Buffer Zone of Tatijharia Lease during this period (January-February-March-2017) is Not Detected and it is within permissible limits as per CPCB Standard.

Free Silica :-

| Sr. No. | Location | Measurement Unit | January 2017 | | February 2017 | | March 2017 | |
|---------|-------------------------------|------------------|--------------|------|---------------|------|------------|------|
| | | | SPM | RSPM | SPM | RSPM | SPM | RSPM |
| 1. | Piprapat/ Near Mining Area | g/100gm | 0.26 | 0.18 | 0.31 | 0.21 | 0.34 | 0.16 |

Table 14
Dust fall Rate

| Sl.No. | Location | January 2017 | February 2017 | March 2017 | Average |
|---------------------------------------|---------------------------|--------------|---------------|------------|-------------|
| Rate (MT/km²/month) | | | | | |
| 1 | Piprapat/Near Mining Area | 17.9 | 24.8 | 28.1 | 23.6 |
| 2 | Tatijharia Village | 16.1 | 18.2 | 21.4 | 18.6 |

Table 15

Noise Level Monitoring

Unit: dB(A)

| Sl. No. | Location | January-2017 | | February-2017 | | March-2017 | |
|--------------------|--|--------------|-------|---------------|-------|------------|-------|
| | | Day | Night | Day | Night | Day | Night |
| Core Zone | | | | | | | |
| 1. | Pirapat/Nr.Mining Area | 64.3 | 52.8 | 59.2 | 46.1 | 62.8 | 49.1 |
| 2. | Betpani | 57.2 | 46.1 | 61.3 | 49.2 | 56.1 | 42.9 |
| 3. | Virhorepat | 68.7 | 54.3 | 62.9 | 51.6 | 64.6 | 52.7 |
| 4. | Tatijharia Village/ Nr.Weigh Bridge | 57.3 | 42.9 | 54.7 | 43.7 | 62.4 | 53.1 |
| Buffer Zone | | | | | | | |
| 5. | Kutku Village/Nr.V.T.Center | 48.7 | 37.3 | 51.6 | 42.4 | 46.9 | 38.2 |
| 6. | Sairaidh Campus | 51.9 | 43.7 | 49.3 | 37.1 | 52.6 | 41.7 |
| 7. | Rajendrapur/Nr.Mining Area | 49.3 | 38.1 | 52.7 | 43.6 | 51.7 | 42.9 |
| 8. | Dumerkholi/Nr.Mining Area | 46.1 | 37.3 | 51.9 | 42.8 | 48.3 | 36.8 |

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)

| Sl. No. | Location | January-2017 | | | February-2017 | | | March-2017 | | |
|---------|-------------------------|--------------|------|-------------|---------------|------|-------------|------------|------|-------------|
| | | Min. | Max. | Avg. | Min. | Max. | Avg. | Min. | Max. | Avg. |
| 1 | Piprapat/Nr.Mining Area | 62.7 | 71.6 | 67.2 | 64.9 | 76.7 | 70.8 | 67.1 | 81.6 | 74.4 |

2.7 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: Piprapat/Near Mining Area (Average of January-February-March-2017)

TEST RESULTS

| Sr. No. | Test Parameter | Measurement Unit | Test Method | As per IS 10500 : 2012 (Drinking Water - Specification) | | Test Result |
|---------|--|------------------|-------------------|--|--------------------|--------------|
| | | | | Acceptable Limit | *Permissible Limit | |
| 1. | pH value | - | IS 3025 (Part 11) | 6.5 to 8.5 | No relaxation | 7.18 at 26°C |
| 2. | Turbidity | NTU | IS 3025 (Part 10) | 1 | 5 | 0.7 |
| 3. | Colour | Hazen units | IS 3025 (Part 4) | 5 | 15 | < 1 |
| 4. | Odour | - | IS 3025 (Part 5) | Agreeable | Agreeable | Agreeable |
| 5. | Taste | - | IS 3025 (Part 8) | Agreeable | Agreeable | Agreeable |
| 6. | Iron (as Fe) | mg/l | IS 3025 (Part 2) | 1.0 | No relaxation | 0.16 |
| 7. | Free residual chlorine | mg/l | IS 3025 (Part 26) | Min. 0.2 | Min. 1 | < 0.1 |
| 8. | Total dissolved solids | mg/l | IS 3025 (Part 16) | 500 | 2000 | 304 |
| 9. | Fluoride (as F) | mg/l | IS 3025 (Part 60) | 1.0 | 1.5 | 0.18 |
| 10. | Cyanide (as CN) | mg/l | IS 3025 (Part 27) | 0.05 | No relaxation | < 0.005 |
| 11. | Chloride (as Cl) | mg/l | IS 3025 (Part 32) | 250 | 1000 | 68.59 |
| 12. | Total Alkalinity (as CaCO ₃) | mg/l | IS 3025 (Part 23) | 200 | 600 | 118.72 |
| 13. | Total hardness (as CaCO ₃) | mg/l | IS 3025 (Part 21) | 200 | 600 | 154.17 |
| 14. | Calcium (as Ca) | mg/l | IS 3025 (Part 40) | 75 | 200 | 48.64 |
| 15. | Magnesium (as Mg) | mg/l | IS 3025 (Part 46) | 30 | 100 | 7.93 |
| 16. | Sulphate (as SO ₄) | mg/l | IS 3025 (Part 24) | 200 | 400 | 16.58 |
| 17. | Nitrate (as NO ₃) | mg/l | APHA Method | 45 | No relaxation | 7.29 |
| 18. | Copper (as Cu) | mg/l | IS 3025 (Part 2) | 0.05 | 1.5 | < 0.03 |
| 19. | Manganese (as Mn) | mg/l | IS 3025 (Part 2) | 0.1 | 0.3 | <0.05 |
| 20. | Mercury (as Hg) | mg/l | IS 3025 (Part 2) | 0.001 | No relaxation | < 0.0005 |
| 21. | Cadmium (as Cd) | mg/l | IS 3025 (Part 2) | 0.003 | No relaxation | < 0.001 |
| 22. | Selenium (as Se) | mg/l | IS 3025 (Part 2) | 0.01 | No relaxation | < 0.001 |
| 23. | Arsenic (as As) | mg/l | IS 3025 (Part 2) | 0.01 | No relaxation | < 0.01 |
| 24. | Aluminium (as Al) | mg/l | IS 3025 (Part 2) | 0.03 | 0.2 | < 0.005 |
| 25. | Lead (as Pb) | mg/l | IS 3025 (Part 2) | 0.01 | No relaxation | < 0.001 |
| 26. | Zinc (as Zn) | mg/l | IS 3025 (Part 2) | 5 | 15 | < 0.1 |

Contd...

(Contd.....)

| Sr. No | Test Parameter | Measurement Unit | Test Method | As per IS 10500 : 2012 (Drinking Water - Specification) | | Test Result |
|------------|--|------------------|-----------------------------|--|-------------------------|-------------|
| | | | | Acceptable Limit | *Permissible Limit | |
| 27. | Nickel (as Ni) | mg/l | IS 3025 (Part 2) | 0.02 | No relaxation | < 0.01 |
| 28. | Total Chromium (as Cr) | mg/l | IS 3025 (Part 2) | 0.05 | No relaxation | < 0.03 |
| 29. | Barium (as Ba) | mg/l | Annexure F of IS 13428 | 0.7 | No relaxation | < 0.01 |
| 30. | Ammonia (as N) | mg/l | IS 3025 (Part 34) | 0.5 | No relaxation | < 0.01 |
| 31. | Sulphide (as H ₂ S) | mg/l | IS 3025 (Part 29) | 0.05 | No relaxation | < 0.03 |
| 32. | Chloramines (as Cl ₂) | mg/l | APHA 4500-Cl ₂ G | 4.0 | No relaxation | < 0.01 |
| 33. | Molybdenum (as Mo) | mg/l | IS 3025 (Part 2) | 0.07 | No relaxation | < 0.001 |
| 34. | Silver (as Ag) | mg/l | Annexure J of IS 13428 | 0.1 | No relaxation | < 0.001 |
| 35. | Polychlorinated Biphenyls (PCB) | µg/l | USEPA 508 | 0.5 | No relaxation | < 0.03 |
| 36. | Boron (as B) | mg/l | IS 3025 (Part 2) | 0.5 | 1.0 | < 0.1 |
| 37. | Mineral Oil | mg/l | IS 3025 (Part 39) | 0.5 | No relaxation | < 0.001 |
| 38. | Tri Halo Methane | | | | | |
| | a. Bromoform | | | 0.1 | No relaxation | Absent |
| | b. Dibromochloromethane | mg/l | APHA 6232 | 0.1 | No relaxation | Absent |
| | c. Bromodichloromethane | | | 0.06 | No relaxation | Absent |
| | d. Chloroform | | | 0.2 | No relaxation | Absent |
| 39. | Phenolic compounds (as C ₆ H ₅ OH) | | | mg/l | IS 3025 (Part 43) :1001 | 0.001 |
| 40. | Anionic detergents (as MBAS) | mg/l | IS 13428:2005 (Annex K) | 0.2 | 1.0 | < 0.001 |
| 41. | Polynuclear aromatic hydrocarbon (PAH) | µg/l | USEPA : 550 | 0.1 | No relaxation | < 0.03 |
| 42. | Total coliform | MPN/100 ml | IS 1622 | --- | --- | < 2 |
| 43. | <i>Escherichia coli</i> | Per100 ml | IS 1622 | Absent | Absent | Absent |
| 44. | Pesticides residues | | | | | |
| i. | Alpha-HCH | µg/l | USEPA 508 | 0.01 | | < 0.01 |
| ii. | Beta HCH | µg/l | USEPA 508 | 0.04 | | < 0.03 |
| iii. | Delta- HCH | µg/l | USEPA 508 | 0.04 | | < 0.03 |
| iv. | Alachlor | µg/l | USEPA 508 | 20 | | < 0.03 |
| v. | Aldrin / Dieldrin | µg/l | USEPA 508 | 0.03 | | < 0.03 |
| vi. | Atrazine | µg/l | USEPA 1657 | 2 | | < 0.03 |
| vii. | Butachlor | µg/l | USEPA 508 | 125 | | < 0.03 |
| viii. | Chlorpyrifos | µg/l | USEPA 1657 | 30 | | < 0.03 |
| ix. | DDT and its Isomers | µg/l | USEPA 508 | 1 | | < 0.03 |
| x. | Gamma - HCH (Lindane) | µg/l | USEPA 508 | 2 | | < 0.03 |
| xi. | 2,4-Dichlorophenoxyacetic acid | µg/l | USEPA 1657 | 30 | | < 0.03 |
| xii. | Endosulphan | µg/l | USEPA 508 | 0.4 | | < 0.03 |
| xiii. | Ethion | µg/l | USEPA 1657 | 3 | | < 0.03 |
| xiv. | Isoproturon | µg/l | USEPA 1657 | 9 | | < 0.03 |
| xv. | Malathion | µg/l | USEPA 1657 | 190 | | < 0.03 |
| xvi. | Methyl Parathion | µg/l | USEPA 1657 | 0.3 | | < 0.03 |
| xvii. | Monocrotophos | µg/l | USEPA 1657 | 1 | | < 0.03 |
| xviii. | Phorate | µg/l | USEPA 1657 | 2 | | < 0.03 |

Note: 1. Results relate to tested sample only. 2. Test report should not be reproduced partially. 3. *Permissible limit in the absence of alternate source. 4. 'mg/l' is equivalent to 'ppm' 5. 'µg/l' is equivalent to 'ppb' 6. '<' indicates detection limit of the laboratory. 7. MPN-Most probable number. 8. Results for test no. 7 are not applicable.

REMARKS: Based upon request of the party, sample was tested for above mentioned parameters only. Sample complies with IS:10500:2012, for tests 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 Mining Area)

| S.No | Parameters | Unit | IS : 2296 Class 'C' | Results |
|------|-------------------------------------|--------|------------------------|------------|
| | | | | March-2017 |
| 1 | pH Value | - | 6.5 to 8.5 | 6.82 |
| 2 | Total Hardness (CaCO ₃) | mg / l | \$ | 218.54 |
| 3 | Iron as (Fe) | mg / l | 50 | 16.92 |
| 4 | Chlorides as (Cl) | mg / l | 600 | 327.42 |
| 5 | Electrical Conductivity | µS/cm | \$ | 463.19 |
| 6 | Total Dissolved Solids (TDS) | mg / l | 1500 | 250 |
| 7 | Calcium as (Ca) | mg / l | \$ | 73.82 |
| 8 | Magnesium as (Mg) | mg / l | \$ | 12.58 |
| 9 | Sulphate as (SO ₄) | mg / l | 400 | 126.43 |
| 10 | Nitrates as (NO ₃) | mg / l | \$ | 9.7 |
| 11 | Fluoride as (F) | mg / l | 0.5 | 0.26 |
| 12 | Alkalinity | mg / l | \$ | 61.58 |
| 13 | Chemical Oxygen demand (COD) | mg / l | \$ | 21.7 |
| 14 | BOD at 27°C for 3days | mg / l | 3 | 7.3 |
| 15 | Total Suspended Solid (TSS) | mg / l | \$ | 18 |

\$: Limits not specified

Table 18

Report on Soil Analysis, Tatijharia

Date of collection: March-2017.

Sample Location: Piprapat/Nr.Mining Area

| Sr. No | Test Parameters | Measurement Unit | Results |
|--------|---|------------------|--------------|
| 1 | pH | - | 6.73 at 26°C |
| 2 | Electrical Conductivity at 25°C | µs/cm | 329 |
| 3 | Texture | - | Clay Loam |
| 4 | Sand | % | 48.3 |
| 5 | Silt | % | 27.2 |
| 6 | Clay | % | 24.5 |
| 7 | Bulk Density | g/cc | 1.21 |
| 8 | Porosity | % | 13 |
| 9 | Water Holding Capacity | % | 52 |
| 10 | Exchangeable Calcium as Ca | mg/kg | 62.9 |
| 11 | Exchangeable Magnesium as Mg | mg/kg | 7.3 |
| 12 | Exchangeable Sodium as Na | mg/kg | 68.1 |
| 13 | Available Potassium as K | kg/hect. | 6.2 |
| 14 | Available Phosphorous as P | kg/hect. | 146 |
| 15 | Available Nitrogen as N | kg/hect. | 38.7 |
| 16 | Organic Matter | % | 0.28 |
| 17 | Organic Carbon | % | 0.17 |
| 18 | Water Soluble Chloride as Cl ⁺ | mg/kg | 12.4 |
| 19 | Water Soluble Sulphate as SO ₄ | mg/kg | 5.9 |
| 20 | Sodium Absorption Ratio | - | 3.82 |
| 21 | CEC | meq/100 gm | 12.4 |
| 22 | Total Iron | % | 4.16 |
| 23 | Available Manganese | mg/kg | 0.0006 |
| 24 | Available Zinc | mg/kg | 0.005 |
| 25 | Available Boron | mg/kg | 0.003 |

Note: 1. Results relate to tested sample only. 2. Test report should not be reproduced partially. 3. 'mg/Kg' is equivalent to 'ppm'. 4. 'g/100g' is equivalent to '%w/w'. 5. All parameters are in 1:5 water extract.

REMARKS: Based upon request of party, sample was tested for above mentioned parameters only.

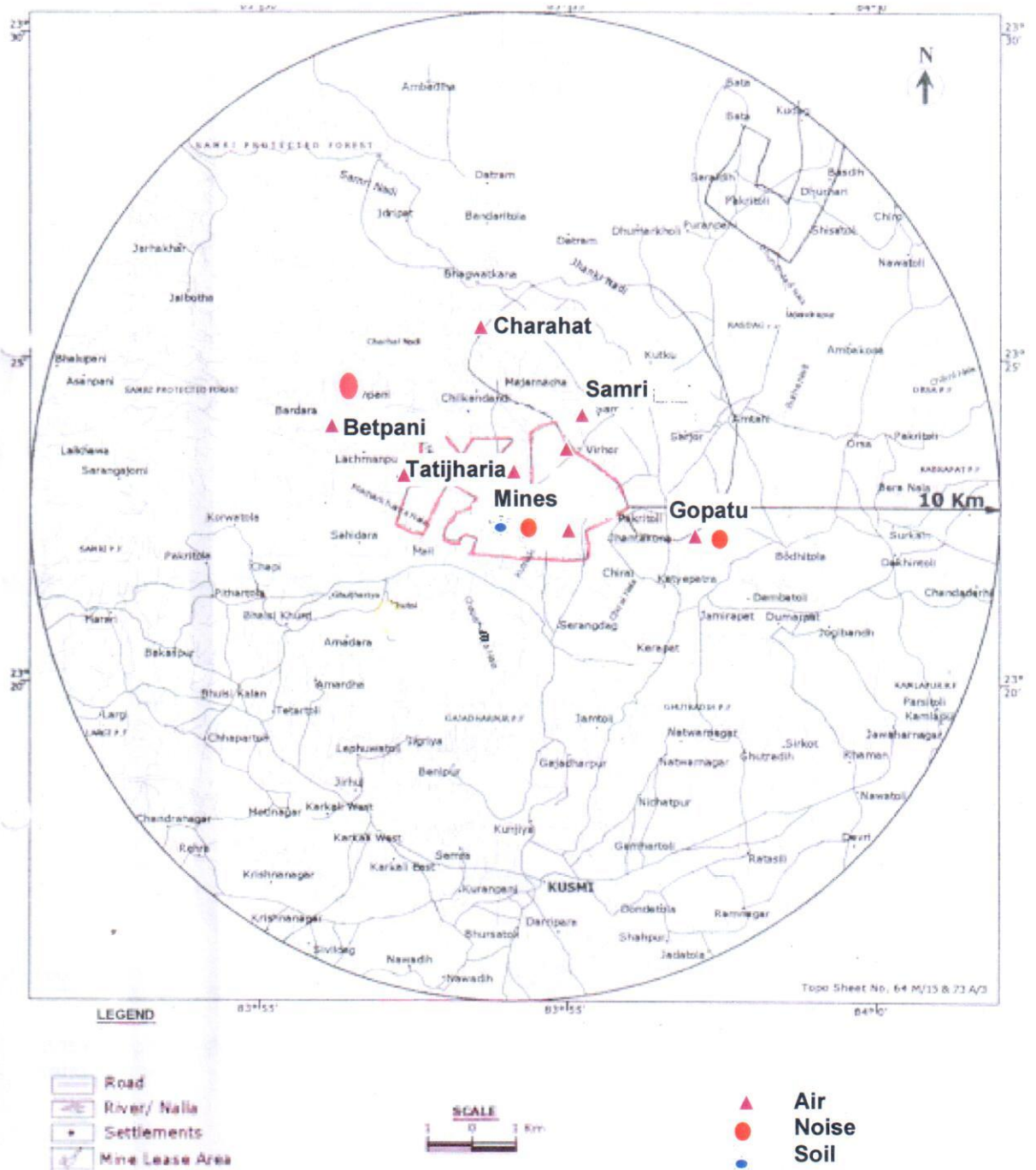


FIG 3: SAMPLING LOCATIONS FOR AIR, NOISE & SOIL

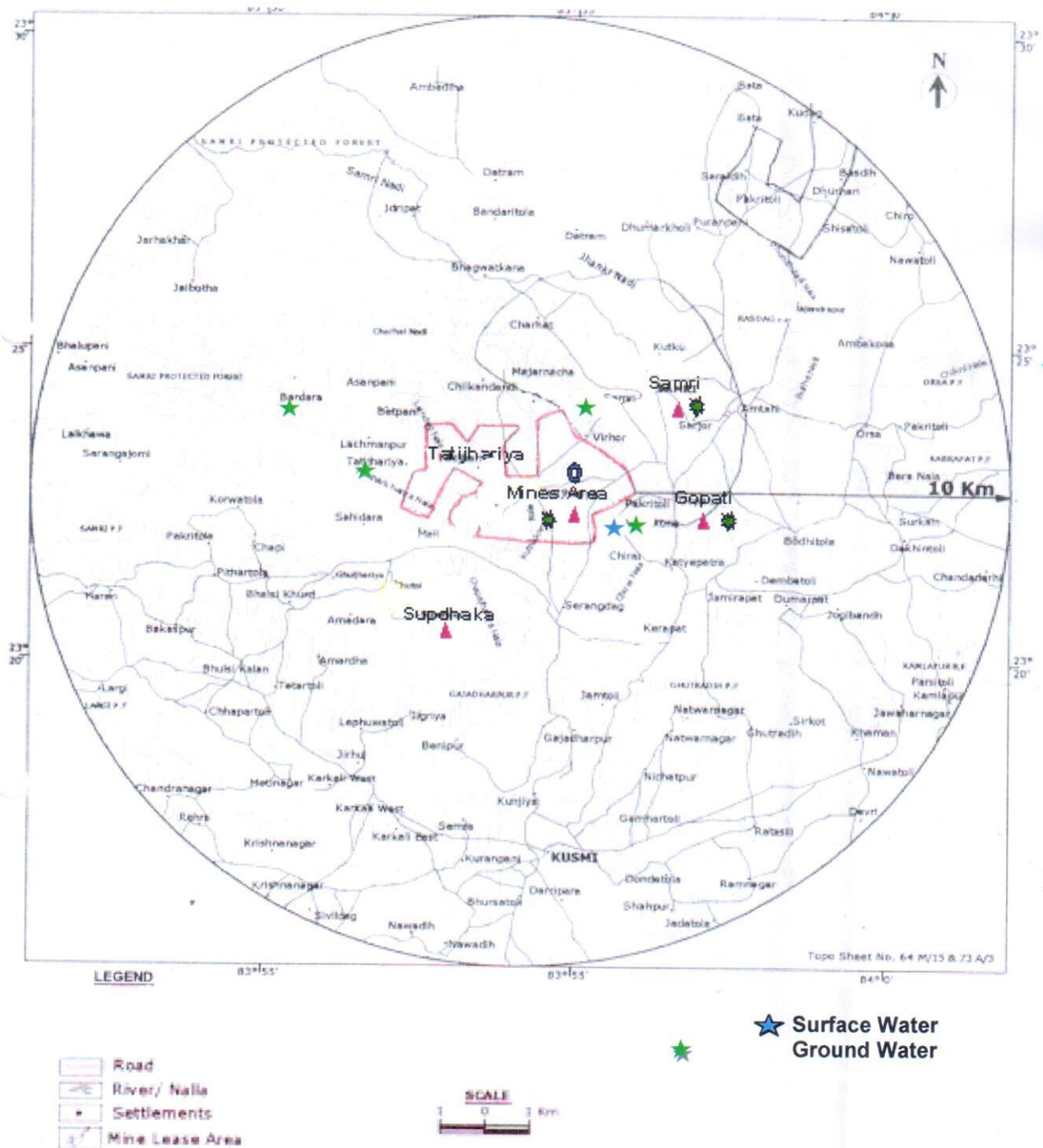


FIG 4: SAMPLING LOCATIONS FOR WATER



Annexure - 12

REGIONAL OFFICE

CHHATTISGARH ENVIRONMENT CONSERVATION BOARD

Bank Colony, Behind B.T.I., Nawapara, Ambikapur (C.G.) Fax/Phone 07774-231936

No. 982 /RO/TS/CECB/2016

Ambikapur, Dt. 02/11/2016

To,

M/s Hindalco Industries Limited,
(Tatijharia Bauxite Mine)
Village- Tatijharia & Betapani,
Tehsil - Samri,
District - Balrampur-Ramanujanj (C.G.)

Subject : Renewal of consent of the board under Section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974.

Ref. : Your letter No. HIL/SAM/CECB/118/2016/T dated 18/07/2016 and subsequent correspondence letter ending dated 23/09/2016.

With reference to your above, application consent and license are hereby renewed for a period from **01/12/2016 to 19/05/2018** with the terms and conditions incorporated in the consent issued by Board Office letter No. 6884/TS/CECB/2007, Raipur, dated 24/12/2007, subsequent renewal of consent issued by Board and additional condition mentioned below:-

| NAME | PRODUCTION CAPACITY |
|-----------------------|---|
| Mining of Bauxite Ore | 4.0 Lakhs Tonnes per Annum (Four Lakhs Tonnes Per Annum) |

Additional Conditions:

1. Industry shall operate and maintain the effluent treatment system effectively and regularly. Industry shall ensure treated effluent quality within the standards prescribed by Board published in Gazette Notification dated 25.03.1988. Treated effluent shall be used for dust suppression, domestic use, irrigation, other useful purposes etc. Industry shall not discharge any treated/untreated effluent into the river or any other surface water bodies. No effluent shall be discharged outside of the mine premises in any circumstances; hence zero discharge condition shall be maintained all the time; failing which, this renewal of consent may be cancelled.
2. Industry shall ensure safe and scientific arrangement for disposal of all solid wastes. Excavated area shall be reclaimed scientifically.
3. All internal roads shall be made pucca & shall be maintained properly. Dust, muck & sludge generated due to transportation on the road shall be cleaned and disposed off properly. Industry shall maintain good house keeping within mine lease area. Industry shall ensure the transportation of ore in duly covered vehicles.
4. Industry shall use fly ash brick, fly ash blocks or fly ash based products in their construction/repairing activities.
5. Industry shall submit monitoring report of effluent regularly.
6. Wide green belt of broad leaf local species shall be developed along the mine lease area. As far as possible maximum area of open spaces shall be utilized for plantation purposes.
7. Provision of water harvesting system should be provided in the industry premises.
8. Industry shall submit Environment statement to the Board as per provision of Environmental (Protection) Amendment Rule, 1993 for the previous year ending 31st March on or before 30th September every year.
9. Chhattisgarh Environment Conservation Board reserves the rights to revoke the Consent at any time for any violation/non-compliance.

Please acknowledge the receipt of this letter.

For and on behalf of

CHHATTISGARH ENVIRONMENT CONSERVATION BOARD

Regional Officer

Chhattisgarh Environment Conservation Board,
Ambikapur

| |
|---|
| Hindalco Industries Ltd Sector Mines Division Kamoh Distt. Balrampur |
| Date- 3/11/16 (58) |
| Received by <i>Ohe</i> |



Annexure - IV

REGIONAL OFFICE

CHHATTISGARH ENVIRONMENT CONSERVATION BOARD

Bank Colony, Behind B.T.I., Nawapara, Ambikapur (C.G.) Fax/Phone 07774-231936

No. 983 /RO/TS/CECB/2016
To,

Ambikapur, Dt. 02/11/2016

M/s Hindalco Industries Limited,
(Tatijharia Bauxite Mine)
Village- Tatijharia & Betapani,
Tehsil - Samri,
District - Bairampur-Ramanujganj (C.G.)

Subject : Renewal of consent of the board under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981.

Ref. : Your letter No. HIL/SAM/CECB/118/2016/T dated 18/07/2016 and subsequent correspondence letter ending dated 23/09/2016.

With reference to your above, application consent and license are hereby renewed for a period from **01/12/2016 to 19/05/2018** with the terms and conditions incorporated in the consent issued by Board Office letter No. 6886/TS/CECB/2007, Raipur, dated 24/12/2007, subsequent renewal of consent issued by Board and additional condition mentioned below:-

| NAME | PRODUCTION CAPACITY |
|-----------------------|---|
| Mining of Bauxite Ore | 4.0 Lakhs Tonnes per Annum (Four Lakhs Tonnes Per Annum) |

Additional Conditions:

1. The Industry shall operate & maintain the air pollution control system effectively & regularly. Effective steps shall be taken to control fugitive dust emission. Fixed type automatic water sprinkling system shall be installed at haul roads/other roads, ore stock yard etc. Dust suppression system (water sprinkling arrangement) shall be made more effective to ensure ambient air quality within prescribed limit in and around the mine area all the time.
2. Regular monitoring for the measurement of air pollutants level in ambient shall be carried out. Industry shall submit air quality monitoring reports to the Board regularly.
3. Industry shall ensure safe and scientific arrangement for disposal of all solid wastes. Excavated area shall be reclaimed scientifically.
4. All internal roads shall be made pucca & shall be maintained properly. Dust, muck & sludge generated due to transportation on the road shall be cleaned and disposed off properly. Industry shall maintain good house keeping within mine lease area. Industry shall ensure the transportation of ore in duly covered vehicles.
5. Industry shall use fly ash brick, fly ash blocks or fly ash based products in their construction/repairing activities.
6. Wide green belt of broad leaf local species shall be developed along the mine lease area. As far as possible maximum area of open spaces shall be utilized for plantation purposes.
7. Industry shall submit Environment statement to the Board as per provision of Environmental (Protection) Amendment Rule, 1993 for the previous year ending 31st March on or before 30th September every year.
8. Chhattisgarh Environment Conservation Board reserves the rights to revoke the Consent at any time for any violation/non-compliance.

Please acknowledge the receipt of this letter.

For and on behalf of

CHHATTISGARH ENVIRONMENT CONSERVATION BOARD

Regional Officer,

Chhattisgarh Environment Conservation Board,
Ambikapur

Hindalco Industries Ltd
Samar Mines Division
Raipur
Distt-Bairampur (C.G.)
Date 2/11/16 (59)
Received by [Signature]

Hindalco Industries Ltd.
Mines Division, Samri

Lease wise Production 2016-17

| Lease | Production (MT) |
|--------------|------------------------|
| Samri | 380380.000 |
| Kudag | 55925.000 |
| Tatijharia | 294015.000 |
| Total | 730320.000 |


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

Hindalco Industries Ltd.
Mines Division, Samri

Lease wise Details 2016-17

| Lease | Mined Out Area (Hact.) | Reclaimed Area (Hact.) | Nos. of Sapling | Area of Sapling (Hact.) |
|--------------|---------------------------|------------------------------|--------------------|-------------------------------|
| Samri | 14.254 | 10.700 | 9110 | 3.700 |
| Kudag | 3.013 | 1.214 | 4390 | 2.800 |
| Tatijharia | 11.117 | 11.135 | 5950 | 2.400 |
| Total | 28.384 | 23.049 | 19450 | 8.900 |


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

Actual Expenditure incurred in Environment Management Plan:-

Total cost incurred for protection of environment in Samri, Tatijharia & Kudag Bauxite Mine of Hindalco Industries Ltd. of Chhattisgarh state during the second half period of F.Y. 2016-17 (Oct-16 - March'17).

| SI No- | Environment Protection Measures | Actual Cost (Lac) (F.Y. 2016-17) (Oct 16- Mar 17)) |
|--------|--|---|
| 1 | Pollution Control | 3.35 |
| 2 | Environment Monitoring | 1.98 |
| 3 | Green Belt | 6.80 |
| 4. | Occupational Health monitoring | 1.32 |
| 4 | Reclamation/Rehabilitation of mined out area (Samri -6.485 Ha. Tatijharia-8.255 Ha. Kudag- 0.714 Ha. Total – 15.454 Ha.) | 463.62 |
| 5 | Total | 477.07 |

- 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 for, Samri, Tatijharia & Kudag lease.
- Reclamation of mined out land has been out sourced along with production. Average cost of reclamation considered @ Rs. 30.0 Lac per Ha.


 Agent of Mines
 Samri Mines Division
 Hindalco Industries Ltd