

**ADITYA BIRLA**



**HINDALCO**

HIL/Sam/MoEF/218/T/2016

09.11.2016

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 April-2016 to September-2016.

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

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

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

**HINDALCO INDUSTRIES LIMITED**  
Samri Mines, Division, Baba Chowk  
At & Post - Kusmi, PIN : 497 224,  
Distt - Balrampur-Ramanujganj (C.G.), INDIA  
Telephone + 91 7778 274326-27  
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**REGISTERED OFFICE**  
Century Bhawan, 3<sup>rd</sup> Floor,  
Dr. Annie Besant Road,  
Worli, Mumbai 400 030  
Telephone +91 22 6662 6666

**Website** [www.hindalco.com](http://www.hindalco.com)  
**E-mail** [hindalco@adityabirla.com](mailto:hindalco@adityabirla.com)  
**Corporate Identity No. -** L27020MH1958LC011238

26.10.2016.

**Status of Compliance from April-2016 to September-2016 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

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.

**(B) General Condition.**

- (i) No change in mining technology and scope of working will be done without approval of MOEF New Delhi.
- (ii) Calendar plan will be followed and there will not be any change in calendar plan.
- (iii) The suggestion of local forest department will be implemented for conservation of flora and fauna in and around lease hold area.
- (iv) Ambient Air quality monitoring is being carried out as per guideline and will be followed.
- (v) Data of ambient air quality (RPM, SPM, SO<sub>2</sub>, Nox) are being submitted to CECB and will be submitted to other regulatory authorities as per guidelines.
- (vi) Fugitive dust emission from generating sources is being controlled. The dust extractor, wet drilling, regular water spraying with 12 KL water tanker in the mine lease hold area is being carried out regularly.
- (vii) The noise level in working are being maintained below the limit prescribed and will be maintained. The operators of HEMM are being provided earplug/muffs. The proper maintenance of HEMM is being carried out to control noise emission.
- (viii) No waste water is generated from the mine however as suggested measures will be taken if required.
- (ix) All workers are provided personal protective equipment and training are also being imparted to them for safety & health and will be continued as per guidelines.
- (x) Periodical and Initial medical examination of all workers are being carried out as per provision of Mines Act.
- (xi) Separate Environment cell is already in place at Samri Mines Division headed by GM (Mines) and comprises of suitable qualified persons.
- (xii) In case of final closure of mine the information will be submitted to Regional Office, Ministry of Environment & Forests, Bhopal.
- (xiii) Adequate fund provision is already earmarked for environmental protection measures and will not be diverted to other purpose. The year wise expenditure will be submitted to concern authorities as per guidelines.
- (xiv) The same will be intimated to Regional Office, Ministry of Environment & Forests, Bhopal.

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

Hope the above compliance will be found in order.

Yours truly,  
For Hindalco Industries Limited



**(M K Nayak)**  
**Agent of Mines.**

Encl. : As Above

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

कार्यालय प्रधान मुख्य वन संरक्षक (वन्यप्राणी प्रबंधन एवं जैव विविधता  
संरक्षण सह मुख्य वन्यप्राणी अभिरक्षक), छत्तीसगढ़

अरण्य भवन, मेडिकल कॉलेज रोड, रायपुर

ईमेल - pccetw@sils.com

(Ph.0771-2552228, Fax 0771-2552227)

क्रमांक/व.प्रा./प्रबंध-12/13/2967

रायपुर दिनांक 07/10/2013

प्रति,

संचालक,

इन्वायरनमेंट क्लीयरेंस सेल

भारत सरकार, वन एवं पर्यावरण मंत्रालय,

पर्यावरण भवन, सी.जी.ओ. काम्प्लेक्स,

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 क्लीयरेंस।

- 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।

1. 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।

उत्पाद प्रदान में उपरोक्त स्वीकृत खादानों की क्षमता सामरी के लिये 1.0 LPTA से बढ़ाकर 5.0 LPTA किया जाना, कृष्णम 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 विभाग के द्वारा उपरोक्त वृद्धि हेतु प्रथम चरण की स्वीकृति 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 के शेड्यूल 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), हिन्डालका 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 सूची में वन्य प्राणी (संरक्षण) अधिनियम के शेड्यूल 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 शेड्यूल 1 के उपरोक्त उल्लेखित वन्य प्राणियों के परियोजना क्षेत्र में आने जाने के प्रमाण पाये गये हैं। 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

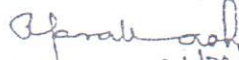
समाप्त करत हूँ 01 वर्षों के लिये राशि रुपये 160 लाख प्रावधानित की गयी है। जिसका क्रियान्वयन वन विभाग के द्वारा किया जायेगा। प्रस्ताव में प्रावधानित बजट का विवरण निम्नानुसार है :-

Sr No	Works to be done	Cost for Four years (Rs. In lakhs)					Remarks
		1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> 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 Annam)	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 Biodiversity management committees (BMC's)
Total		55.00	35.00	35.00	35.00	160.00	



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

संलग्न:—उपरोक्तानुसार।

  
(रामप्रकाश) 01/11/13

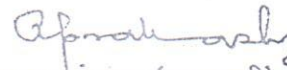
प्रधान मुख्य वन संरक्षक (वन्यप्राणी)  
छत्तीसगढ़, रायपुर

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

रायपुर दिनांक 01/10/2013

प्रतिलिपि :-

1. प्रमुख सचिव, छत्तीसगढ़ शासन, वन विभाग, महानदी मंत्रालय भवन, नया रायपुर की ओर मय योजना की प्रति सहित सूचनार्थ प्रेषित।
2. श्री एम. के. नायक, जी. एम. माइन्स हिन्डालको इन्डस्ट्रीज लिमिटेड, सामरी बॉक्साईट माइन्स, पोस्ट-कुसनी, जिला-सरगुजा, छत्तीसगढ़ की ओर मय योजना की प्रति सहित सूचनार्थ प्रेषित।

  
प्रधान मुख्य वन संरक्षक (वन्यप्राणी) 01/11/13  
छत्तीसगढ़, रायपुर

TATIJHARIA

  
Agent of Mines  
Samri Mines Division  
Hindalco Industries Ltd.

Annexure-6  
Details of Flora and Fauna

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**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 biferla</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
<b>I. Agricultural Crops</b>			
1	<i>Hordium vulgare</i>	Poaceae	Hemicryptophyte
2	<i>Sorghum vulgare</i>	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
<b>II. Commercial Crops (including Vegetables)</b>			
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	<i>Cicer arletinum</i>	Fabaceae	Hemicryptophyte
14	<i>Citrus lemon</i>	Rutaceae	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>Memordla 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>Ulthi chinensis</i>	Sapindaceae	Phanerophyte
<b>III. Plantations</b>			
25	<i>Bauhinia cormbosa</i>	Caesalpinaceae	Phanerophyte
26	<i>Acacia nilotica</i>	Mimosaceae	Phanerophyte
27	<i>Albizia lebbbeck</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
<b>IV. Natural Vegetation / Forest Type</b>			
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	Phanerophyte
54	<i>Ageratum conyzoides</i>	Compositae	Therophyte
55	<i>Ailanthes 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 prionites</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 campestris</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	Therophyte
94	<i>Cestrum noctrunum</i>	Rubiaceae	Therophyte

Sr. No.	Technical Name	Family	Life Form
95	<i>Chloris varigata</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 fastulosa</i>	Solanaceae	Therophyte
105	<i>Datura metal</i>	Solanaceae	Therophyte
106	<i>Desmodium triflorum</i>	Asclepiadaceae	Therophyte
107	<i>Diospyros melanoxylon</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>Emblica 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 religiosa</i>	Moraceae	Phanerophyte
130	<i>Ficus 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>Gmelina 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>Helictis 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 ciliate</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 paradisisca</i>	Musaceae	Therophyte
204	<i>Nymphia sp</i>	Magnoliaceae	Hydrophyte
205	<i>Ocimum americanum</i>	Labiatae	Therophyte
206	<i>Ocimum basillum</i>	Labiatae	Therophyte
207	<i>Ocimum canum</i>	Labiatae	Therophyte
208	<i>Ocimum sanctum</i>	Labiatae	Therophyte
209	<i>Oldenlandia umbellate</i>	Convolvulaceae	Therophyte
210	<i>Oldenlandia corymbosa</i>	Rubiaceae	Therophyte
211	<i>Oogenia 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>Phyllanthus niruri</i>	Euphorbiaceae	Therophyte
228	<i>Phyllanthus reticulatus</i>	Euphorbiaceae	Therophyte
229	<i>Physalis minima</i>	Solanaceae	Therophyte
230	<i>Pithecolobium 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>	Portulaccaceae	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 swietenoides</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 veranifolia</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>Syzygium 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 negungo</i>	Verbinaceae	Therophyte
272	<i>Vitlis 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
<b>V. Grasslands</b>			
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>Inpura 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
	<b>Endangered plants</b>	<b>No endangered plant species observed during study period and also from records of Botanical Survey of India (Red data of Books of Indian Plants)</b>	

**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
<b>Aves</b>		
<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
<b>Butterflies</b>		
<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 aglea Stoll.</i>	Glassy tiger	-
<b>Mammals</b>		
<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)
<b>Aves</b>		
<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
<i>Meops philippinus philippinus</i>	Bluetailed bee-eater	Sch-IV



Technical Name	English Name/Local Name	Wild Life Protection Act (1972)
<i>Coracias benghalensis indica</i>	Southern Indian Roller	Sch-IV
<i>Dinopium benghalense tehminae</i>	Malabar golden backed Woodpecker	Sch-IV
<i>Acridotheres tristis tristis</i>	Common myna	Sch-IV
<i>Corvus splendens protegatus</i>	Ceylon house crow	Sch-IV
<i>Nectarinia minima</i>	Small sunbird	Sch-IV
<i>Nectarinia zeylonica sola</i>	Indian purple rumped sunbird	Sch-IV
<i>Arachnothera longirostris longirostris</i>	Little spinder hunter	Sch-IV
<i>Passer domesticus indicus</i>	Indian house sparrow	Sch-IV
<i>Copsychus saularis ceyonensis</i>	Southern magpie-robin	Sch-IV
<i>Orthotomus sutorius</i>	Tailor bird guzurata	Sch-IV
<i>Pavocristatus</i>	Peacock	Part-III of Sch-I
<b>Amphibians</b>		
<i>Rana tigrana</i>	Common frog	Sch-IV
<i>Bufo melanosticus</i>	Toad	Sch-IV
<b>Reptiles</b>		
<i>Calotes versicolor</i>	Lizard	Sch-IV
<i>Calotes versicolor</i>	Common garden lizard	Sch-IV
<i>Chamaeleon zeylanicus</i>	Indian chamaeleon	Sch-II
<i>Lycodon spp.</i>	Wolf snake	Sch-III
<i>Boiga spp.</i>	Cat snake	Sch-III
<i>Bangarus spp.</i>	Krait	Sch-II
<i>Naja naja</i>	Indian cobra	Sch-III
<i>Viperia spp.</i>	Russels viper	Sch-III
<i>Phyton sp</i>	Python sp	Sch-I
<b>Butterflies</b>		
<i>Pachlopta hector Lin.</i>	Crimson rose	-
<i>Papilio demoleus Lin.</i>	Lime butterfly	-
<i>Graphium agamemnon Lin.</i>	Tailed jay	-
<i>Junonia almana Lin.</i>	Peacock pansy	-
<i>Hypolimnas bolina Lin.</i>	Great eggfly	-
<i>Euploea core Cramer</i>	Common crow	-
<i>Nephtis hylas Moore</i>	Common sailor	-
<i>Eutema hecabe Lin.</i>	Common grass yellow	-
<i>Catopsilia sp.</i>	Emigrant	-
<b>Mammals</b>		
<i>Rattus sp.</i>	Rat	Sch-IV
<i>Lepus nigricollis</i>	Hare	Sch-IV
<i>Canis aureus</i>	Jackal	Sch-III
<i>Presbytis entellus</i>	Langur	Sch-II
<i>Presbytis phayrei</i>	Monkey	Sch-I
<i>Funambulus spp.</i>	Squirrel	Sch-IV
<i>Funambulus palmarum</i>	Squirrel	Sch-IV
<i>Sus scrofa</i>	Wild pig	Sch-III
<i>Rattus norvegicus</i>	Field mouse	Sch-V
<i>Rattus rattus</i>	House rat	Sch-V
<i>Rhinolopus spp.</i>	Bat	Sch-V
<i>Hipposiderus spp.</i>	Bat	Sch-V
<i>Herpestes edwardii</i>	Common mongoose	Sch-IV
<i>Bandicota indica</i>	Bandicoot	Sch-V
<i>Bandicota bengalensis</i>	Bandicoot	Sch-V
<i>Vulpus benghalensis</i>	Wild fox	Sch-III
<i>Melurus ursinus</i>	Bear	Sch-III
<i>Hystrix indica</i>	Porcupine	Sch-IV
<i>Axis axis</i>	Spotted deer	Sch-III
<i>Canis lupus pallipes</i>	Indian wolf	Part-I of Sch-I
<i>Mellivora capensis</i>	Indian Ratel	Part-I of Sch-I
<i>Elephas maximus</i>	Indian Elephant	Part-I of Sch-I
<i>Felis chaus</i>	Jungle cat	Part-II of sch-II
<i>Paradoxurus hermiphroiditus</i>	Indian Small civet	Part-I of sch-I
<i>Muntiacus muntiacus</i>	Barking deer	Sch-III
<i>Macaca mulata</i>	Monkey	Part-I of Sch-I

Annexure - B  
(18)

✓ Annexure - II

Telegram : PARYAVARAN,  
NEW DELHI

दूरभाष :

Telephone :

टेलिग्राम (द्विभाषीय) :

Telex : (bi-lingual) : W-56195 DOE IN

FAX : 4360678

TATIJHARIA

भारत सरकार  
पर्यावरण एवं वन मंत्रालय  
GOVERNMENT OF INDIA  
MINISTRY OF ENVIRONMENT & FORESTS  
पर्यावरण भवन, सी.ओ. कॉम्प्लेक्स  
PARYAVARAN BHAWAN, C.G.O. COMPLEX

लूही रोड, नई दिल्ली - 110003  
LOOHI ROAD, NEW DELHI - 110003

Dated: 17 March, 1996.

No. 3-2J/95-FC

To

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

*S. Gupta*  
Suraj Gupta  
R.O.P.

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

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

Sir,

I am directed to refer to your letter no. F.5/19/95/IC/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.
- (2) 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 MWLD 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.

( R.K. CHAUDHRY )  
AIGF.

APPROVED

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

**Duration: July-August-September-2016**

Name of Industry:-



  
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  
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[info@anacon.in](mailto:info@anacon.in)

Website: [www.anaconlaboratories.com](http://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 **July-2016 To September-2016.** 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 : September, 2016

for **ANACON LABORATORIES PVT. LTD.**  
  
*Stamp*  
Authorized Signatory



## **1.1 Introduction**

**Hindalco Industries Limited (Hindalco)** is one among the flagship companies of 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 manifold in 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 (July-August-September-2016) as per the requirements 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 1218.762 hectares. Tatijharia, Post Jamira, Tehsil Samri of Balrampur district, Chhattisgarh on 25/06/1998 for a period of 20 years. The mining operations were started on 01/04/2004. The production capacity of bauxite is 4.0 Lakh Tonnes Per Annum (LTPA).

## **1.3 Salient Features of Tatijharia Bauxite Mine**

The deposits occur in Tatijharia block, Post Jamira Tehsil Samri of Balrampur district. This deposit has been identified as one of the resources to cater the raw material requirement 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 <sup>0</sup> 21' 02"N to 23 <sup>0</sup> 24' 15"N
3.	Longitude	83 <sup>0</sup> 54' 50"E to 83 <sup>0</sup> 56' 30"E
4.	Elevation	1282-m above Mean Sea Level
5.	Climatic Conditions (as per IMD, Ambikapur)	Annual maximum temperature : 30.3 <sup>0</sup> C Annual minimum temperature : 17.7 <sup>0</sup> 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 12 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 regular monitoring for PM<sub>2.5</sub>, RPM(PM<sub>10</sub>), SO<sub>2</sub>, NO<sub>x</sub> and SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub> Pb, Hg, As and Cr at above Ambient Air Quality Monitoring (AAQM) locations. The dust fall rate is measured in the mining area (BKB campus) and Tatijharia village during July-August-September-2016. 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<sub>2.5</sub>, RPM(PM<sub>10</sub>), SPM, NO<sub>x</sub> and SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub>, Pb, Hg, As and Cr from July-August-September -2016 as CPCB norms. Sampling Frequency is given in **Table-3**.

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





## MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

### Methods and Instruments used for Sampling

The air samples were analyzed as per methods specified by Central Pollution Control Board (CPCB).

The levels of Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulfur Dioxide ( $\text{SO}_2$ ), Oxides of Nitrogen ( $\text{NO}_x$ ), Pb, Hg, As and Cr were monitored for established 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  $1 \text{ m}^3/\text{min}$  which collects the particles less than  $10 \mu\text{m}$  diameter over glass fiber filter paper. The bigger particulates from  $10$  to  $100 \mu\text{m}$  are collected into the cup provided at the bottom of the cyclone. The dust deposited over the filter paper is measured as RPM,  $\text{PM}_{2.5}$  collected with the help of Fine Dust sampler operating 24 hours. Due to the high flow rate of air, the dust fall rate was measured using dust fall jar. The jar was exposed for one month in the mine area and (BKB campus) Tatijharia village during July-August-September -2016. The jar was filled with 2 lit of distilled water. The water in the jar is mixed with copper sulphate solution (copper sulphate solution) to prevent any growth of algae. The water level in the jar is constantly maintained such a way that 2 lit of water is always retained. The measurement techniques used for monitoring of 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 <sub>2</sub> )	24 hourly sample twice a week for Three months
Oxides of Nitrogen (NO <sub>x</sub> )	24 hourly sample twice a week for Three months
Pb,Hg,As,Cr	8 hourly samples for 24 hour twice a week for three months

**Table 4.0**

**Measurement Techniques for various pollutants**

S.No.	Parameter	Technique	Technical Protocol	Minimum Reportable Value (µg/ m <sup>3</sup> )
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 July-August-September -2016 are presented in detail in **Table 3.0**. 98<sup>th</sup> 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.

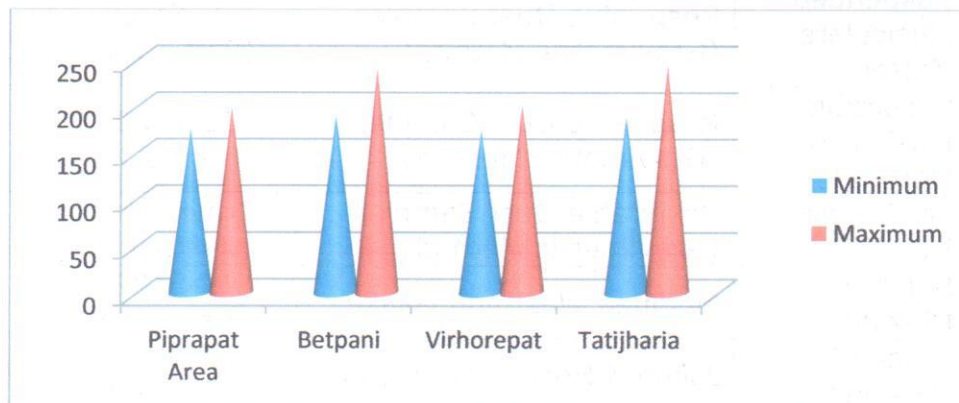
### 1.6.1 Presentation of Results.

#### **Suspended Particulate Matter-SPM**

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 174  $\mu\text{g}/\text{m}^3$  and 244  $\mu\text{g}/\text{m}^3$  respectively. The average concentrations were ranged between 182 to 226  $\mu\text{g}/\text{m}^3$ . and 98<sup>th</sup> percentile values ranged between 189 to 244  $\mu\text{g}/\text{m}^3$  in the study area (**Table 6**).

#### **Graphical Presentation Of Fugitive Emission Monitoring**

##### **SPM**

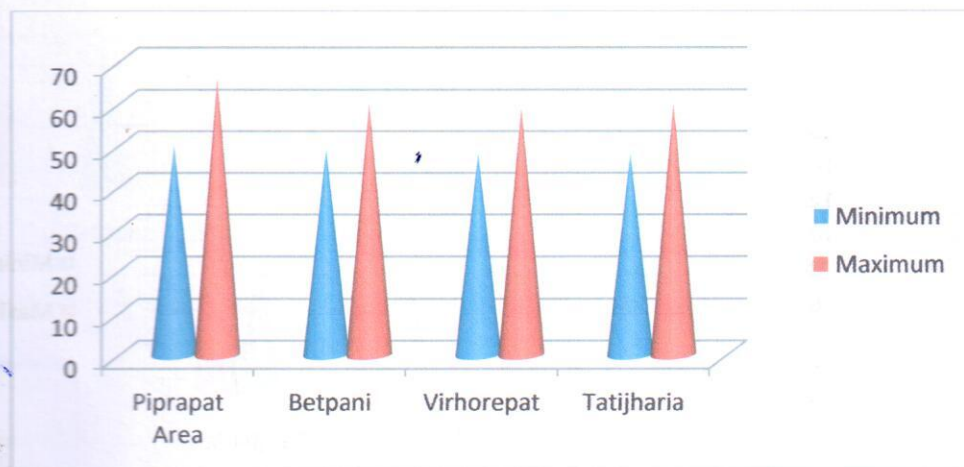


**Respirable Suspended Particulate Matter –RSPM**

The minimum and maximum concentrations for RSPM were recorded as 48  $\mu\text{g}/\text{m}^3$  and 66  $\mu\text{g}/\text{m}^3$  respectively. The average values were observed to be in the range of 52 to 60  $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values ranged between 54 to 66  $\mu\text{g}/\text{m}^3$  in the study area (**Table 7**).

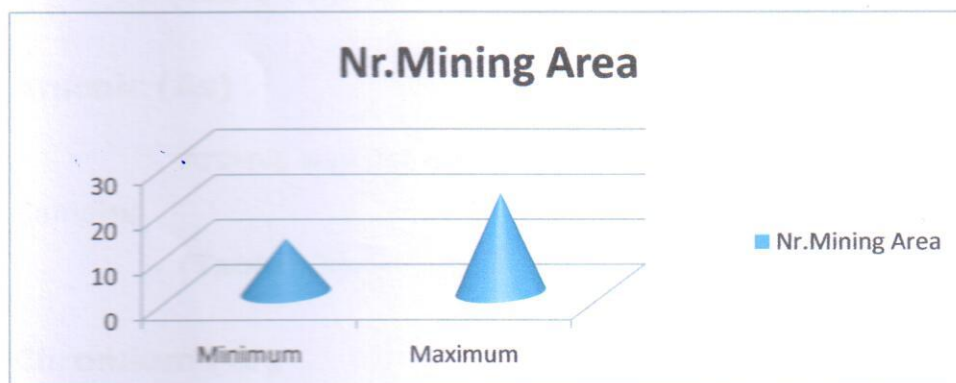
**Graphical Presentation Of Fugitive Emission Monitoring**

**RSPM**



**Particulate Matter -PM<sub>2.5</sub>**

The minimum and maximum values of PM<sub>2.5</sub> concentrations varied between 12 to 22  $\mu\text{g}/\text{m}^3$  respectively. The average values range between 15 to 20  $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values varied between 18 to 22  $\mu\text{g}/\text{m}^3$  (**Table 8**).

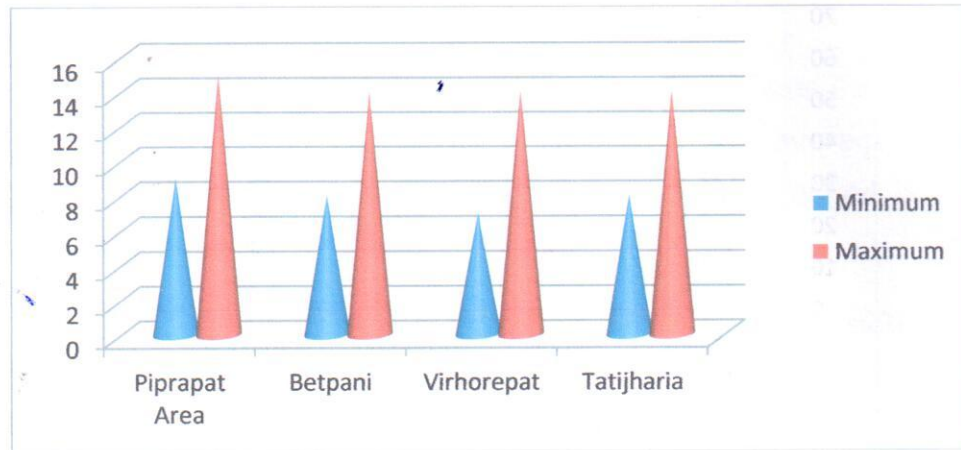


**Sulphur Dioxide (SO<sub>2</sub>)**

The minimum and maximum SO<sub>2</sub> concentrations were recorded as 7 µg/m<sup>3</sup> and 15 µg/m<sup>3</sup> respectively. The average values were observed to be in the range of 9 to 13 µg/m<sup>3</sup> and 98<sup>th</sup> percentile values varied between 10 to 15 µg/m<sup>3</sup> (**Table 9**).

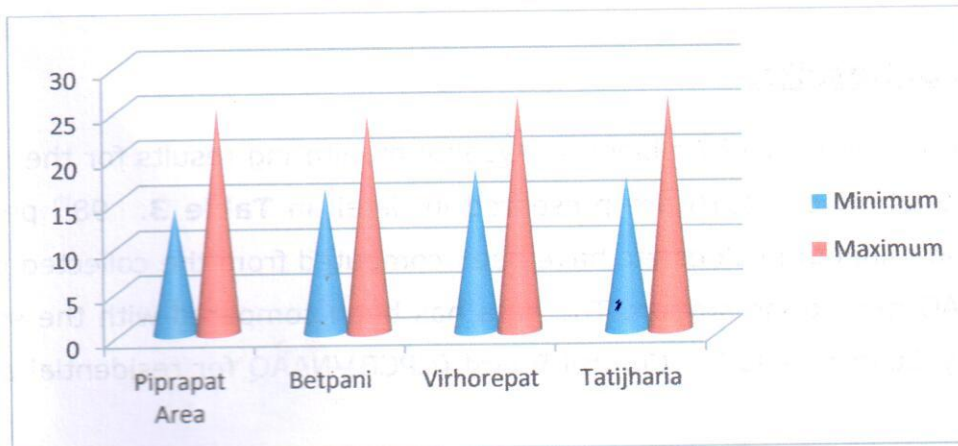
**Graphical Presentation Of Fugitive Emission Monitoring**

**SO<sub>2</sub>**



### Nitrogen Oxide (NO<sub>x</sub>)

The minimum and maximum NO<sub>x</sub> concentrations were recorded as 14 µg/m<sup>3</sup> and 26 µg/m<sup>3</sup>. The average concentrations were ranged between 18 to 23 µg/m<sup>3</sup> and 98<sup>th</sup> percent values varied between 22 to 26 µg/m<sup>3</sup> (**Table 10**).



### Lead (Pb)

The minimum and maximum Lead detected between 0.016 to 0.040 µg/m<sup>3</sup> respectively. The average Lead detected between 0.020 to 0.034 µg/m<sup>3</sup> & 98<sup>th</sup> percent values varied between 0.023 to 0.040 µg/m<sup>3</sup> 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.

## 1.7 Ambient Air Quality (Buffer Zone)

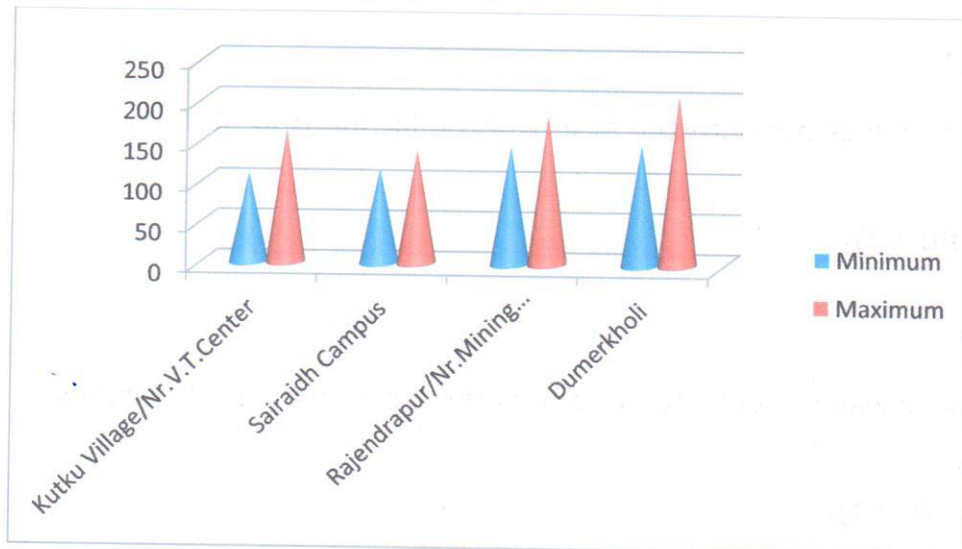
The background levels of SPM, RPM( $PM_{10}$ ),  $PM_{2.5}$ ,  $SO_2$ ,  $NO_x$ , Pb, Hg, As and Cr measured are required to compute Ambient Air Quality. The sampling locations are selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum, Maximum concentration,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

### 1.7.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the month July-August-September -2016 are presented in detail in **Table 3**. 98<sup>th</sup> 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.

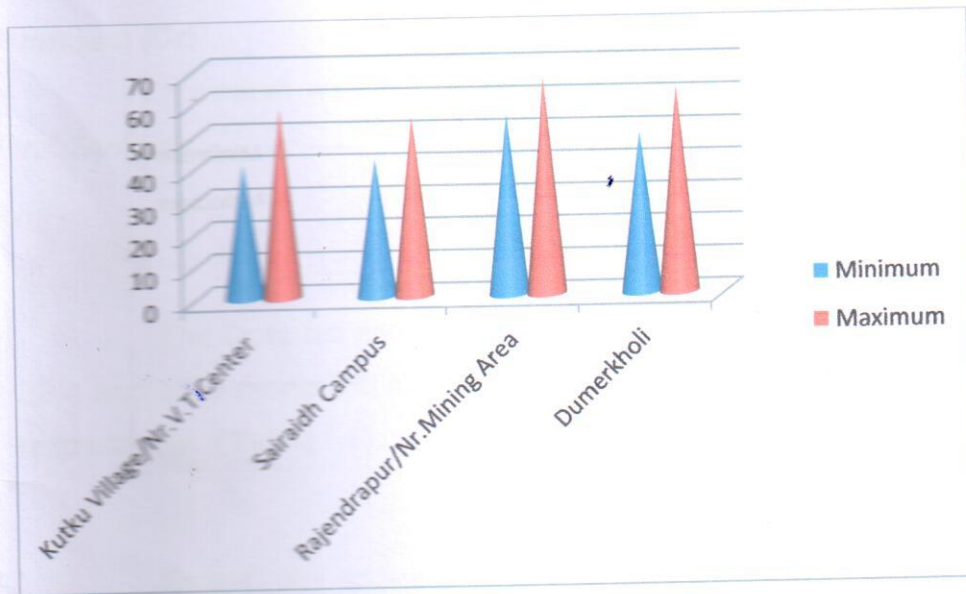
#### Suspended Particulate Matter-SPM

The statistical analysis of SPM is presented in **Table 6** for the mining area. The minimum and maximum values varied between 111 to 210  $\mu g/m^3$  respectively during study period at all the 4 locations. The average values ranged between 120 to 199  $\mu g/m^3$  and 98<sup>th</sup> percentile values ranged between 130 to 210  $\mu g/m^3$  in the study area.



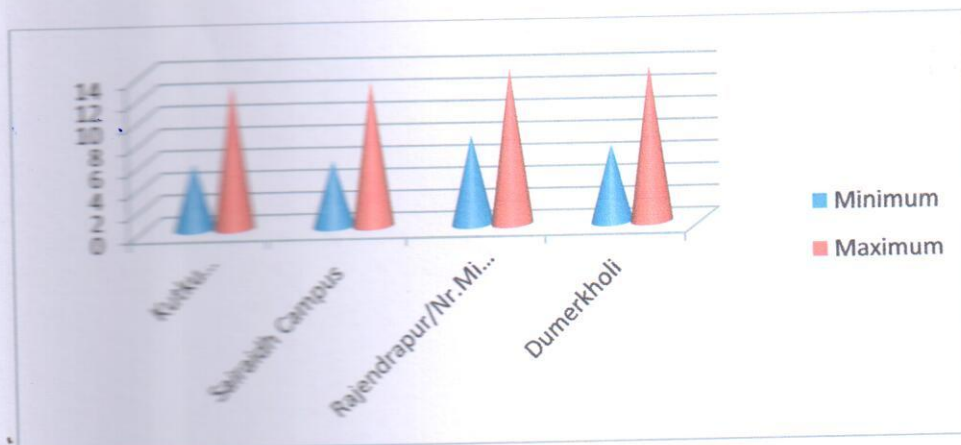
### Particulate Matter-RSPM

The minimum and maximum values of RSPM varied between 41 to 66  $\mu\text{g}/\text{m}^3$  respectively (**Table 7**). The average values varied between 45 to 63  $\mu\text{g}/\text{m}^3$ . The 98<sup>th</sup> percentile values varied between 48 to 66  $\mu\text{g}/\text{m}^3$  in the mining area. The overall values of SPM and RSPM were well within the CPCB limits prescribe for industrial and residential area in the study area during the study period.



### Sulphur Dioxide (SO<sub>2</sub>)

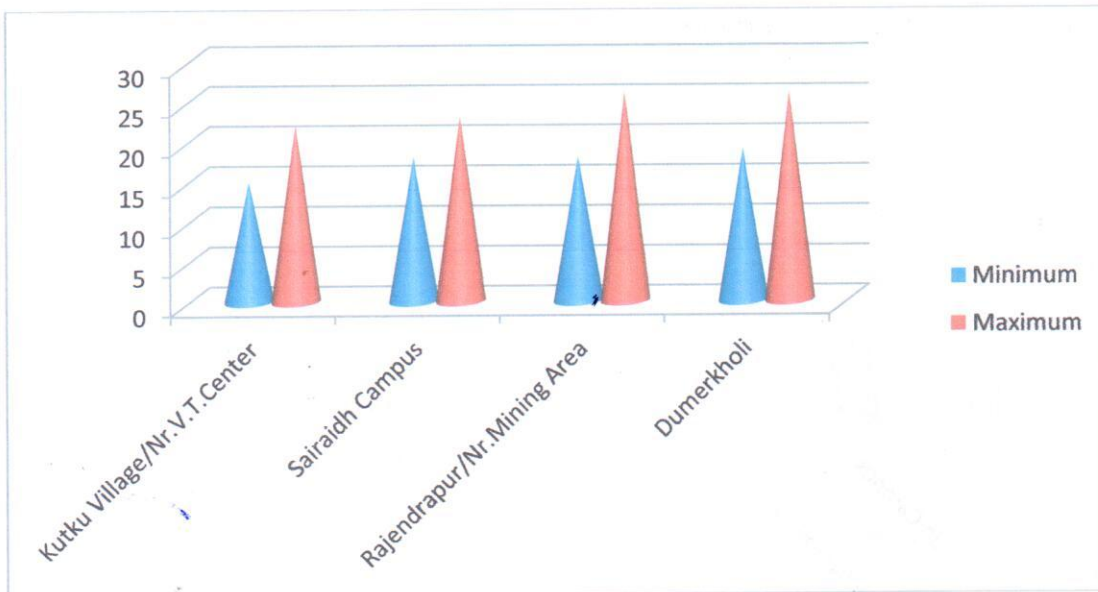
The minimum and maximum values of SO<sub>2</sub> concentrations varied between 8 to 14  $\mu\text{g}/\text{m}^3$  respectively. The average values range between 8 to 12  $\mu\text{g}/\text{m}^3$  and 98<sup>th</sup> percentile values varied between 10 to 14  $\mu\text{g}/\text{m}^3$  (**Table 9**).





### Nitrogen Oxide (NO<sub>x</sub>)

The minimum and maximum values of NO<sub>x</sub> concentrations varied between 15 to 30 µg/m<sup>3</sup> respectively. The average values range between 18 to 25 µg/m<sup>3</sup> and 98th percent values varied between 20 to 26 µg/m<sup>3</sup> (**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)

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 July-August-September-2016 was observed 22.4 and 18.3 month MT/km<sup>2</sup>/month in the Piprapat/Near Mining Area and Tatijharia Village respectively. (Table 14).

Overall the ambient air concentrations of SPM, PM 10(RPM), PM2.5, SO<sub>2</sub>, NO<sub>x</sub>, Pb Hg, and As were well within the limits of concentrations promulgated by CPCB, New Delhi in the study area.

### 1.8 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (Jul-Aug-Sep-2016) indicates that the wind was blowing predominantly from (SE and SSE) directions, during study period, for 3.08% 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.

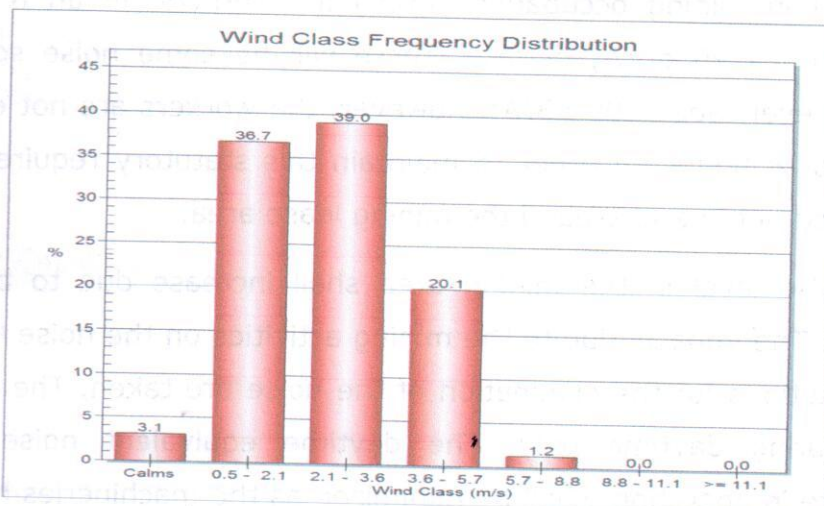
**Table.1**

**Wind Frequency Distribution Data**

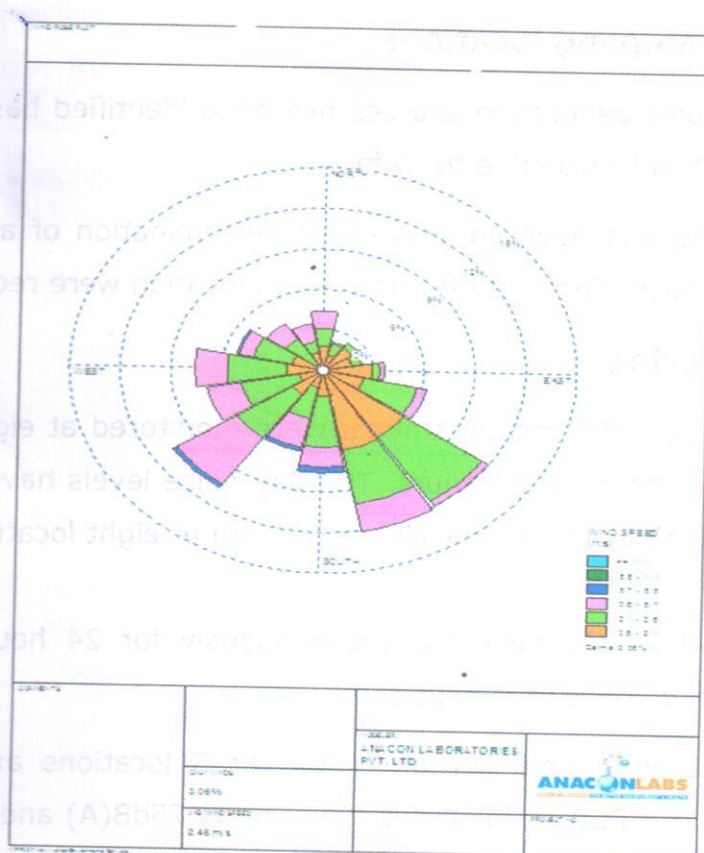
Sr. No.	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
1	348.75 - 11.25	12	9	9	0	0	0	30
2	11.25 - 33.75	8	6	1	0	0	0	15
3	33.75 - 56.25	14	3	0	0	0	0	17
4	56.25 - 78.75	12	4	0	0	0	0	16
5	78.75 - 101.25	20	3	2	0	0	0	25
6	101.25 - 123.75	17	22	4	0	0	0	43
7	123.75 - 146.25	40	39	3	0	0	0	82
8	146.25 - 168.75	41	28	14	0	0	0	83
9	168.75 - 191.25	13	26	10	3	0	0	52
10	191.25 - 213.75	9	16	15	2	0	0	42
11	213.75 - 236.25	15	27	29	2	0	0	73
12	236.25 - 258.75	10	24	14	0	0	0	48
13	258.75 - 281.25	15	24	13	0	0	0	52
14	281.25 - 303.75	13	16	6	1	0	0	36
15	303.75 - 326.25	4	15	9	0	0	0	28
16	326.25 - 348.75	9	6	9	0	0	0	24
	Sub-Total	252	268	138	8	0	0	666
	Calms							21
	Missing/Incomplete							0
	Total							687

### SUMMARY OF WIND PATTERN

Season	First Predominant Wind Direction	Second Predominant Wind Direction	Calm Condition
Jul-Aug-Sep-2016	SE (12.5%)	SSE (11.8%)	3.08 %



**Figure.01: Wind Class Frequency Distribution**



## **1.6 Noise Environment**

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

Work zone noise level in the mining area shall increase due to blasting excavation and transportation. The impacts due to the mining activities on the noise levels shall be negligible if all the precautions for the elimination of the noise are taken. The mining activities will be undertaken during daytime only. The daytime equivalent noise levels, when all the machineries are in operation, shall be minimized as the machineries have been provided with noise control equipment. Noise monitoring carried out on monthly basis at 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 Envirotech made in India (Model no. SLM-100). This instrument is capable of measuring the Sound Pressure Level (SPL), Leq.

### **1.7 Water Quality**

The existing status of water quality for ground water and surface water was assessed by collecting the water samples from underground wells from the pipapat/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 month given in **(Table 16 & 17)**. The overall water quality found to be below the stipulated standards of IS 10500-2012 for ground water and found to be fit for drinking purpose for tested parameters. Surface water quality is satisfactory as per IS 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%
<b>Unit : µg/r</b>						
<b>Fugitive Emission (Core Zone):-</b>						
<b>Piprapat /Nr.Mining Area</b>	July-2016	184	195	190	190	195
	August-2016	187	198	193	193	198
	September-2016	175	196	186	186	196
<b>Betpani</b>	July-2016	199	229	214	214	229
	August-2016	204	240	222	222	240
	September-2016	190	234	212	212	234
<b>Virhorepat</b>	July-2016	185	197	191	191	197
	August-2016	187	201	194	194	201
	September-2016	174	189	182	182	189
<b>Tatijharia Village/Nr.Weigh Bridge</b>	July-2016	207	244	226	226	244
	August-2016	199	222	211	211	222
	September-2016	188	201	195	195	201
<b>Buffer Zone :-</b>						
<b>Kutku Village/ Nr.V.T.Center</b>	July-2016	120	151	136	136	151
	August-2016	150	164	157	157	164
	September-2016	111	134	123	123	134
<b>Sairaidh Campus</b>	July-2016	128	140	134	134	140
	August-2016	119	139	129	129	139
	September-2016	117	130	124	124	130
<b>Rajendrapur/ Nr.Mining Area</b>	July-2016	148	166	157	157	166
	August-2016	155	184	170	170	184
	September-2016	146	159	153	153	159
<b>Dumerkholi/ Nr.Mining Area</b>	July-2016	171	208	190	190	208
	August-2016	188	210	199	199	210
	September-2016	149	169	159	159	169

**Conclusion (A):-**

- 1) **Piprapat /Nr.Mining Lease Area Core Zone:** For the Months of Jul-August-Sept-2016 Average of SPM is 190 µg/m<sup>3</sup>.
- 2) **Betpani Lease Area Core Zone:-** For the Months of Jul-August-September-2016 Average of SPM is 216 µg/m<sup>3</sup>.
- 3) **Virhorepat Lease Area Core Zone:-** For the Months of Jul-August-September-2016 Average of SPM is 189 µg/m<sup>3</sup>.
- 4) **Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of Jul-August-September-2016 Average of SPM is 201 µg/m<sup>3</sup>.

- The Average Concentration of SPM within the Core Zone of Tatijharia Lease is 201 µg/m<sup>3</sup>.

**Conclusion (B):-**

- 1) **Kutku Village/ Nr.V.T.Center Lease Area Buffer Zone:-** For the Months of Jul-Aug-Sep-2016 Average of SPM is 139 µg/m<sup>3</sup>.
- 2) **Sairaidh Campus Lease Area Buffer Zone:-** For the Months of Jul-Aug-Sep-2016 Average of SPM is 129 µg/m<sup>3</sup>.
- 3) **Rajendrapur/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jul-Aug-Sep-2016 Average of SPM is 160 µg/m<sup>3</sup>.
- 4) **Dumerkholi/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jul-Aug-Sep-2016 Average of SPM is 183 µg/m<sup>3</sup>.

- The Average Concentration of SPM within the Buffer Zone of Tatijharia Lease is 153 µg/m<sup>3</sup>.

**Monthwise Summary of Statistical Analysis of SPM**

**1.8 Fugitive Emission (Core Zone):-**

**1.8.1 Presentation of Results.**

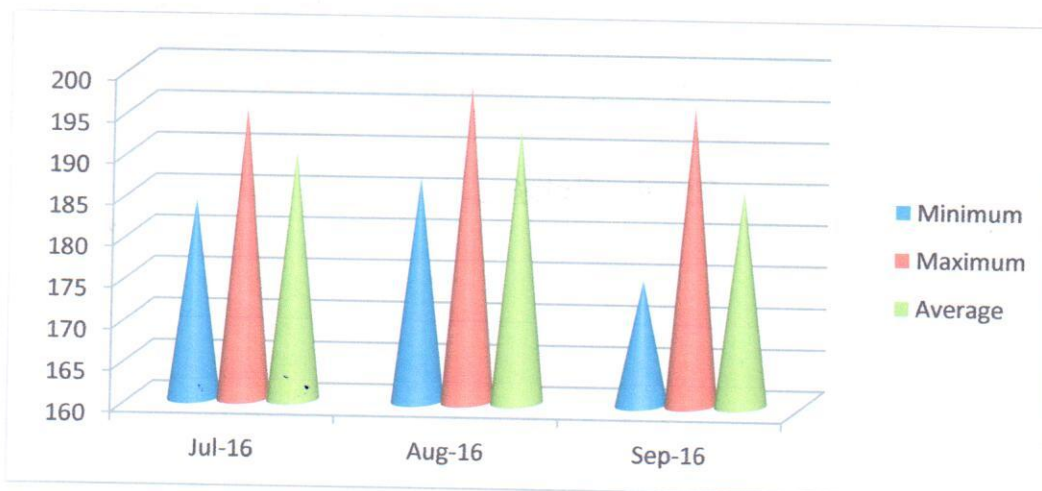
The summary of Statistical Analysis of SPM results for the month of July-August-September-2016 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Piprapat / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for SPM were recorded as 184  $\mu\text{g}/\text{m}^3$  and 195  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 190  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for SPM were recorded as 187  $\mu\text{g}/\text{m}^3$  and 198  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 193  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for SPM were recorded as 175  $\mu\text{g}/\text{m}^3$  and 196  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 186  $\mu\text{g}/\text{m}^3$ .



**Graph :- Piprapat / Nr.Mining Area**

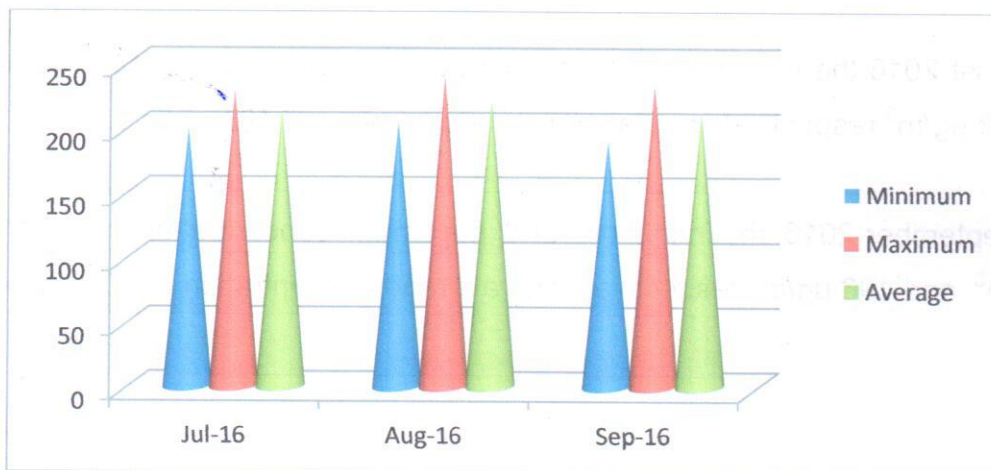


**Betpani**

For the Month of July-2016 the minimum and maximum concentrations for SPM were recorded as 199  $\mu\text{g}/\text{m}^3$  and 229  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 214  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for SPM were recorded as 204  $\mu\text{g}/\text{m}^3$  and 240  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 222  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for SPM were recorded as 190  $\mu\text{g}/\text{m}^3$  and 234  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 212  $\mu\text{g}/\text{m}^3$ .



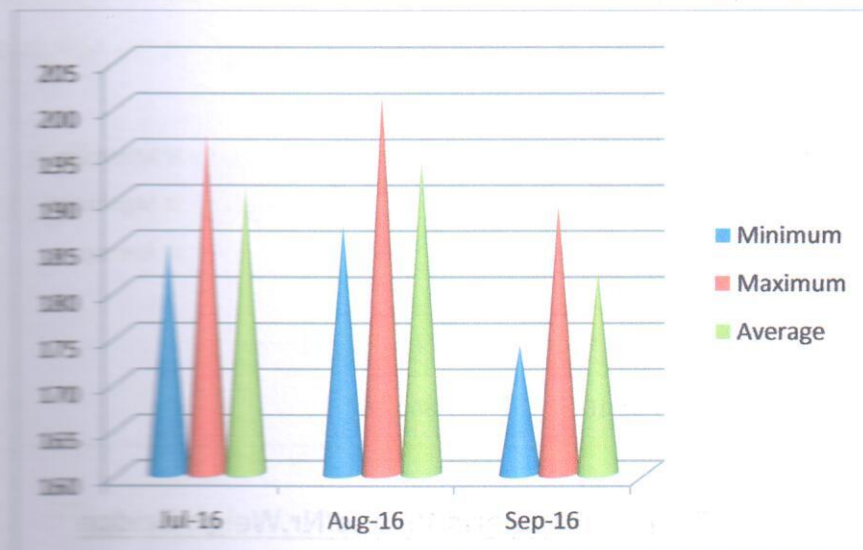
**Graph:- Betpani**

**Virhorepat**

For the Month of July-2016 the minimum and maximum concentrations for SPM were recorded as 185  $\mu\text{g}/\text{m}^3$  and 197  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 191  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for SPM were recorded as 187  $\mu\text{g}/\text{m}^3$  and 201  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 194  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for SPM were recorded as 174  $\mu\text{g}/\text{m}^3$  and 189  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 182  $\mu\text{g}/\text{m}^3$ .



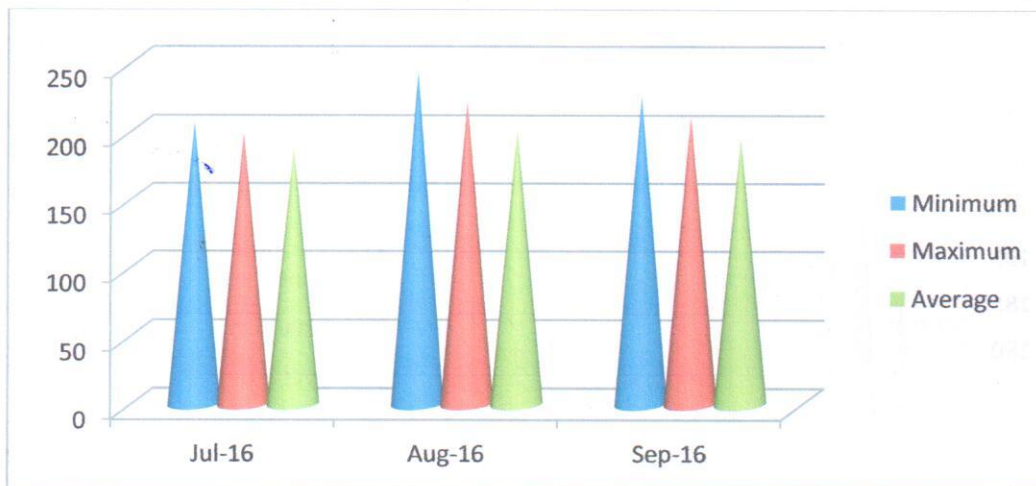
**Graph:- Virhorepat**

### Tatijharia Village/Nr.Weigh Bridge

For the Month of July-2016 the minimum and maximum concentrations for SPM were recorded 207  $\mu\text{g}/\text{m}^3$  and 244  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 226  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for SPM were recorded as 199  $\mu\text{g}/\text{m}^3$  and 222  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 211  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for SPM were recorded as 188  $\mu\text{g}/\text{m}^3$  and 201  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 195  $\mu\text{g}/\text{m}^3$ .



**Graph:- Tatijharia Village/Nr.Weigh Bridge**



## 1.9 Fugitive Emission (Buffer Zone):-

### 1.9.1 Presentation of Results.

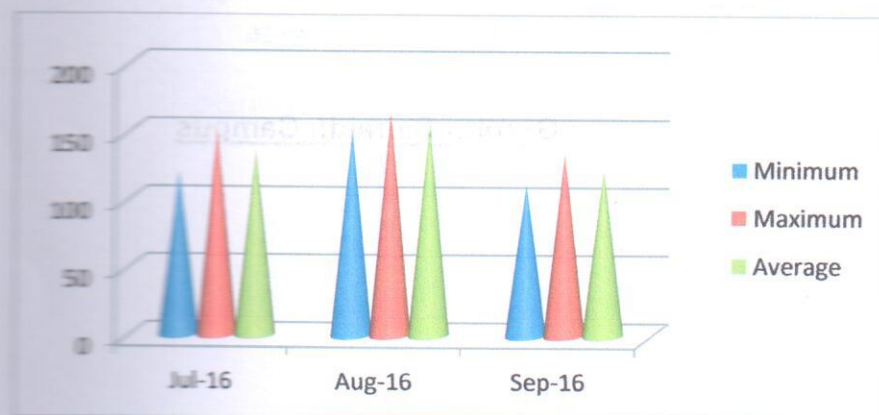
The summary of Statistical Analysis of SPM results for the month of July-August-September-2016 are presented in detail in **Table 6**. 98<sup>th</sup> percentile; maximum, minimum and average values have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Kutku Village / Nr. V.T.Center

For the Month of July-2016 the minimum and maximum concentrations for SPM were recorded as 120  $\mu\text{g}/\text{m}^3$  and 151  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 136  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for SPM were recorded as 150  $\mu\text{g}/\text{m}^3$  and 164  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 157  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for SPM were recorded as 111  $\mu\text{g}/\text{m}^3$  and 134  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 123  $\mu\text{g}/\text{m}^3$ .



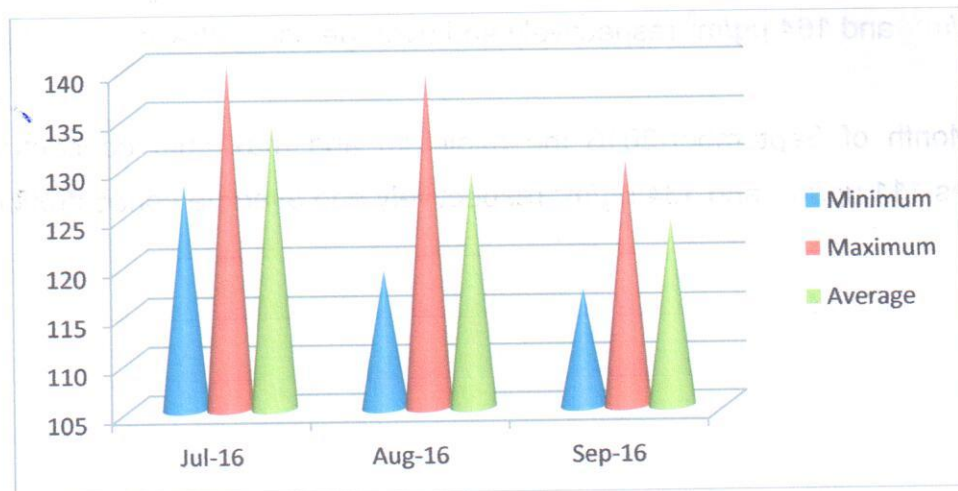
**Graph:- Kutku Village / Nr. V.T.Center**

**Sairaidh Campus**

For the Month of July-2016 the minimum and maximum concentrations for SPM were recorded as 128  $\mu\text{g}/\text{m}^3$  and 140  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 134  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for SPM were recorded as 119  $\mu\text{g}/\text{m}^3$  and 139  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 129  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for SPM were recorded as 117  $\mu\text{g}/\text{m}^3$  and 130  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 124  $\mu\text{g}/\text{m}^3$ .



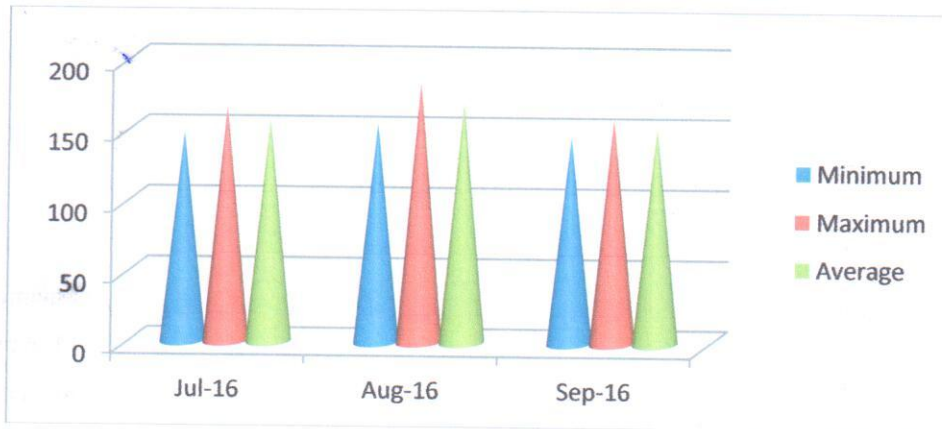
**Graph:- Sairaidh Campus**

**Rajendrapur / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for SPM were recorded as  $148 \mu\text{g}/\text{m}^3$  and  $166 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $157 \mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for SPM were recorded as  $155 \mu\text{g}/\text{m}^3$  and  $184 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $170 \mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for SPM were recorded as  $146 \mu\text{g}/\text{m}^3$  and  $159 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $153 \mu\text{g}/\text{m}^3$ .



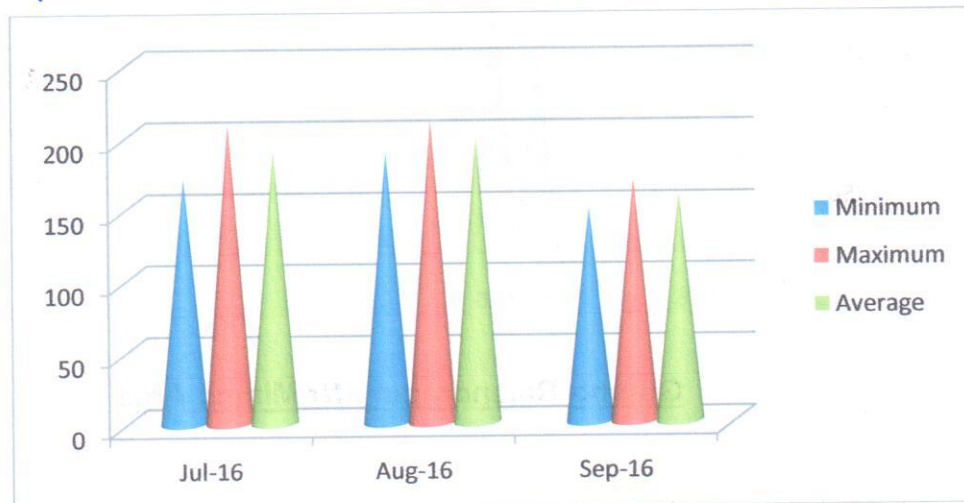
**Graph:- Rajendrapur / Nr.Mining Area**

**Dumerkholi / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for SPM were recorded as 171  $\mu\text{g}/\text{m}^3$  and 208  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 190  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for SPM were recorded as 188  $\mu\text{g}/\text{m}^3$  and 210  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 199  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for SPM were recorded as 149  $\mu\text{g}/\text{m}^3$  and 169  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 159  $\mu\text{g}/\text{m}^3$ .



**Graph:- Dumerkholi / Nr.Mining Area**



**Table 7**  
**Statistical analysis of RSPM**

Location	Month & Year	Min.	Max.	A.M.	G.M.	Unit : $\mu\text{g}/\text{r}$ 98%
<b>Fugitive Emission (Core Zone):-</b>						
Piprapat /Nr.Mining Area	July-2016	52	66	59	59	66
	August-2016	58	64	61	61	64
	September-2016	50	55	53	53	55
Betpani	July-2016	54	59	57	57	59
	August-2016	53	60	57	57	60
	September-2016	49	57	53	53	57
Virhorepat	July-2016	51	55	53	53	55
	August-2016	54	59	57	57	59
	September-2016	48	58	53	53	58
Tatijharia Village/Nr.Weigh Bridge	July-2016	52	60	56	56	60
	August-2016	48	55	52	52	55
	September-2016	49	54	52	52	54
						<b>100 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
Kutku Village/ Nr.V.T.Center	July-2016	46	50	48	48	50
	August-2016	49	58	54	54	58
	September-2016	41	48	45	45	48
Sairaidh Campus	July-2016	46	54	50	50	54
	August-2016	49	55	52	52	55
	September-2016	42	48	45	45	48
Rajendrapur/ Nr.Mining Area	July-2016	55	60	58	58	60
	August-2016	60	66	63	63	66
	September-2016	56	62	59	59	62
Dumerkholi/ Nr.Mining Area	July-2016	58	63	61	61	63
	August-2016	51	59	55	55	59
	September-2016	49	54	52	52	54
<b>CPCB Standard</b>						<b>100 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>

**Conclusion (A):-**

- 1) Piprapat /Nr.Mining Lease Area Core Zone: For the Months of Jul-Aug-Sep-2016 Average of RSPM is 58  $\mu\text{g}/\text{m}^3$ .
- 2) Betpani Lease Area Core Zone: For the Months of Jul-Aug-Sep-2016 Average of RSPM is 56  $\mu\text{g}/\text{m}^3$ .
- 3) Virhorepat Lease Area Core Zone: For the Months of Jul-Aug-Sep-2016 Average of RSPM is 54  $\mu\text{g}/\text{m}^3$ .
- 4) Tatijharia Village/ Nr. Weigh Bridge Lease Area Core Zone : For the Months of Jul-Aug-Sep-2016 Average of RSPM is 53  $\mu\text{g}/\text{m}^3$ .

The Average Concentration of RSPM within the Core Zone of Tatijharia Lease is 55  $\mu\text{g}/\text{m}^3$  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 Jul-Aug-Sep-2016 Average of RSPM is 49  $\mu\text{g}/\text{m}^3$ .
  - 2) Sairaidh Campus Lease Area Buffer Zone:- For the Months of Jul-Aug-Sep-2016 Average of RSPM is 49  $\mu\text{g}/\text{m}^3$ .
  - 3) Rajendrapur/ Nr.Mining Lease Area Buffer Zone:- For the Months of Jul-Aug-Sep-2016 Average of RSPM is 60  $\mu\text{g}/\text{m}^3$ .
  - 4) Dumerkholi/ Nr.Mining Lease Area Buffer Zone:- For the Months of Jul-Aug-Sep-2016 Average of RSPM is 56  $\mu\text{g}/\text{m}^3$ .
- The Average Concentration of RSPM within the Buffer Zone of Tatijharia Lease is 54  $\mu\text{g}/\text{m}^3$  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.**

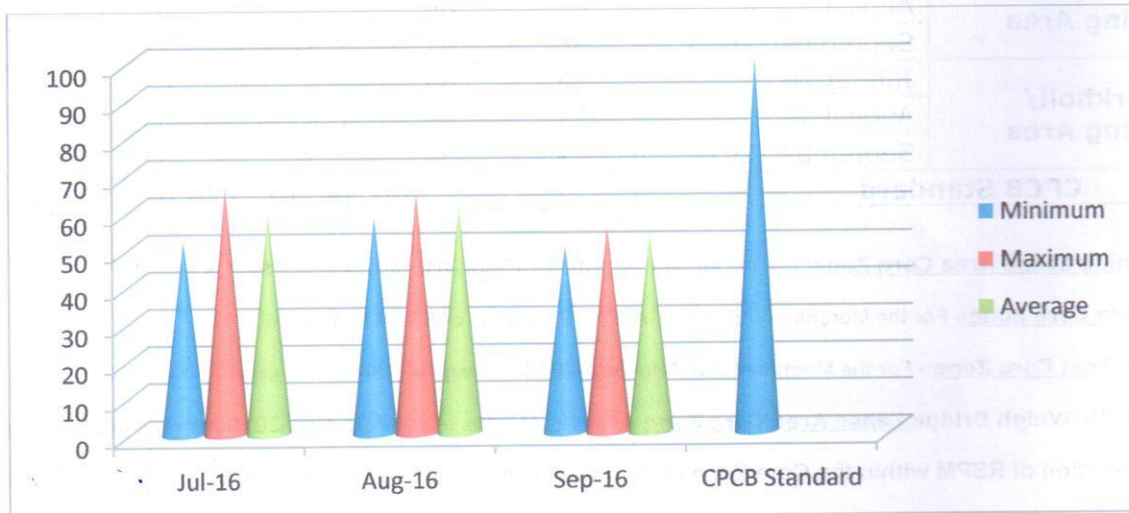
The summary of Statistical Analysis of RSPM results for the month of July-August-September 2016 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average value etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Piprapat / Nr.Mining Area**

For the Month of July-2016 the minimum, and maximum concentrations for RSPM were recorded as 52  $\mu\text{g}/\text{m}^3$  and 66  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 59  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for RSPM were recorded as 58  $\mu\text{g}/\text{m}^3$  and 64  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 61  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for RSPM were recorded as 50  $\mu\text{g}/\text{m}^3$  and 55  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 53  $\mu\text{g}/\text{m}^3$ .



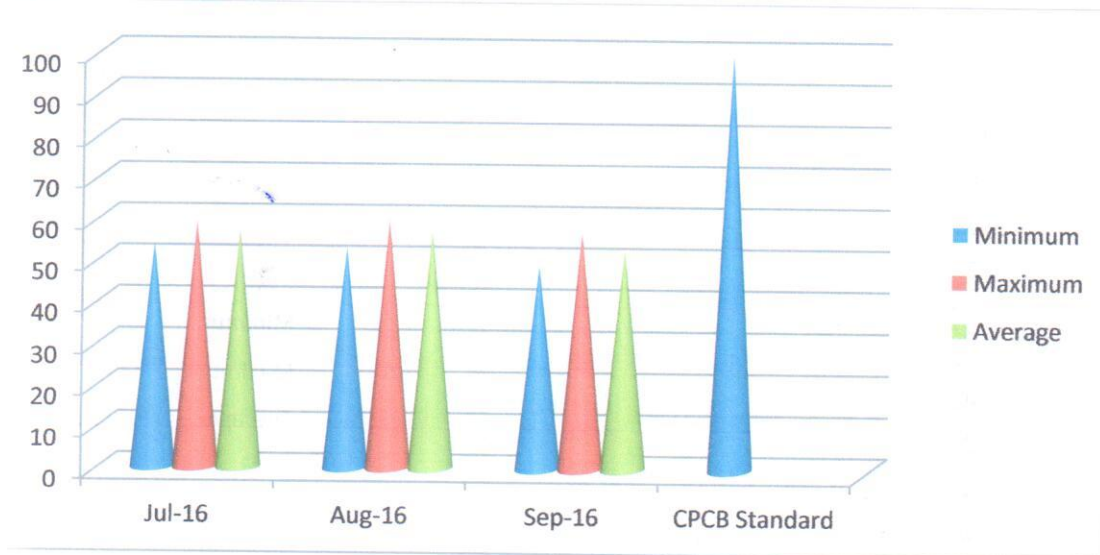
**Graph :- Piprapat / Nr.Mining Area**

**Betpani**

For the Month of July-2016 the minimum and maximum concentrations for RSPM were recorded as 54  $\mu\text{g}/\text{m}^3$  and 59  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 57  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for RSPM were recorded as 53  $\mu\text{g}/\text{m}^3$  and 60  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 57  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for RSPM were recorded as 49  $\mu\text{g}/\text{m}^3$  and 57  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 53  $\mu\text{g}/\text{m}^3$ .



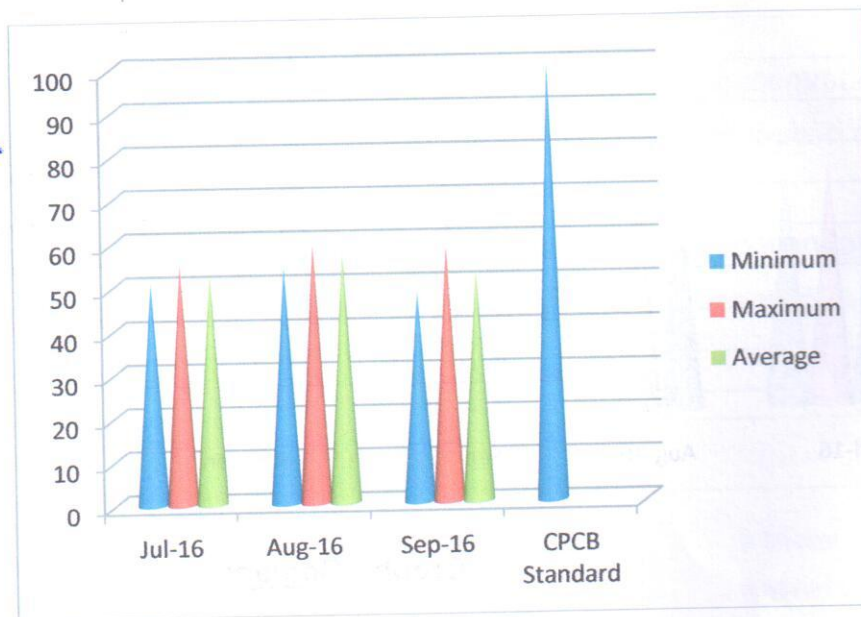
**Graph:- Betpani**

**Virhorepat**

For the Month of July-2016 the minimum and maximum concentrations for RSPM were recorded as  $51 \mu\text{g}/\text{m}^3$  and  $55 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $53 \mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for RSPM were recorded as  $54 \mu\text{g}/\text{m}^3$  and  $59 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $57 \mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for RSPM were recorded as  $48 \mu\text{g}/\text{m}^3$  and  $58 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $53 \mu\text{g}/\text{m}^3$ .



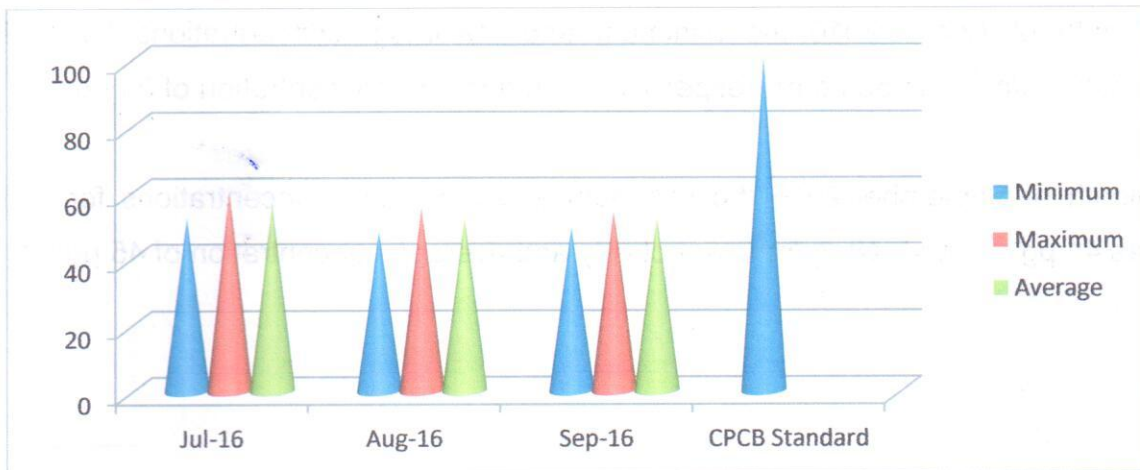
**Graph:- Virhorepat**

**Tatijharia Village/Nr.Weigh Bridge**

For the Month of July-2016 the minimum and maximum concentrations for RSPM were recorded as 52  $\mu\text{g}/\text{m}^3$  and 60  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 56  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for RSPM were recorded as 48  $\mu\text{g}/\text{m}^3$  and 55  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 52  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for RSPM were recorded as 49  $\mu\text{g}/\text{m}^3$  and 54  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 52  $\mu\text{g}/\text{m}^3$ .



**Graph:- Tatijharia Village/Nr.Weigh Bridge**

## 2.1 Fugitive Emission (Buffer Zone):-

### 2.1.1 Presentation of Results.

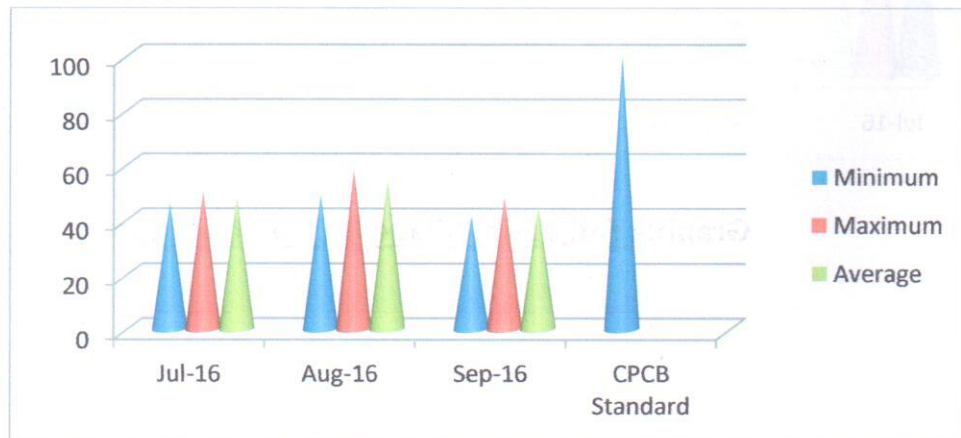
The summary of Statistical Analysis of RSPM results for the month of July-August-September 2016 are presented in detail in **Table 7**. 98<sup>th</sup> percentile; maximum, minimum and average value etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

#### Kutku Village / Nr. V.T.Center

For the Month of July-2016 the minimum and maximum concentrations for RSPM were recorded as 46  $\mu\text{g}/\text{m}^3$  and 50  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 48  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for RSPM were recorded as 49  $\mu\text{g}/\text{m}^3$  and 58  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 54  $\mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for RSPM were recorded as 41  $\mu\text{g}/\text{m}^3$  and 48  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 45  $\mu\text{g}/\text{m}^3$ .



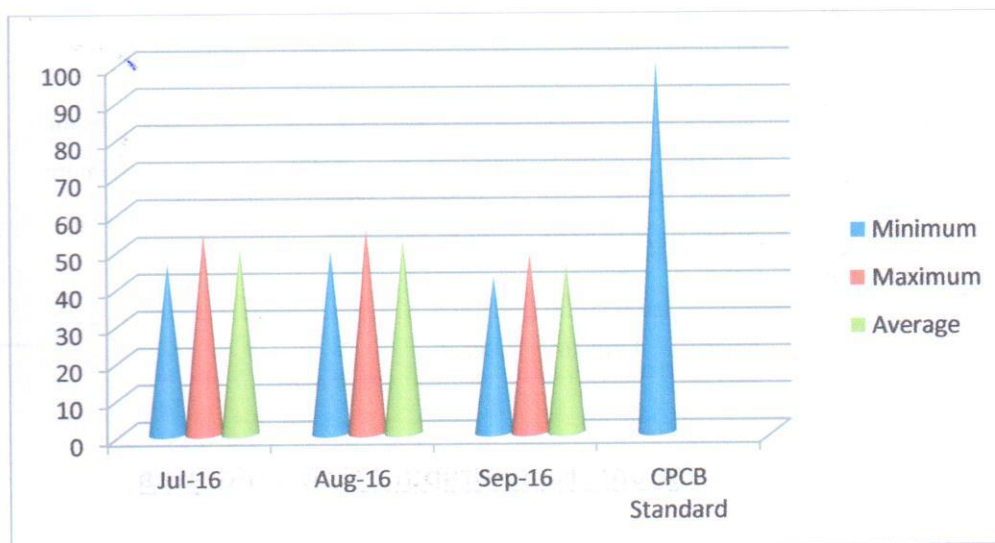
**Graph:- Kutku Village / Nr. V.T.Center**

**Sairaidh Campus**

For the Month of July-2016 the minimum and maximum concentrations for RSPM were recorded as  $46 \mu\text{g}/\text{m}^3$  and  $54 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $50 \mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for RSPM were recorded as  $49 \mu\text{g}/\text{m}^3$  and  $55 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $52 \mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for RSPM were recorded as  $42 \mu\text{g}/\text{m}^3$  and  $48 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $45 \mu\text{g}/\text{m}^3$ .



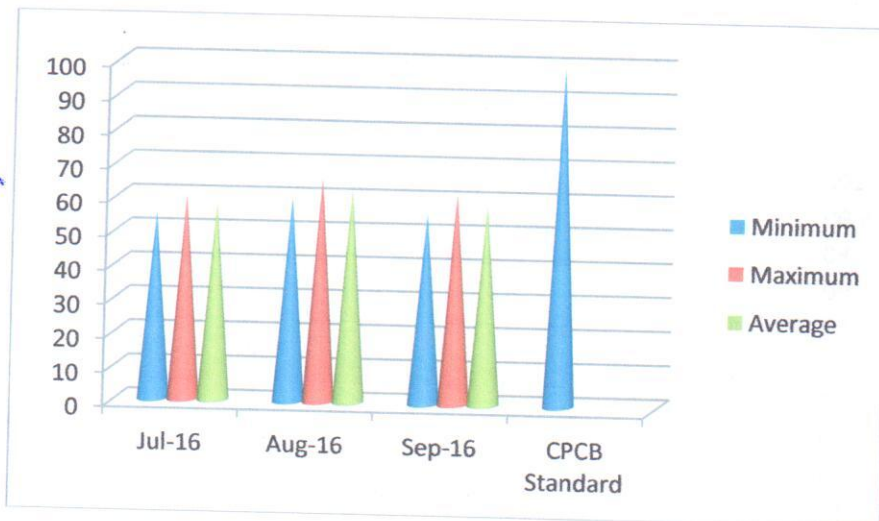
**Graph:- Sairaidh Campus**

**Rajendrapur / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for RSPM were recorded as  $55 \mu\text{g}/\text{m}^3$  and  $60 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $58 \mu\text{g}/\text{m}^3$ .

For the Month of August-2016 the minimum and maximum concentrations for RSPM were recorded as  $60 \mu\text{g}/\text{m}^3$  and  $66 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $63 \mu\text{g}/\text{m}^3$ .

For the Month of September-2016 the minimum and maximum concentrations for RSPM were recorded as  $56 \mu\text{g}/\text{m}^3$  and  $62 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $59 \mu\text{g}/\text{m}^3$ .



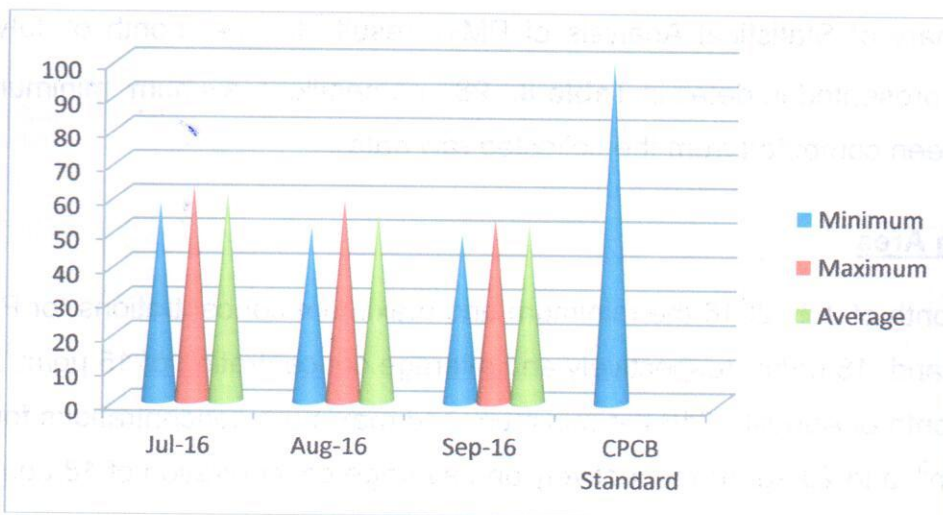
**Graph:- Rajendrapur / Nr.Mining Area**

**Dumerkholi / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for RSPM were recorded as 58  $\mu\text{g}/\text{m}^3$  and 63  $\mu\text{g}/\text{m}^3$  respectively and average concentration of 61  $\mu\text{g}/\text{m}^3$ .

For the Month of August-2016 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 September-2016 the minimum and maximum concentrations for RSPM were recorded as 49  $\mu\text{g}/\text{m}^3$  and 54  $\mu\text{g}/\text{m}^3$  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	July-2016	12	18	15	15	18
	August-2016	15	20	18	18	20
	September-2016	18	22	20	20	22
<b>CPCB Standard</b>		<b>60 <math>\mu\text{g}/\text{m}^3</math></b> <b>(24 hrs)</b>				

**Note :- All the Values are in CPCB Limit**

**Conclusion:-** The Average Concentration of  $\text{PM}_{2.5}$  within Tatijharia Lease during this period (Jul to Sep-2016) is  $18 \mu\text{g}/\text{m}^3$  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.**

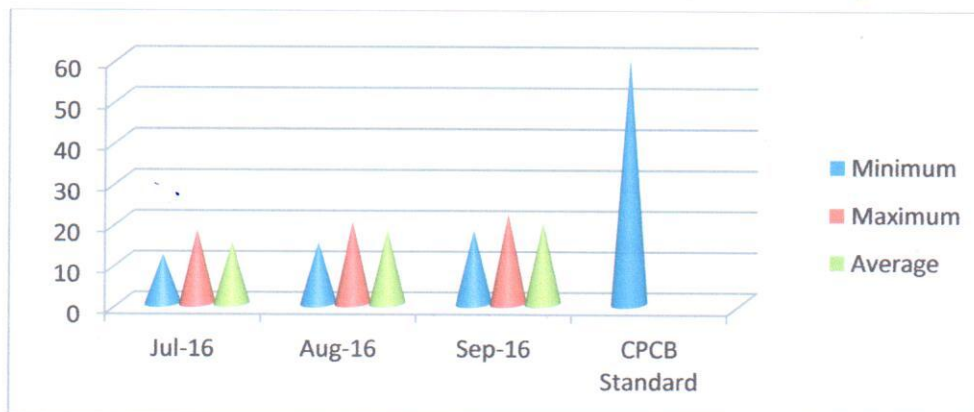
The summary of Statistical Analysis of  $\text{PM}_{2.5}$  results for the month of July-August-September 2016 are presented in detail in **Table 8**. 98<sup>th</sup> percentile; maximum, minimum and average value etc have been computed from the collected raw data.

**Nr. Mining Area**

For the month of July-2016 the minimum and maximum concentrations for  $\text{PM}_{2.5}$  were recorded as  $12 \mu\text{g}/\text{m}^3$  and  $18 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $15 \mu\text{g}/\text{m}^3$ .

For the month of August-2016 the minimum and maximum concentrations for  $\text{PM}_{2.5}$  were recorded as  $15 \mu\text{g}/\text{m}^3$  and  $20 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $18 \mu\text{g}/\text{m}^3$ .

For the month of September-2016 the minimum and maximum concentrations for  $\text{PM}_{2.5}$  were recorded as  $18 \mu\text{g}/\text{m}^3$  and  $22 \mu\text{g}/\text{m}^3$  respectively and average concentration of  $20 \mu\text{g}/\text{m}^3$ .



**Graph :- Nr. Mining Area**



**Hindalco Industries Limited**  
**Tatijharia Mining Environmental Status Report for**  
**July-2016 To September-2016**

**Introduction**

**Table 9**  
**Statistical Analysis of SO<sub>2</sub>**

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
<b>Piprapat/ Nr.Mining Area</b>	July-2016	10	14	12	12	14
	August-2016	11	15	13	13	15
	September-2016	9	12	11	11	12
<b>Betpani</b>	July-2016	8	13	11	11	13
	August-2016	9	13	11	11	13
	September-2016	8	14	11	11	14
<b>Virhorepat</b>	July-2016	7	12	10	10	12
	August-2016	9	14	12	12	14
	September-2016	8	11	10	10	11
<b>Tatijharia Village/Nr.Weigh Bridge</b>	July-2016	9	13	11	11	13
	August-2016	9	14	12	12	14
	September-2016	8	10	9	9	10
<b>CPCB Standard</b>		<b>80 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
<b>Kutku Village/ Nr.V.T.Center</b>	July-2016	6	10	8	8	10
	August-2016	6	11	9	9	11
	September-2016	8	13	11	11	13
<b>Sairaidh Campus</b>	July-2016	7	12	10	10	12
	August-2016	9	13	11	11	13
	September-2016	6	10	8	8	10
<b>Rajendrapur/ Nr.Mining Area</b>	July-2016	8	14	11	11	14
	August-2016	9	13	11	11	13
	September-2016	8	11	10	10	11
<b>Dumerkholi/ Nr.Mining Area</b>	July-2016	7	10	9	9	10
	August-2016	7	11	9	9	11
	September-2016	9	14	12	12	14
<b>CPCB Standard</b>		<b>80 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

**Conclusion: (A)**

1) **Piprapat /Nr.Mining Lease Area Core Zone:** For the Months of Jul-Aug-Sep-2016 Average of SO<sub>2</sub> is 12  $\mu\text{g}/\text{m}^3$ .

2) **Betpani Lease Area Core Zone:-** For the Months of Jul-Aug-Sep-2016 Average of SO<sub>2</sub> is 11  $\mu\text{g}/\text{m}^3$ .

3) **Virhorepat Lease Area Core Zone:-** For the Months of Jul-Aug-Sep-2016 Average of SO<sub>2</sub> is 11  $\mu\text{g}/\text{m}^3$ .

4) **Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone :-** For the Months of Jul-Aug-Sep-2016 Average of SO<sub>2</sub> is 11  $\mu\text{g}/\text{m}^3$ .

• The Average Concentration of SO<sub>2</sub> within the Core Zone of Tatijharia Lease during this period (Jul to Sep-2016) is 11  $\mu\text{g}/\text{m}^3$  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 Jul-August-September-2016 Average of SO<sub>2</sub> is 9  $\mu\text{g}/\text{m}^3$ .

2) **Sairaidh Campus Lease Area Buffer Zone:-** For the Months of Jul-August-September-2016 Average of SO<sub>2</sub> is 10  $\mu\text{g}/\text{m}^3$ .

3) **Rajendrapur/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jul-August-September-2016 Average of SO<sub>2</sub> is 11  $\mu\text{g}/\text{m}^3$ .

4) **Dumerkholi/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jul-August-September-2016 Average of SO<sub>2</sub> is 10  $\mu\text{g}/\text{m}^3$ .

• The Average Concentration of SO<sub>2</sub> within the Buffer Zone of Tatijharia Lease during this period (Jul to September-2016) is 10  $\mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Monthwise Summary of Statistical Analysis of SO<sub>2</sub>**

**2.3 Fugitive Emission (Core Zone):-**

**2.3.1 Presentation of Results.**

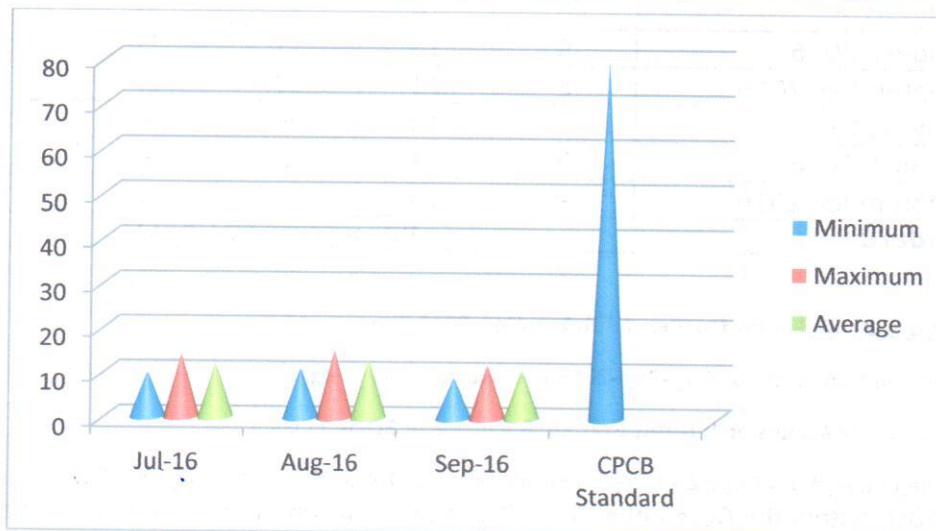
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of July-August-September-2016 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Piprapat / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 10 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 12 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 11 µg/m<sup>3</sup> and 15 µg/m<sup>3</sup> respectively and average concentration of 13 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9 µg/m<sup>3</sup> and 12 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.



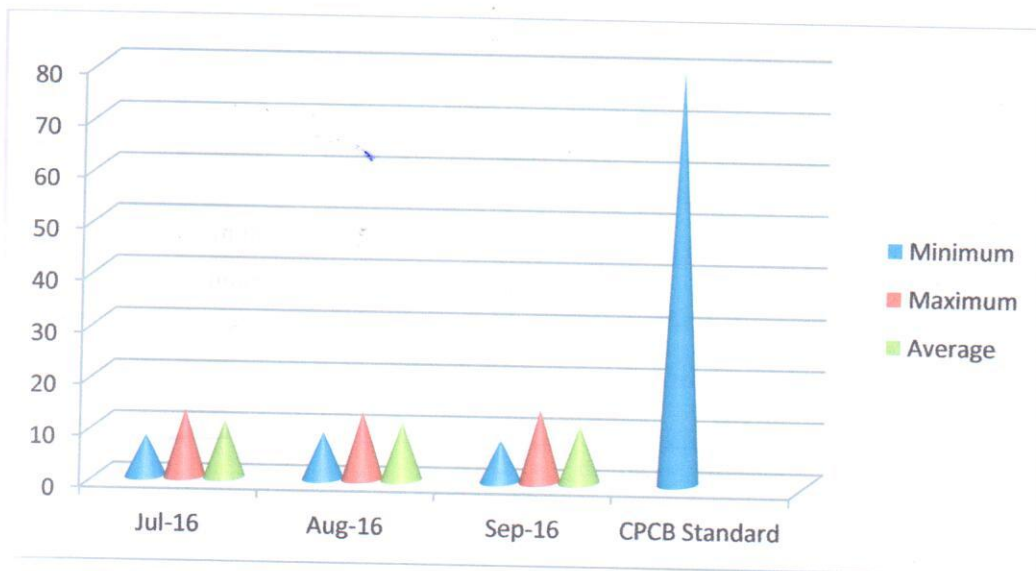
**Graph :- Piprapat / Nr.Mining Area**

**Betpani**

For the Month of July-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.



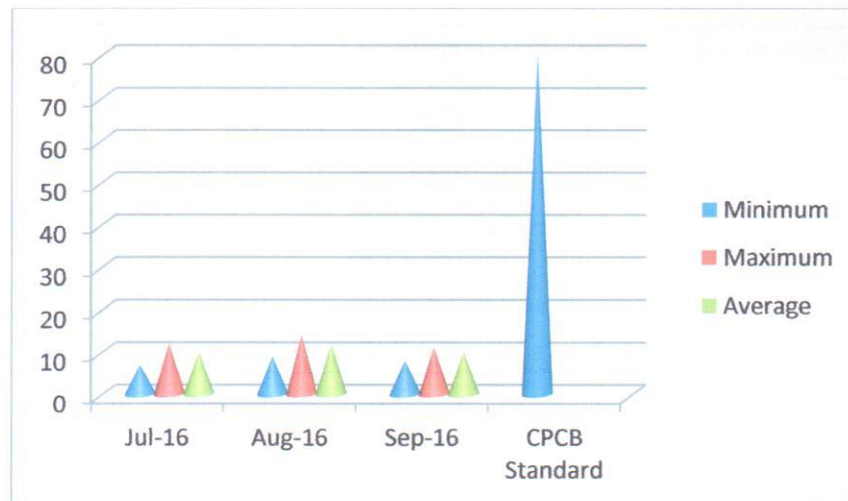
**Graph:- Betpani**

**Virhorepat**

For the Month of July-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 12 µg/m<sup>3</sup> respectively and average concentration of 10 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 12 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 10 µg/m<sup>3</sup>.



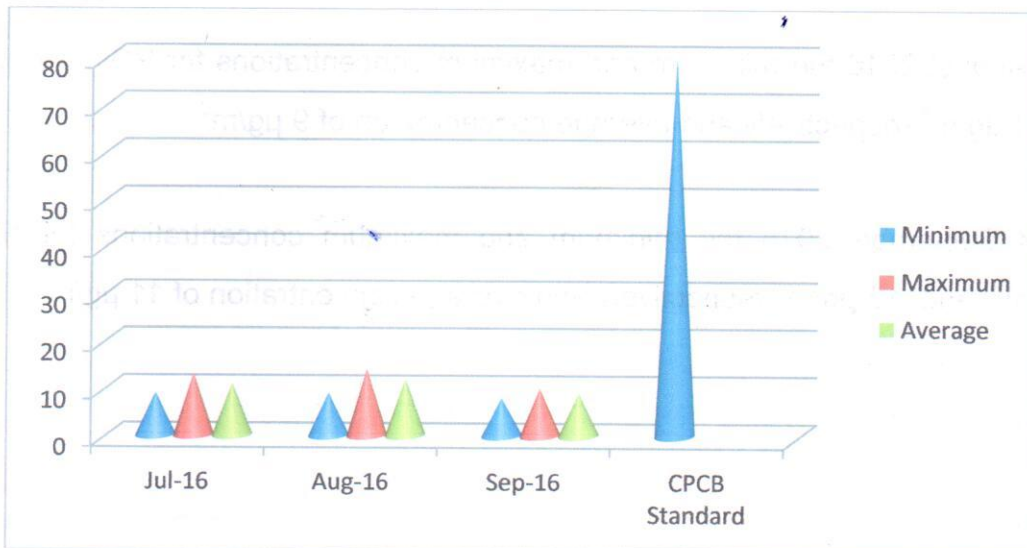
**Graph:- Virhorepat**

**Tatijharia Village/Nr.Weigh Bridge**

For the Month of July-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 12 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 10 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.



**Graph:- Tatijharia Village/Nr.Weigh Bridge**

**2.4 Fugitive Emission (Buffer Zone):-**

**2.4.1 Presentation of Results.**

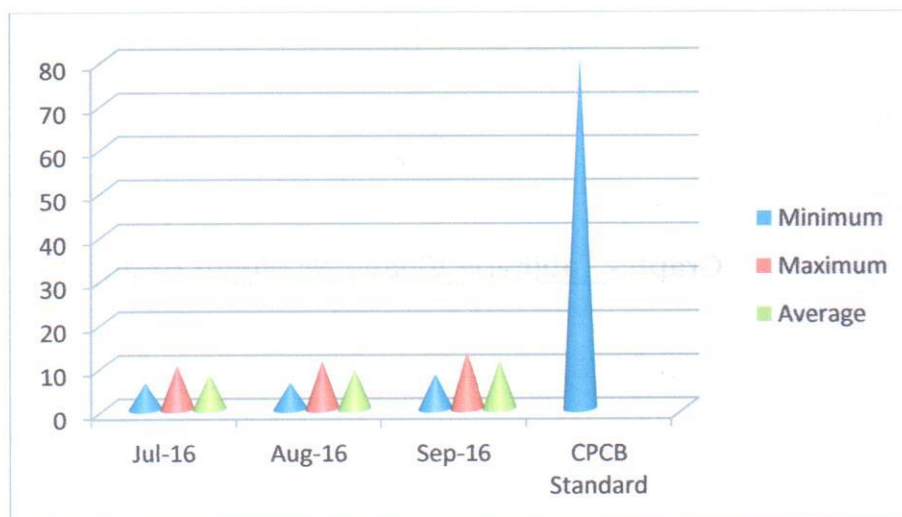
The summary of Statistical Analysis of SO<sub>2</sub> results for the month of July-August-September-2016 are presented in detail in **Table 9**. 98<sup>th</sup> percentile; maximum, minimum and average values have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Kutku Village / Nr. V.T.Center**

For the Month of July-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 10 µg/m<sup>3</sup> respectively and average concentration of 8 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.



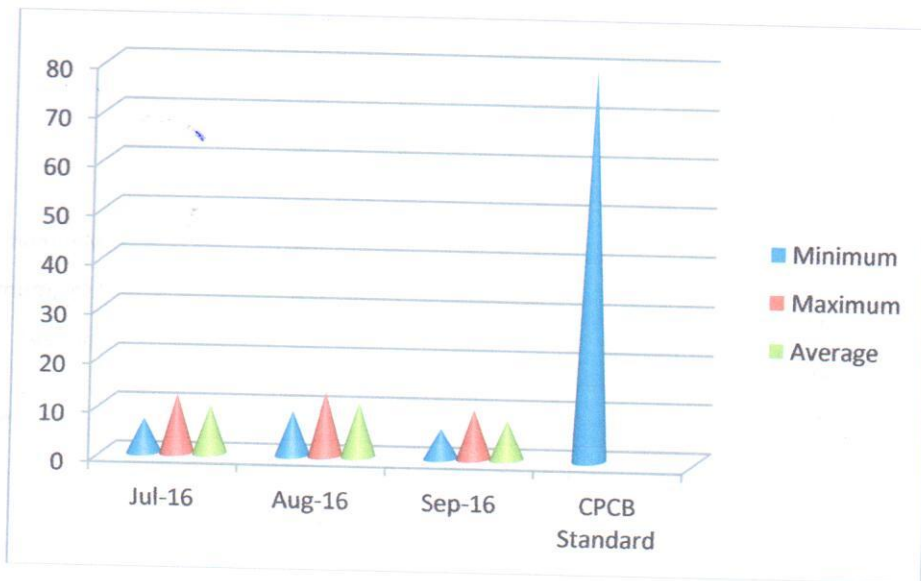
**Graph:- Kutku Village / Nr. V.T.Center**

**Sairaidh Campus**

For the Month of July-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 12 µg/m<sup>3</sup> respectively and average concentration of 10 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 6 µg/m<sup>3</sup> and 10 µg/m<sup>3</sup> respectively and average concentration of 8 µg/m<sup>3</sup>.



**Graph:- Sairaidh Campus**



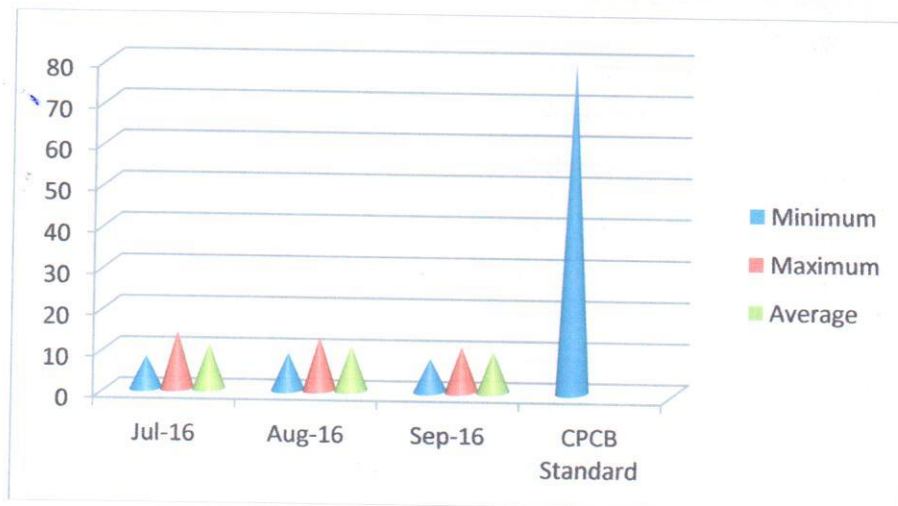


**Rajendrapur / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9 µg/m<sup>3</sup> and 13 µg/m<sup>3</sup> respectively and average concentration of 11 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 8 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 10 µg/m<sup>3</sup>.



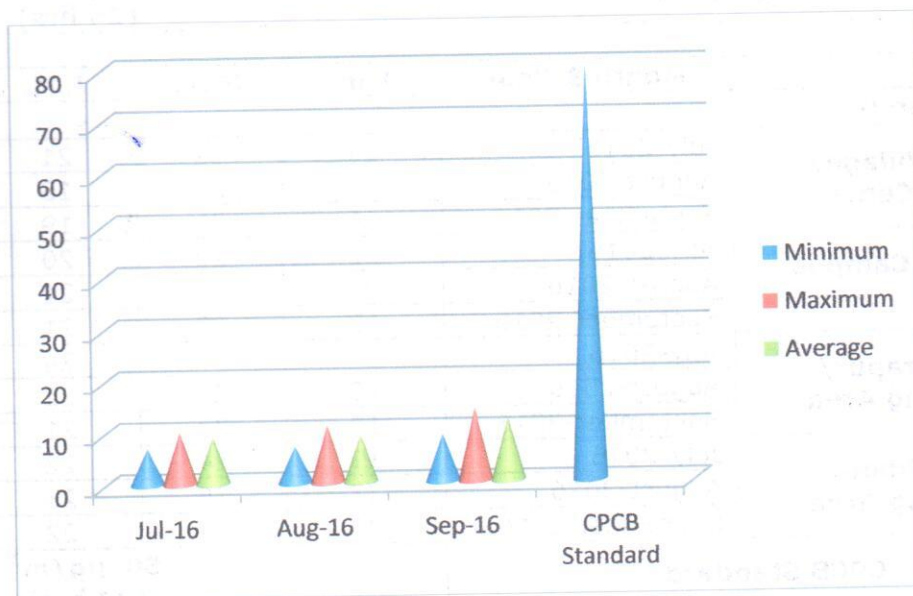
**Graph:- Rajendrapur / Nr.Mining Area**

**Dumerkholi / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 10 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 7 µg/m<sup>3</sup> and 11 µg/m<sup>3</sup> respectively and average concentration of 9 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for SO<sub>2</sub> were recorded as 9 µg/m<sup>3</sup> and 14 µg/m<sup>3</sup> respectively and average concentration of 12 µg/m<sup>3</sup>.



**Graph:- Dumerkholi / Nr.Mining Area**



**Table 10**  
**Statistical Analysis of NO<sub>x</sub>**

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Unit : µg/m<sup>3</sup></b>						
<b>Fugitive Emission (Core Zone):-</b>						
<b>Piprapat/ Nr.Mining Area</b>	July-2016	14	22	18	18	22
	August-2016	19	25	22	22	25
	September-2016	18	24	21	21	24
<b>Betpani</b>	July-2016	16	22	19	19	22
	August-2016	18	23	21	21	23
	September-2016	20	24	22	22	24
<b>Virhorepat</b>	July-2016	21	25	23	23	25
	August-2016	19	26	23	23	26
	September-2016	18	26	22	22	26
<b>Tatijharia Village/Nr.Weigh Bridge</b>	July-2016	17	23	20	20	23
	August-2016	20	26	23	23	26
	September-2016	19	24	22	22	24
<b>CPCB Standard</b>			<b>80 µg/m<sup>3</sup> (24 hrs)</b>			

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
<b>Kutku Village/ Nr.V.T.Center</b>	July-2016	19	22	21	21	22
	August-2016	15	20	18	18	20
	September-2016	16	21	19	19	21
<b>Sairaidh Campus</b>	July-2016	18	22	20	20	22
	August-2016	20	22	21	21	22
	September-2016	19	23	21	21	23
<b>Rajendrapur/ Nr.Mining Area</b>	July-2016	22	26	24	24	26
	August-2016	20	24	22	22	24
	September-2016	18	23	21	21	23
<b>Dumerkholi/ Nr.Mining Area</b>	July-2016	19	24	22	22	24
	August-2016	23	26	25	25	26
	September-2016	20	24	22	22	24
<b>CPCB Standard</b>			<b>80 µg/m<sup>3</sup> (24 hrs)</b>			

**Conclusion (A):-**

**Piprapat /Nr.Mining Lease Area Core Zone:** For the Months of Jul-August-September-2016 Average of NO<sub>x</sub> is 20 µg/m<sup>3</sup>.

**Betpani Lease Area Core Zone:-** For the Months of Jul-August-September-2016 Average of NO<sub>x</sub> is 21 µg/m<sup>3</sup>.

**Virhorepat Lease Area Core Zone:-** For the Months of Jul-August-September-2016 Average of NO<sub>x</sub> is 23 µg/m<sup>3</sup>.

**Tatijharia Village/Nr.Weigh Bridge Lease Area Core Zone :-** For the Months of Jul-August-September-2016 Average of NO<sub>x</sub> is 22 µg/m<sup>3</sup>.

- The Average Concentration of NO<sub>x</sub> within the Core Zone of Tatijharia Lease during this period (Jul-August-September-2016) is 21 µg/m<sup>3</sup> 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 Jul-August-September-2016 Average of NO<sub>x</sub> is 19 µg/m<sup>3</sup>.

**2)Sairaidh Campus Lease Area Buffer Zone:-** For the Months of Jul-August-September-2016 Average of NO<sub>x</sub> is 21 µg/m<sup>3</sup>.

**3)Rajendrapur/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jul-August-September-2016 Average of NO<sub>x</sub> is 22 µg/m<sup>3</sup>.

**4)Dumerkholi/ Nr.Mining Lease Area Buffer Zone:-** For the Months of Jul-August-September-2016 Average of NO<sub>x</sub> is 23 µg/m<sup>3</sup>.

- The Average Concentration of NO<sub>x</sub> within the Buffer Zone of Tatijharia Lease during this period (Jul-August-September-2016) is 21 µg/m<sup>3</sup> and it is within permissible limits as per CPCB Standard.

**Monthwise Summary of Statistical Analysis of NO<sub>x</sub>**

**2.5 Fugitive Emission (Core Zone):-**

**2.5.1 Presentation of Results.**

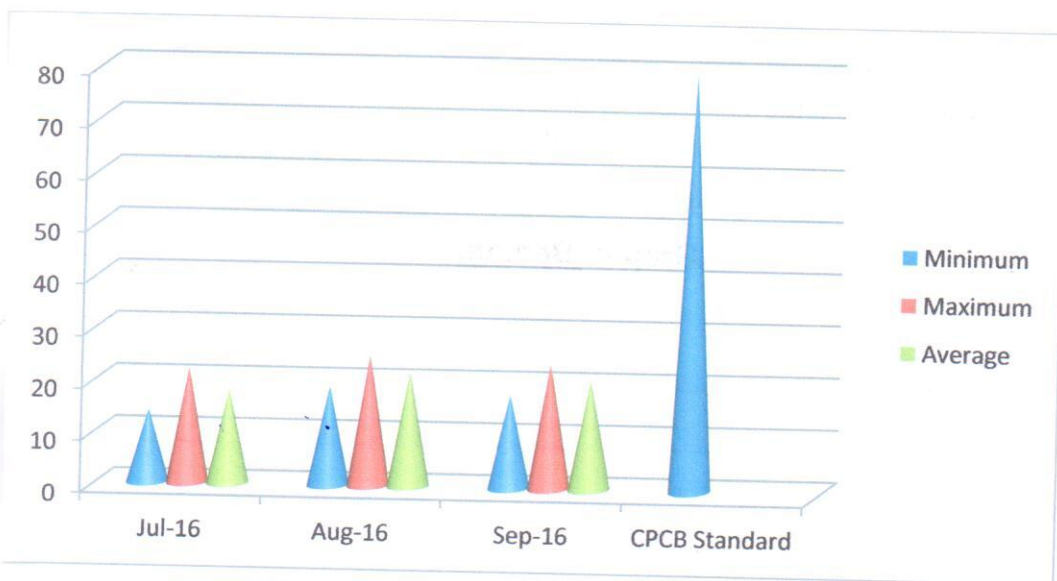
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of July-August-September-2016 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

**Piprapat / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 14 µg/m<sup>3</sup> and 22 µg/m<sup>3</sup> respectively and average concentration of 18 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 19 µg/m<sup>3</sup> and 25 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18 µg/m<sup>3</sup> and 24 µg/m<sup>3</sup> respectively and average concentration of 21 µg/m<sup>3</sup>.



**Graph :- Piprapat / Nr.Mining Area**

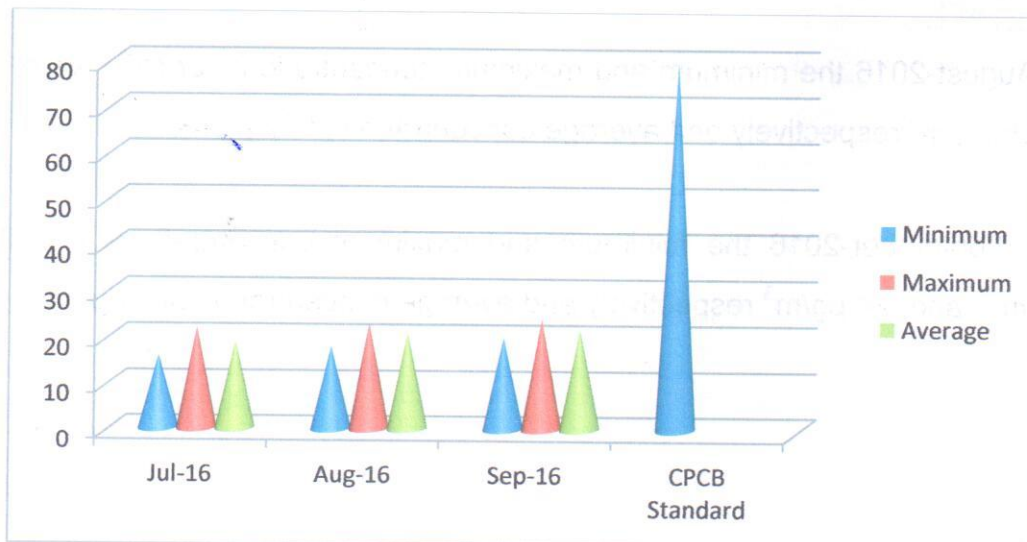
e  
s

**Betpani**

For the Month of July-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16 µg/m<sup>3</sup> and 22 µg/m<sup>3</sup> respectively and average concentration of 19 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18 µg/m<sup>3</sup> and 23 µg/m<sup>3</sup> respectively and average concentration of 21 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 20 µg/m<sup>3</sup> and 24 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.



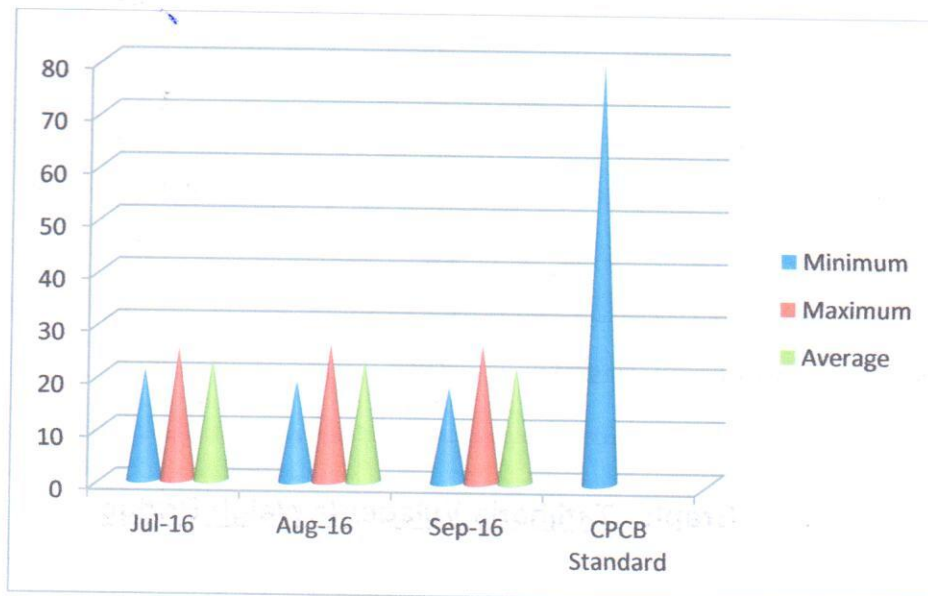
**Graph:- Betpani**

**Virhorepat**

For the Month of July-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 21 µg/m<sup>3</sup> and 25 µg/m<sup>3</sup> respectively and average concentration of 23 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 19 µg/m<sup>3</sup> and 26 µg/m<sup>3</sup> respectively and average concentration of 23 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18 µg/m<sup>3</sup> and 26 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.



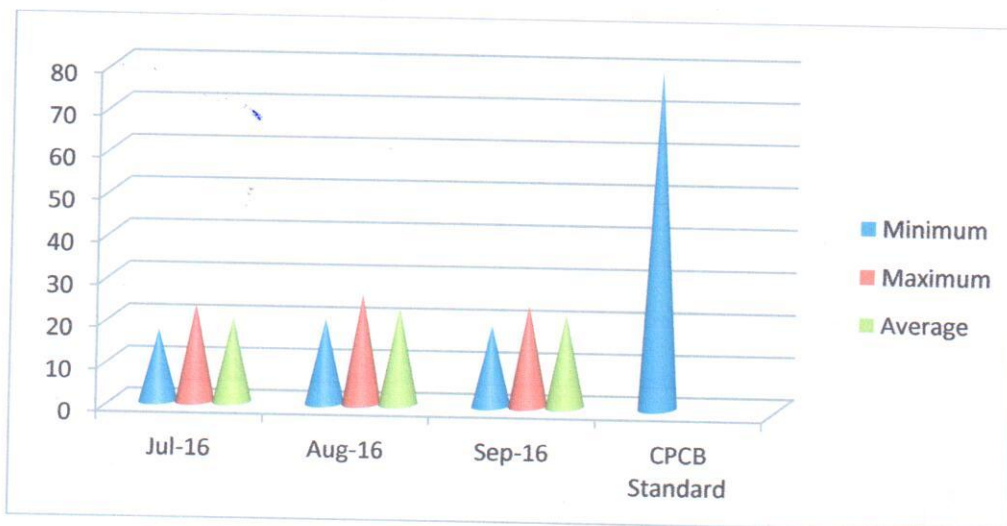
**Graph:- Virhorepat**

**Tatijharia Village/Nr.Weigh Bridge**

For the Month of July-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 17 µg/m<sup>3</sup> and 23 µg/m<sup>3</sup> respectively and average concentration of 20 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 20 µg/m<sup>3</sup> and 26 µg/m<sup>3</sup> respectively and average concentration of 23 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 19 µg/m<sup>3</sup> and 24 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.



**Graph:- Tatijharia Village/Nr.Weigh Bridge**



6 Fugitive Emission (Buffer Zone):-

6.1 Presentation of Results.

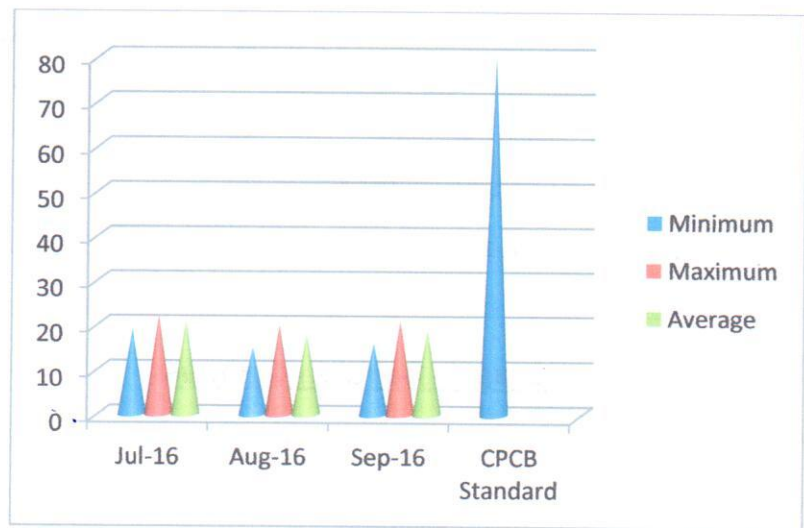
The summary of Statistical Analysis of NO<sub>x</sub> results for the month of July-2016 to September-2016 are presented in detail in **Table 10**. 98<sup>th</sup> percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Kutku Village / Nr. V.T.Center

For the Month of July-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 19 µg/m<sup>3</sup> and 22 µg/m<sup>3</sup> respectively and average concentration of 21 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 15 µg/m<sup>3</sup> and 20 µg/m<sup>3</sup> respectively and average concentration of 18 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 16 µg/m<sup>3</sup> and 21 µg/m<sup>3</sup> respectively and average concentration of 19 µg/m<sup>3</sup>.



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

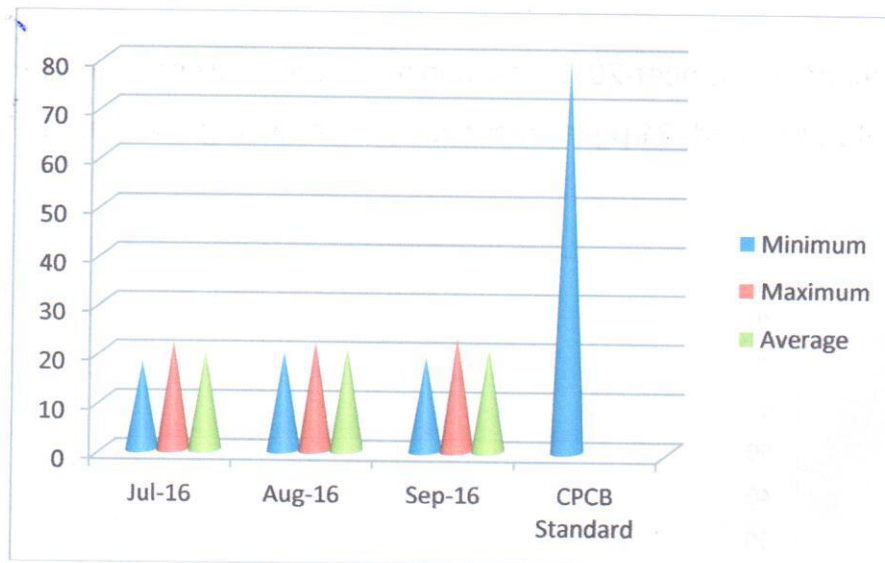


**Sairaidh Campus**

For the Month of July-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18 µg/m<sup>3</sup> and 22 µg/m<sup>3</sup> respectively and average concentration of 20 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 20 µg/m<sup>3</sup> and 22 µg/m<sup>3</sup> respectively and average concentration of 21 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 19 µg/m<sup>3</sup> and 23 µg/m<sup>3</sup> respectively and average concentration of 21 µg/m<sup>3</sup>.



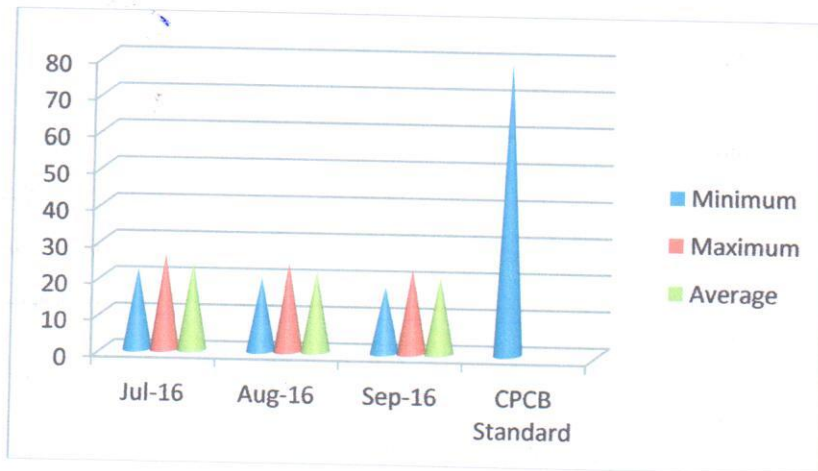
**Graph:- Sairaidh Campus**

**Rajendrapur / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 22 µg/m<sup>3</sup> and 26 µg/m<sup>3</sup> respectively and average concentration of 24 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 20 µg/m<sup>3</sup> and 24 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 18 µg/m<sup>3</sup> and 23 µg/m<sup>3</sup> respectively and average concentration of 21 µg/m<sup>3</sup>.



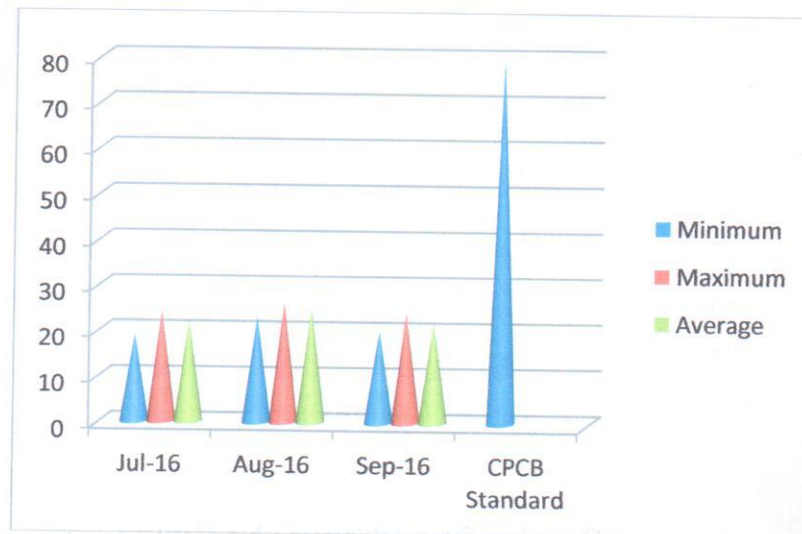
**Graph:- Rajendrapur / Nr.Mining Area**

**Dumerkholi / Nr.Mining Area**

For the Month of July-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded 19 µg/m<sup>3</sup> and 24 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.

For the Month of August-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 23 µg/m<sup>3</sup> and 26 µg/m<sup>3</sup> respectively and average concentration of 25 µg/m<sup>3</sup>.

For the Month of September-2016 the minimum and maximum concentrations for NO<sub>x</sub> were recorded as 20 µg/m<sup>3</sup> and 24 µg/m<sup>3</sup> respectively and average concentration of 22 µg/m<sup>3</sup>.



**Graph:- Dumerkholi / Nr.Mining Area**



**Table 11**

**Statistical Analysis of Pb**

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
<b>Fugitive Emission (Core Zone):-</b>						
<b>Piprapat/ Nr.Mining Area</b>	July-2016	0.016	0.023	0.020	0.020	0.023
	August-2016	0.020	0.030	0.025	0.025	0.030
	September-2016	0.019	0.025	0.022	0.022	0.025
<b>Betpani</b>	July-2016	0.021	0.026	0.024	0.024	0.026
	August-2016	0.024	0.028	0.026	0.026	0.028
	September-2016	0.023	0.029	0.026	0.026	0.029
<b>Virhorepat</b>	July-2016	0.024	0.039	0.032	0.032	0.039
	August-2016	0.026	0.037	0.032	0.032	0.037
	September-2016	0.020	0.024	0.022	0.022	0.024
<b>Tatijharia Village/Nr.Weigh Bridge</b>	July-2016	0.028	0.040	0.034	0.034	0.040
	August-2016	0.024	0.029	0.027	0.027	0.029
	September-2016	0.026	0.032	0.029	0.029	0.032
<b>CPCB Standard</b>		<b>1.0 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
<b>Buffer Zone :-</b>						
<b>Kutku Village/ Nr.V.T.Center</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Sairaidh Campus</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Rajendrapur/ Nr.Mining Area</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Dumerkholi/ Nr.Mining Area</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>CPCB Standard</b>		<b>1.0 <math>\mu\text{g}/\text{m}^3</math> (24 hrs)</b>				

**Conclusion: (A)**

The Average concentration of Pb within the Core Zone of Tatijharia Lease during this period (July to September-2016) is  $0.027 \mu\text{g}/\text{m}^3$  and it is within permissible limits as per CPCB Standard.

**Conclusion: (B)**

The Average Concentration of Pb within the Buffer Zone of Tatijharia Lease during this period (July to September-2016) is Not Detected and it is within permissible limits as per CPCB Standard.



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**Table 12**

**Statistical Analysis of Hg**

Unit: µg/

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
<b>Piprapat/ Nr.Mining Area</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Betpani</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Virhorepat</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Tatijharia Village/Nr.Weigh Bridge</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Buffer Zone :-</b>						
<b>Kutku Village/ Nr.V.T.Center</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	Sep-2016	ND	ND	ND	ND	ND
<b>Sairaidh Campus</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	Sep-2016	ND	ND	ND	ND	ND
<b>Rajendrapur/ Nr.Mining Area</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	Sep-2016	ND	ND	ND	ND	ND
<b>Dumerkholi/ Nr.Mining Area</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	Sep-2016	ND	ND	ND	ND	ND
<b>CPCB Standard</b>		---				

**Conclusion: (A)**

The Average Concentration of Hg within the Core Zone of Tatijharia Lea during this period (July to September-2016) is Not Detected.and it is within permissible limits per CPCB Standard.

**Conclusion: (B)**

The Average Concentration of Hg within the Buffer Zone of Tatijharia Lea during this period (July to September-2016) is Not Detected.and it is within permissible limits per CPCB Standard.



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**Table 13**

**Statistical Analysis of As**

Unit: ng/m<sup>3</sup>

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Fugitive Emission (Core Zone):-</b>						
<b>Piprapat/ Nr.Mining Area</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Betpani</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Virhorepat</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Tatijharia Village/Nr.Weigh Bridge</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>CPCB Standard</b>				<b>06 ng/m<sup>3</sup> (Annual)</b>		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
<b>Buffer Zone :-</b>						
<b>Kutku Village/ Nr.V.T.Center</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Sairaidh Campus</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Rajendrapur/ Nr.Mining Area</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>Dumerkholi/ Nr.Mining Area</b>	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
<b>CPCB Standard</b>				<b>06 ng/m<sup>3</sup> (Annual)</b>		

**Conclusion: (A)**

The Average Concentration of As within the Core Zone of Tatijharia Lease during this period (July to Sep-2016) 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 (July to Sep-2016) is Not Detected.and it is within permissible limits as per CPCB Standard.



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**Free Silica :-**

Sr. No.	Location	Measurement Unit	July-2016		August-2016		September-2016	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Piprapat/ Near Mining Area	g/100gm	0.24	0.16	0.31	0.23	0.29	0.11

**Table 14**

**Dust fall Rate**

Sl.No.	Location	July-2016	August-2016	September-2016	Average
		<b>Rate (MT/km<sup>2</sup>/month)</b>			
1	Piprapat/Near Mining Area	18.4	23.9	24.8	<b>22.4</b>
2	Tatijharia Village	14.9	18.3	21.6	<b>18.3</b>



**Table 15**

**Noise Level Monitoring**

Unit: dB(A)

Sl. No.	Location	July-2016		August-2016		September-2016	
		Day	Night	Day	Night	Day	Night
<b>Core Zone</b>							
1.	Piprapat/Nr.Mining Area	64.9	56.2	62.8	53.9	54.8	39.4
2.	Betpani	56.2	41.6	61.7	53.8	57.3	43.9
3.	Virhorepat	67.3	58.3	72.1	63.2	63.9	57.1
4.	Tatijharia Village/ Nr.Weigh Bridge	62.8	47.2	56.9	43.8	57.1	48.3
<b>Buffer Zone</b>							
5.	Kutku Village/Nr.V.T.Center	48.3	39.7	51.6	42.8	46.7	38.2
6.	Sairaidh Campus	51.6	42.1	49.2	38.7	47.8	36.7
7.	Rajendrapur/Nr.Mining Area	49.2	38.4	52.7	41.4	46.3	38.9
8.	Dumerkholi/Nr.Mining Area	52.7	41.6	49.3	39.2	47.1	41.8

**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	July-2016			August-2016			September-2016		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	Piprapat/Nr.Mining Area	63.8	72.9	<b>68.4</b>	64.7	79.2	<b>72.0</b>	67.2	78.1	<b>72.7</b>



**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 July-August-September-2016)**

**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	7.03 at 26°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.6
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)	0.3	No relaxation	0.21
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	283
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.16
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	63.82
12.	Total Alkalinity (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 23)	200	600	114.58
13.	Total hardness (as CaCO <sub>3</sub> )	mg/l	IS 3025 (Part 21)	200	600	146.74
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	46.94
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	7.16
16.	Sulphate (as SO <sub>4</sub> )	mg/l	IS 3025 (Part 24)	200	400	32.58
17.	Nitrate (as NO <sub>3</sub> )	mg/l	APHA Method	45	No relaxation	< 2
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	< 0.05
20.	Mercury (as Hg)	mg/l	IS 3025 (Part 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	0.05	< 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 <sub>2</sub> S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.03
32.	Chloramines (as Cl <sub>2</sub> )	mg/l	APHA 4500-Cl <sub>2</sub> 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	mg/l	APHA 6232	0.1	No relaxation	Absent
	b. Dibromochloromethane			0.1	No relaxation	Absent
	c. Bromodichloromethane			0.06	No relaxation	Absent
	d. Chloroform			0.2	No relaxation	Absent
39.	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	IS 3025 (Part 43) :1001	0.001	0.002	< 0.001
40.	Anionic detergents (as MBAS)	mg/l	IS 13428:2005 (Annex K)	0.2	1.0	< 0.001
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
<b>44.</b>	<b>Pesticides residues</b>					
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 S: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
				September- 2016
1	pH Value	-	6.5 to 8.5	6.87
2	Total Hardness (CaCO <sub>3</sub> )	mg / l	\$	304.73
3	Iron as (Fe)	mg / l	50	21.54
4	Chlorides as (Cl)	mg / l	600	318.92
5	Electrical Conductivity	µS/cm	\$	471.2
6	Total Dissolved Solids (TDS)	mg / l	1500	232.80
7	Calcium as (Ca)	mg / l	\$	73.94
8	Magnesium as (Mg)	mg / l	\$	11.68
9	Sulphate as (SO <sub>4</sub> )	mg / l	400	143.71
10	Nitrates as (NO <sub>3</sub> )	mg / l	\$	9.4
11	Fluoride as (F)	mg / l	0.5	0.26
12	Alkalinity	mg / l	\$	62.8
13	Chemical Oxygen demand (COD)	mg / l	\$	16.4
14	BOD at 27°C for 3days	mg / l	3	5.7
15	Total Suspended Solid (TSS)	mg / l	\$	23

\$: Limits not specified

**Table 18**

**Report on Soil Analysis, Tatijharia**

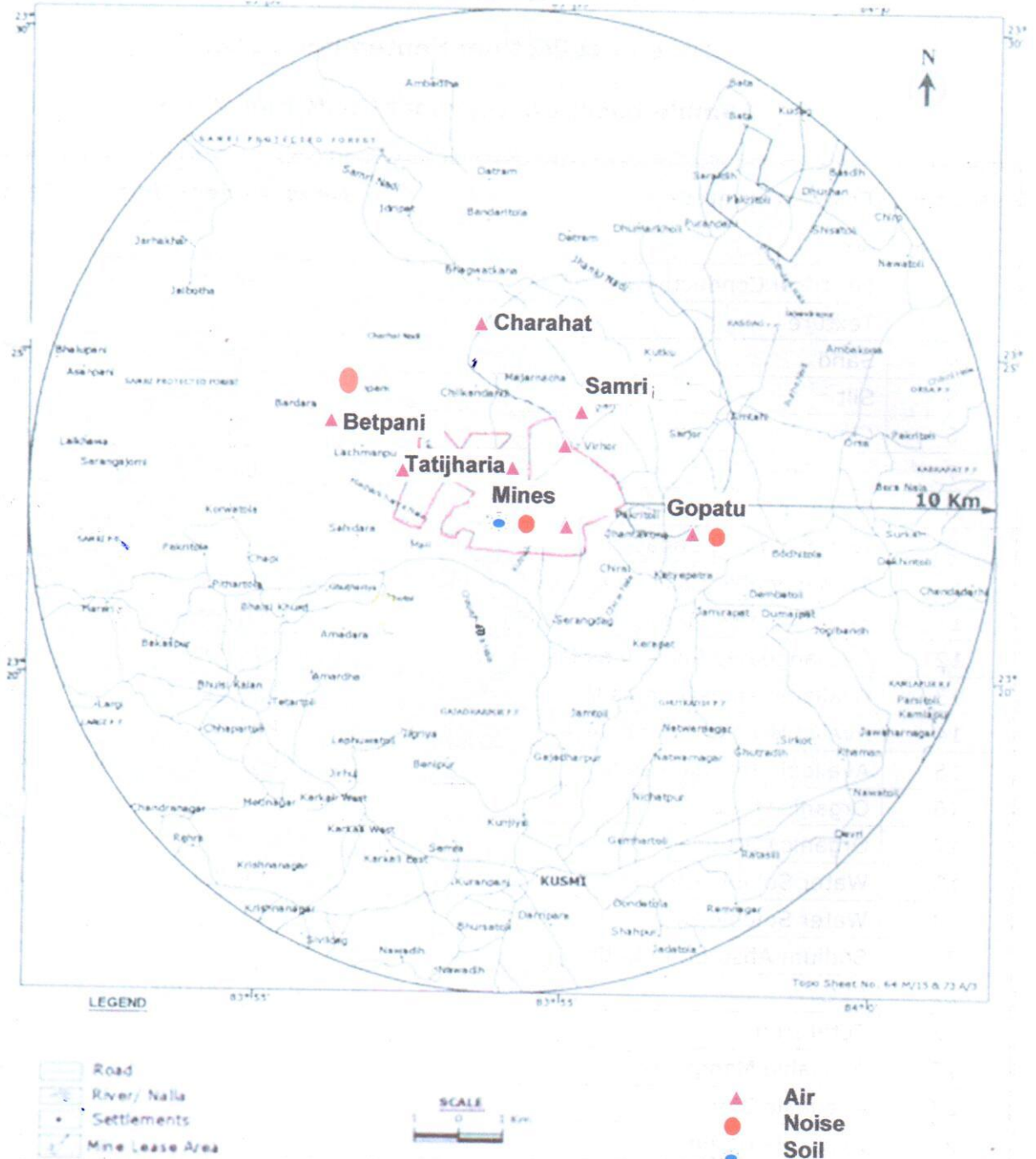
**Date of collection: September-2016.**

**Sample Location: Piprapat/Nr.Mining Area**

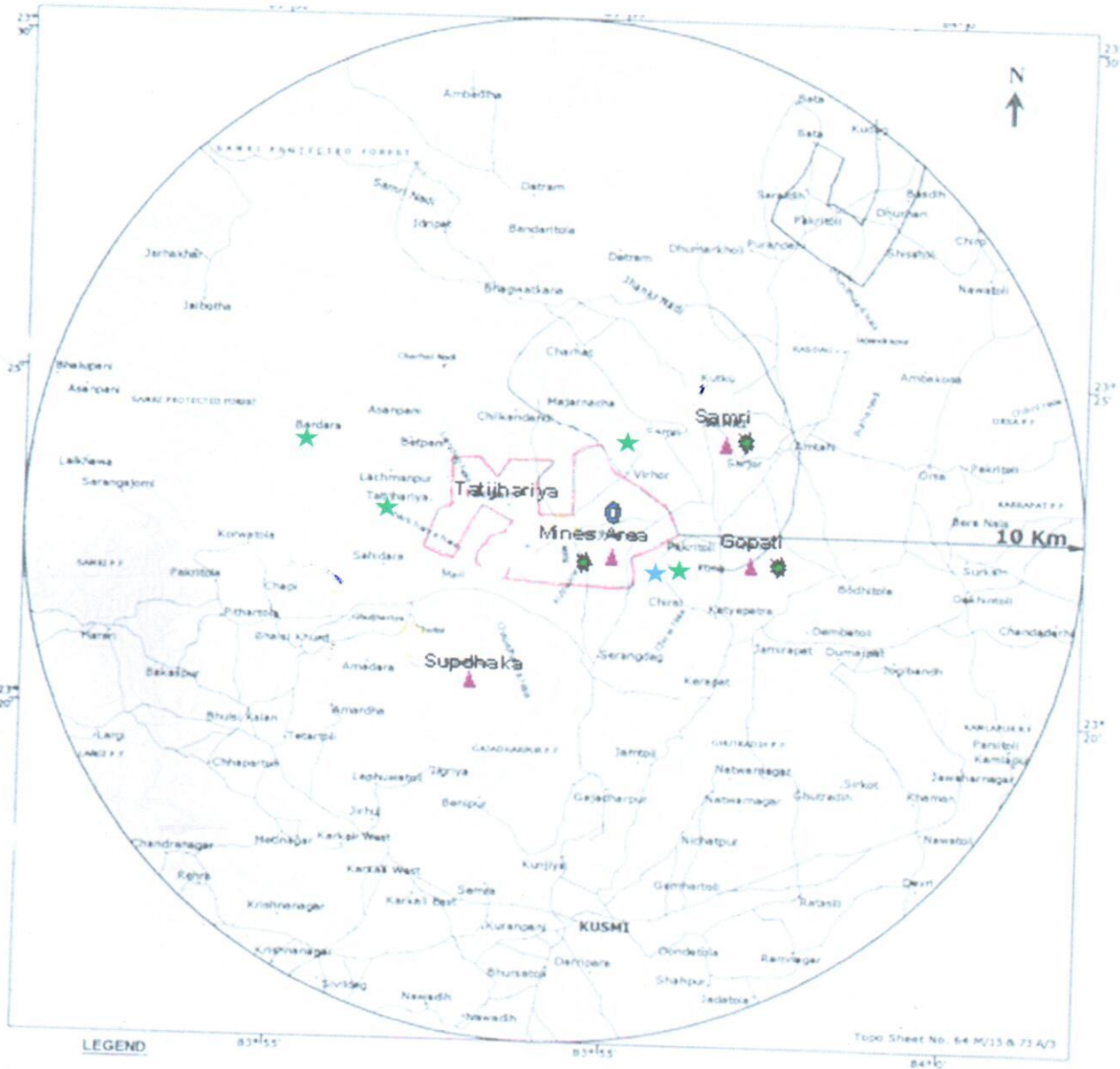
Sr. No	Test Parameters	Measurement Unit	Results
1	pH	-	6.74at 26 <sup>o</sup> C
2	Electrical Conductivity at 25 <sup>o</sup> C	µs/cm	352
3	Texture	-	Clay Loam
4	Sand	%	46.1
5	Silt	%	28.3
6	Clay	%	25.6
7	Bulk Density	g/cc	1.16
8	Porosity	%	16
9	Water Holding Capacity	%	51
10	Exchangeable Calcium as Ca	mg/kg	63.9
11	Exchangeable Magnesium as Mg	mg/kg	7.4
12	Exchangeable Sodium as Na	mg/kg	68.3
13	Available Potassium as K	kg/hect.	5.6
14	Available Phosphorous as P	kg/hect.	164
15	Available Nitrogen as N	kg/hect.	43.9
16	Organic Matter	%	0.28
17	Organic Carbon	%	0.17
18	Water Soluble Chloride as Cl <sup>+</sup>	mg/kg	12.4
19	Water Soluble Sulphate as SO <sub>4</sub>	mg/kg	5.8
20	Sodium Absorption Ratio	-	4.16
21	CEC	meq/100 gm	12.4
22	Total Iron	%	4.16
23	Available Manganese	mg/kg	0.007
24	Available Zinc	mg/kg	0.005
25	Available Boron	mg/kg	0.004

**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**



**CHHATTISGARH ENVIRONMENT CONSERVATION BOARD**  
Commercial Complex, Housing Board Colony,  
Kabir Nagar, Raipur (C.G.)

No. 6267/TS/CECB/2016

Raipur, dated: 17/3/2016

To,

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

*Handwritten signature and date: 21/3/16*

Sub: - Renewal of consent of the Board under section 21 of the Air (Prevention and Control of Pollution) Act, 1981.

- Ref: - 1. Consent of the Board issued under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 vide letter no. 5685/TS/CECB/2007 Raipur, dated: 6886/TS/CECB/2007 Raipur, dated: 24/12/2007.
2. Last renewal of consent of the Board issued under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 vide letter no. 1976/TS/CECB/2014 Raipur, dated: 02/07/2014.
3. Your application letter no. HIL/SAM/CECB/103/2015, dated: 14/07/2015 and subsequent correspondence ending dated: 16/11/2015.

--: 00 :--

With reference to your above application, consent is hereby renewed for a period of one year from 01/12/2015 to 30/11/2016 subject to the fulfillment of the terms and conditions incorporated in the consent letter no. 6886/TS/CECB/2007 Raipur, dated: 24/12/2007, subsequent renewal of consent issue by Board and additional conditions mentioned below.

This renewal of consent is valid for:-

Name	Production Capacity
Mining of Bauxite Ore	4.0 Lakh Tonnes Per Year [Four Lakh Tonnes Per Year]

**Additional Conditions**

1. Industry shall operate and maintain the air pollution control system effectively and regularly. Effective steps shall be taken to control fugitive dust emission. Fixed type automatic water sprinkling system shall be installed at haul road / 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. Industry shall maintain the ambient air quality within prescribed limit in and around the mine area all the time.

*Handwritten signature: Rell*

2. Regular monitoring for the measurement of air pollutants level in ambient shall be carried out. Industry shall submit ambient air quality monitoring reports to the Board regularly every month.
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 at the earliest and shall be maintained properly. Dust, muck and sludge generated due to transportation on the roads shall be cleaned and disposed off properly. Industry shall maintain good housekeeping 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. Extensive tree plantation shall be carried out in this year.
7. Industry shall submit Environment Statement to this Board as per provision of Environment (Protection) amendment Rule, 1993 for the previous year ending 31<sup>st</sup> March on or before 30<sup>th</sup> September every year.

Please acknowledge the receipt of this letter.

For & on behalf of  
Chhattisgarh Environment Conservation Board Raipur (C.G.)

  
Member Secretary

Chhattisgarh Environment Conservation Board  
Raipur (C.G.)

Endt. No. /TS/CECB/2016  
Copy to: -

Raipur, dated: \_\_\_ / \_\_\_ /2016

- 1- Regional Officer, Regional Office, Chhattisgarh Environment Conservation Board, Ambikapur (C.G.). Please ensure compliance and report, if any condition/conditions are violated by the industry.

  
Member Secretary

Chhattisgarh Environment Conservation Board  
Raipur (C.G.)







**CHHATTISGARH ENVIRONMENT CONSERVATION BOARD**  
Commercial Complex, Housing Board Colony,  
Kabir Nagar, Raipur (C.G.)

No. <sup>6265</sup> /TS/CECB/2016  
To,

Raipur, dated: 17/3/2016

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

*[Handwritten signature]*  
3/3/16

Sub: - Renewal of consent of the Board under section 25/26 of the Water (Prevention and Control of Pollution) Act, 1974.

- Ref: - 1. Consent of the Board issued under section 25/26 of the Water (Prevention and Control of Pollution) Act, 1974 vide letter no. 6884/TS/CECB/2007 Raipur, dated: 24/12/2007.
2. Last renewal of consent of the Board issued under section 25/26 of the Water (Prevention and Control of Pollution) Act, 1974 vide letter no. 1974/TS/CECB/2014 Raipur, dated: 02/07/2014.
3. Your application letter no. HIL/SAM/CECB/103/2015, dated: 14/07/2015 and subsequent correspondence ending dated: 16/11/2015.

--: 00 :--

With reference to your above application, consent is hereby renewed for a period of one year from 01/12/2015 to 30/11/2016 subject to the fulfillment of the terms and conditions incorporated in the consent letter no. 6884/TS/CECB/2007 Raipur, dated: 24/12/2007, subsequent renewal of consent issue by Board and additional conditions mentioned below.

This renewal of consent is valid for:-

Name	Production Capacity
Mining of Bauxite Ore	4.0 Lakh Tonnes Per Year [Four Lakh Tonnes Per Year]

**Additional Conditions**

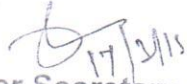
1. Industry shall operate and maintain the effluent treatment system effectively and regularly. Industry shall ensure treated effluent quality within the standards prescribed by Board published in Gazette Notification dated: 25/03/1988. Treated effluent shall be used for dust suppression, domestic use, irrigation, other useful purposes etc. Industry shall not discharge any treated / untreated effluent in to the river or any 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.

*[Handwritten signature]*

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 at the earliest and shall be maintained properly. Dust, muck and sludge generated due to transportation on the roads shall be cleaned and disposed off properly. Industry shall maintain good housekeeping 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. Extensive tree plantation shall be carried out in this year.
7. Industry shall submit Environment Statement to this Board as per provision of Environment (Protection) amendment Rule, 1993 for the previous year ending 31<sup>st</sup> March on or before 30<sup>th</sup> September every year.

Please acknowledge the receipt of this letter.

For & on behalf of  
Chhattisgarh Environment Conservation Board Raipur (C.G.)

  
Member Secretary  
Chhattisgarh Environment Conservation Board  
Raipur (C.G.)

Endt. No. /TS/CECB/2016

Raipur, dated: \_\_\_ / \_\_\_ /2016

Copy to: -

- 1- Regional Officer, Regional Office, Chhattisgarh Environment Conservation Board, Ambikapur (C.G.). Please ensure compliance and report, if any condition/conditions are violated by the industry.
- 2- Cess Section, Chhattisgarh Environment Conservation Board, Raipur (C.G.).

  
Member Secretary  
Chhattisgarh Environment Conservation Board  
Raipur (C.G.)



Hindalco Industries Ltd.  
Mines Division, Samri

**Lease wise Production 2015-16**

<b>Lease</b>	<b>Production (MT)</b>
Samri	411399.000
Kudag	49372.000
Tatijharia	365945.000
<b>Total</b>	<b>826716.000</b>

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

Actual Expenditure incurred in Environment Management Plan:-

Total cost 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 (Apr 16- Sep-16).

SI No-	Environment Protection Measures	Actual Cost (Lac) (F.Y. 2016-17) (Apr 16- Sept 16))
1	Pollution Control	9.75
2	Environment Monitoring	1.51
3	Green Belt	9.23
4	Reclamation/Rehabilitation of mined out area (Samri -4.215 Ha. Tatijharia-2.880 Ha. Kudag- 0.500 Ha. Total – 7.595 Ha.)	37.975
5	Total	58.465

- Environment monitoring jobs has been out sourced to Annacon Lab, recognized by MoEF (GOI) & NABL etc.
- One centralized nursery has been established at Samri mines among three leases viz, Samri, Tatijharia & Kudag.
- Reclamation of mined out land has been out sourced along with production. Average cost of reclamation considered @ 5.0 Lac per Ha.

