

ADITYA BIRLA



HINDALCO

Ref: HIL/KUD/CR/MoEF/45

09.05.2017.

To,

**The Addl. Principal Chief Conservator of Forest (Central),
MoEF Regional Office (Western Zone)**

Kendriya Paryavaran Bhawan, Link Road-3, Ravisankar Nagar
Bhopal-462016 (M P)

Sub:- Status of compliance of EC condition (Half yearly status of compliance report) of Kudag Bauxite Mine (Lease area- 377.116 Ha.) of Hindalco Industries Limited of Chhattisgarh state from October-2016 to March-2017.

Ref No:- Environment Clearance Letter No-J-11015/354/2007-IA. II(M) dated July 27, 2007

Dear Sir,

We do hereby submit half yearly compliance status report of EC condition with respect of Kudag Bauxite Mine, Lease area -377.116 Ha, of Hindalco Industries Limited, P.O- Kusmi in Balrampur- Ramanujganj, district, Chhattisgarh state, PIN-497224 from October-2016 to March-2017.

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

Thanking you,

Yours' faithfully

For, Hindalco Industries Limited


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

- Encl:-
1. Half Yearly Status of compliance of Environment condition as annexure-I.
 2. Copy of Diversion of Revenue Forest Land enclosed as annexure -II.
 3. Environment Status Report from Jan-2017 to March-2017 enclosed as annexure -III
 4. Renewal copy of Consent to Operate from CECB enclosed as annexure -IV
 5. Yearly Production report enclosed as annexure-V.
 6. Status report of mined out, reclaimed and afforested land as annexure-VI.
 7. Actual expenditure incurred in protection of environment from October-2016 to March-2017 as annexure-VII.

HINDALCO INDUSTRIES LIMITED
Samri Mines, Division, Baba Chowk
At & Post - Kusmi, PIN : 497 224,
Distt - Balrampur-Ramanujganj (C.G.), INDIA
Telephone + 91 7778 274326-27
FAX + 91 7778 274325

REGISTERED OFFICE
Century Bhawan, 3rd Floor,
Dr. Annie Besant Road,
Worli, Mumbai 400 030
Telephone +91 22 6662 6666

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

04.05.2017.

**Status of Compliance from October-2016 to March-2017 of Environmental
Condition laid down by MOEF**

Kudag Bauxite Mine

The status of compliance of the conditions (as per point no.3) with reference to environment clearance letter no.J-11015/354/2007-11A.II(M) dated 27.07.07 of Ministry of Environment & Forests, New Delhi, for expansion of production capacity of Kudag Bauxite Mine is 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 will be restricted to above ground water table As per our current mining operation. The ultimate depth of working is 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 being stacked at earmark location and slope of dump is maintained less than 28 degree/ concurrently reclaimed in the mined out area. 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.


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

- (ix) Controlled blasting is being 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.
- (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, Kashia Samia, mango, babul, pears & guava etc. Social forestry is also being encouraged among the local villagers. Year wise plantation is enclosed as annexure-C.
- (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) One rain water harvesting ponds has been made at lease hold area.
- (xv) 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) The report has been submitted to ministry. The rehabilitation of land • oustees is not involved in the project.
- (xix) All workers are provided personal protective equipment and training are also being imparted to them for safety & health in our Group vocational training centre – Samri and will be continued. One doctor having MBBS qualification has been appointed for facilitation of OHS. All employees working in the mine have been under gone through medical test as per Mines ACT-1952. A sample copy of medical test has been enclosed as annexure-4.
- (xx) We accept the condition.


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd
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(B) General Condition.

- (i) No change in mining technology and scope of working will be done without approval of MOEF New Delhi.
- (ii) Calendar plan will be followed and there will not be any change in calendar plan.
- (iii) The suggestion of local forest department will be implemented for conservation of flora and fauna in and around lease hold area.
- (iv) Ambient Air quality monitoring is being carried out as per guideline and will be followed.
- (v) Data of ambient air quality (RPM, SPM, SO₂, Nox) are being submitted to CECB and will be submitted as per guidelines. Data of ambient air quality (RPM, SPM, SO₂ and Nox) from Jan-15 to Mar-15 is enclosed as annex-3.
- (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 area is being maintained below the limit prescribed and will be maintained. The operators of HEMM are being provided earplag/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 in our Group vocational training centre – Samri 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) 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 information also 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

कार्यालय प्रधान मुख्य वन संरक्षक (वन्यप्राणी प्रबंधन एवं जैव विविधता
संरक्षण सह मुख्य वन्यप्राणी अभिरक्षक), छत्तीसगढ़
अरण्य भवन, मेडिकल कॉलेज रोड, रायपुर

ईमेल - pccfwl@sify.com

(Ph 0771-2552228, Fax 0771-2552227)

क्रमांक/व.प्रा./प्रबंध-12/13/2967

रायपुर दिनांक 07/10/2013

प्रति,

संचालक,

इन्वायरनमेंट क्लियरेंस सेल

भारत सरकार, वन एवं पर्यावरण मंत्रालय,

पर्यावरण भवन, सी.जी.ओ. 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 क्लियरेंस।

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

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

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।

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2. वर्तमान प्रस्ताव में उपरोक्त स्वीकृत खादानों की क्षमता सामरी के लिये 1.0 LPTA से बढ़ाकर 5.0 LPTA किया जाना, कुदाग के लिये 0.4 LPTA से बढ़ाकर 0.6 LPTA किया जाना एवं टाटीझरिया के लिये 50,000 TPA से बढ़ाकर 4,00,000 TPA किया जाना प्रस्तावित है। भारत सरकार पर्यावरण व वन मंत्रालय के द्वारा उपरोक्त वृद्धि हेतु प्रथम चरण की स्वीकृति क्रमांक आदेश क्रमांक J-11015/353/2007-IA.II/M दिनांक 27 जुलाई 2007, J-11015/354/2007-IA.II/M दिनांक 27 जुलाई 2007 एवं J-11015/337/2007-IA.II/M दिनांक 9 अगस्त 2007 द्वारा कुछ शर्तों के साथ दी गई है। जिसमें एक महत्वपूर्ण शर्त यह भी उल्लेखित है कि संबंधित क्षेत्र में वन्य प्राणी (संरक्षण) अधिनियम 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 सूचि 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 है। प्रस्तावित क्षेत्र से 6 से 7 कि.मी.की दूरी पर झारखंड राज्य में भेड़िया अभ्यारण्य भी स्थापित है। अतः संस्था द्वारा दस वर्षों के लिये वन्य प्राणी संरक्षण व प्रबंध योजना श्री पी. के. सेन पूर्व वन्य प्राणी अभिरक्षक, झारखंड से तैयार कराया जाकर प्रस्तुत किया गया है। जिसका समग्र व विस्तृत अध्ययन किया गया। प्रबंधन योजना में प्रस्तावित प्रबंधन संबंधित मुख्य गतिविधियों का विवरण निम्नानुसार है।
 5. योजना में वन्य प्राणियों के लिये जलग्रहण क्षेत्र विकास, रहवास-विकास, पेयजल व्यवस्था, विभाग के क्षेत्रीय अमले के सहयोग से क्षेत्र में पेट्रोलिंग व मॉनिटरिंग, अग्नि सुरक्षा, ईको विकास की गतिविधियाँ, स्थानीय ग्रामीणों के लिये आजीविका सृजन, टीकाकरण, जनजागृति कार्यक्रम जैसी गतिविधियों का

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

Sr. No.	Works to be done	Cost for Four years (Rs. In lakhs)					Remarks
		1 st Year	2 nd Year	3 rd Year	4 th Year	Total	
1	Plantation including soil and moisture Conservation works as per norms of forest department surrounding the lease hold	5.00	5.00	5.00	5.00	20.00	
2	Silvicultural Operation on degraded forest Land and cut back in rooted waste	2.00	2.00	2.00	2.00	8.00	
3	Habitat Management Eradication of unwanted species in buffer Zone area, Fire Protection work including wages for fire watchman, Creation of Fire line etc. surrounding lease hold and in buffer area.	2.50	2.50	2.50	2.50	10.00	
4	Monitoring - One Staff of forest department to monitor movement of wild life, encroachment, illicit cutting, poaching, fire etc. including Salary of 1 staff	3.00	3.00	3.00	3.00	12.00	
5	Construction of water holes, their maintenance and patrolling (One per Annum)	10.00	10.00	10.00	10.00	40.00	
6	Eco-development activities like poultry, piggery, bee keeping etc.	5.00	5.00	5.00	5.00	20.00	
7	Vocational Training to weaker section, females, old persons and minors of the surrounding villages in three centre in the buffer Zone of the mining lease @ 50000/- per centre.	3.00	3.00	3.00	3.00	12.00	
8	Veterinary camp for immunization of Cattle with the help of block veterinary staff.	2.00	2.00	2.00	2.00	8.00	
9	Awareness Programme including Signages, distribution of Pamphlets related to wild life conservation etc.	2.50	2.50	2.50	2.50	10.00	
10	Provision for conservation of Biodiversity among flora and fauna of the area & Preparation of Biodiversity register	20.00	0.00	0.00	0.00	20.00	The amount is to be deposited in the account of Biodiversity Board as this work is to be done by 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 रू. 160.00 लाख वर्तमान दरों पर है, परियोजना में देरी होने से यह लागत बढ़ेगी जिसमें प्राईस इन्डेक्स के हिसाब से वृद्धि होगी। परियोजना के क्रियान्वयन के समय जो भी लागत आयेगी वह परियोजना प्रस्तावकों को वन विभाग में एकमुश्त जमा करानी होगी। जिससे मूल्य वृद्धि के प्रभाव का समाप्त किया जा सके। वन विभाग एकमुश्त जमा की गई राशि से वन्यप्राणी संरक्षण योजना क्रियान्वित करेगा।
- 7 अनुमोदित वन्यप्राणी संरक्षण योजना की एक प्रति संलग्न प्रेषित है। कृपया वन्यप्राणी संरक्षण योजना में प्रावधानित राशि रू. 160.00 लाख एकमुश्त जमा कराने हेतु परियोजना प्रस्तावकों को आदेशित करने का कष्ट करें।

संलग्न:-उपरोक्तानुसार।

A. Prakash
(रामप्रकाश) 01/11/13

प्रधान मुख्य वन संरक्षक (वन्यप्राणी)

छत्तीसगढ़, रायपुर

रायपुर दिनांक 01/10/2013

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

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 बॉक्सार्ट माइन्स, पोस्ट-कुसनी, जिला-सरगुजा, छत्तीसगढ़ की ओर मय योजना की प्रति सहित सूचनार्थ प्रेषित।

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

Annexure - B


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

Annexure-6

Details of Flora and Fauna

**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 cyendrica</i>	Grass	Poaceae
<i>Themeda quadrivalvis</i>	Grass	Poaceae
<i>Aristida adscensionsis</i>	Grass	Poaceae
<i>Eragrostis biferia</i>	Grass	Poaceae
<i>Eragrostis tenella</i>	Grass	Poaceae
<i>Setaria glauca</i>	Grass	Poaceae
<i>Thysanolaena maxima</i>	Grass	Cyperaceae
<i>Parthenium hysterophorus</i>	Congress grass	Graminae
<i>Cassia tora</i>	-	Compositae
<i>Delonix regia</i>	Kachnar	Caesalpinaceae
<i>Dalbergia Sissoo</i>	Sisoo	Caesalpinaceae

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

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

Sr. No.	Technical Name	Family	Life Form
			Phanerophyte
30	<i>Azadirachta indica</i>	Meliaceae	Phanerophyte
31	<i>Bauhinia variegata</i>	Caesalpinaceae	Phanerophyte
32	<i>Bauhinia purpuria</i>	Caesalpinaceae	Phanerophyte
33	<i>Bambusa arundanaceae</i>	Poaceae	Phanerophyte
34	<i>Butea monosperma</i>	Caesalpinaceae	Phanerophyte
35	<i>Butea frondosa</i>	Caesalpinaceae	Phanerophyte
36	<i>Eucalyptus sp</i>	Myrtaceae	Phanerophyte
37	<i>Delonix regia</i>	Caesalpinaceae	Phanerophyte
38	<i>Leucena leucophloe</i>	Caesalpinaceae	Phanerophyte
IV. Natural Vegetation / Forest Type			
39	<i>Abrus precatorius</i>	Fabaceae	Therophyte
40	<i>Abutilon indicum</i>	Malvaceae	Phanerophyte
41	<i>Acacia Arabica</i>	Mimosaceae	Phanerophyte
42	<i>Acacia auriculiformis</i>	Mimosaceae	Phanerophyte
43	<i>Acacia catechu</i>	Mimosaceae	Phanerophyte
44	<i>Acacia intinsia</i>	Mimosaceae	Phanerophyte
45	<i>Acacia fernacea</i>	Mimosaceae	Phanerophyte
46	<i>Acacia leucophloe</i>	Mimosaceae	Therophyte
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	Phanerophyte
51	<i>Adina cordifolia</i>	Rubiaceae	Phanerophyte
52	<i>Aegle marmelos</i>	Rutaceae	Phanerophyte
53	<i>Aerva lanata</i>	Compositae	Therophyte
54	<i>Ageratum conyzoides</i>	Compositae	Phanerophyte
55	<i>Ailanthus excelsa</i>	Simaroubaceae	Phanerophyte
56	<i>Alangium salivus</i>	Alangiceae	Phanerophyte
57	<i>Albizia odoratissima</i>	Caesalpinaceae	Phanerophyte
58	<i>Albizia procera</i>	Caesalpinaceae	Phanerophyte
59	<i>Alstonia scholaris</i>	Apocyanaceae	Therophyte
60	<i>Alternanthera sessilis</i>	Amaranthaceae	Therophyte
61	<i>Alysicarpus hamosus</i>	Fabaceae	Phanerophyte
62	<i>Anogeissus latifolia</i>	Combretaceae	Phanerophyte
63	<i>Anogeissus serica</i>	Combretaceae	Phanerophyte
64	<i>Argemone mexicana</i>	Papevaraceae	Phanerophyte
65	<i>Azadirachta indica</i>	Meliaceae	Phanerophyte
66	<i>Barleria prionoites</i>	Acanthaceae	Therophyte
67	<i>Bidens biternata</i>	Compositae	Phanerophyte
68	<i>Blepharis asperima</i>	Acanthaceae	Therophyte
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	Phanerophyte
73	<i>Bombax ceiba</i>	Bombacaceae	Therophyte
74	<i>Borreria hispida</i>	Rubiaceae	Therophyte
75	<i>Borreria stricta</i>	Rubiaceae	Phanerophyte
76	<i>Boswellia serrata</i>	Burseraceae	Therophyte
77	<i>Brassica camprestris</i>	Cruciferae	Phanerophyte
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	Therophyte
83	<i>Capparis aphylla</i>	Capparidaceae	Phanerophyte
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	Therophyte
89	<i>Cassia absus</i>	Caesalpinaceae	Therophyte
90	<i>Cassia auriculata</i>	Caesalpinaceae	Therophyte
91	<i>Cassia occidentalis</i>	Caesalpinaceae	Phanerophyte
92	<i>Cassia tora</i>	Caesalpinaceae	Theophyte
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 melanoxyton</i>	Lythraceae	Phanerophyte
108	<i>Diospyros Montana</i>	Lythraceae	Phanerophyte
109	<i>Echinops echinatus</i>	Compositae	Therophyte
110	<i>Eclipta prostrate</i>	Compositae	Hemicryptophyte
111	<i>Emblia officinale</i>	Euphorbiaceae	Phanerophyte
112	<i>Emilia lajerium</i>	Compositae	Hemicryptophyte
113	<i>Erythrina indica</i>	Papilionaceae	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 rellsiosa</i>	Moraceae	Phanerophyte
130	<i>Ficvus gibbosa</i>	Moraceae	Phanerophyte
131	<i>Gardenia latifolia</i>	Rubiaceae	Phanerophyte
132	<i>Gardenia lucida</i>	Rubiaceae	Phanerophyte
133	<i>Garuga pinnata</i>	Burseraceae	Phanerophyte
134	<i>Glossocardia bosvellia</i>	Compositae	Hemicryptophyte
135	<i>Gmellna arborea</i>	Rubiaceae	Phanerophyte
136	<i>Gomphrena globosa</i>	Amaranthaceae	Therophyte
137	<i>Gossyplum 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>Hellotropium indicum</i>	Rubiaceae	Hemicryptophyte
144	<i>Helltropium ovalifolium</i>	Rubiaceae	Hemicryptophyte
145	<i>Hemidesmus indicus</i>	Asclepiadaceae	Phanerophyte
146	<i>Hilbsicus 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 paradisiaca</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 umbellata</i>	Convolvulaceae	Therophyte
210	<i>Oldenlandia corymbosa</i>	Rubiaceae	Therophyte
211	<i>Oogeinia oojensis</i>	Papilionaceae	Phanerophyte
212	<i>Opuntia dillinii</i>	Opuntiaceae	Therophyte
213	<i>Opuntia elator</i>	Cacataceae	Therophyte
214	<i>Oxalis corniculata</i>	Oxalidaceae	Therophyte
215	<i>Panicum milliria</i>	Poaceae	Hemicryptophyte
216	<i>Panicum notatum</i>	Poaceae	Hemicryptophyte
217	<i>Papaver somniferum</i>	Papaveraceae	Hemicryptophyte
218	<i>Parkinsonia aculata</i>	Mimosaceae	Phanerophyte
219	<i>Parthenium hysterophorus</i>	Compositae	Therophyte
220	<i>Paspalum strobilanthus</i>	Passifloraceae	Hemicryptophyte
221	<i>Passiflora foetida</i>	Passifloraceae	Phanerophyte
222	<i>Pavonia zeylanica</i>	Malvaceae	Phanerophyte
223	<i>Peltophorum ferrusinum</i>	Caesalpinaceae	Phanerophyte
224	<i>Phoenix aculis</i>	Palmae	Phanerophyte
225	<i>Phyllanthus asperulatus</i>	Euphorbiaceae	Phanerophyte
226	<i>Phyllanthus emblica</i>	Euphorbiaceae	Phanerophyte

Sr. No.	Technical Name	Family	Life Form
227	<i>Phyllanthes nirurii</i>	Euphorbiaceae	Therophyte
228	<i>Phyllanthes 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 dumatorum</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>Sygygium cumini</i>	Myrtaceae	Phanerophyte
256	<i>Tamarindus indica</i>	Caesalpinaceae	Phanerophyte
257	<i>Tecomella undulate</i>	Bignoniaceae	Therophyte
258	<i>Tectona grandis</i>	Verbinaceae	Phanerophyte
259	<i>Tephrosia purpuria</i>	Fabaceae	Therophyte
260	<i>Terminalia bellarica</i>	Combretaceae	Phanerophyte
261	<i>Terminalia chebula</i>	Combretaceae	Phanerophyte
262	<i>Terminalia tomentosa</i>	Combretaceae	Phanerophyte
263	<i>Tinospora cordifolia</i>	Rhamnaceae	Therophyte
264	<i>Tragus biflorus</i>	Poaceae	Hemicryptophyte
265	<i>Tribulus terrestris</i>	Zygophyllaceae	Therophyte
266	<i>Tridax procumbens</i>	Compositae	Therophyte
267	<i>Triumferta pilosa</i>	Tiliaceae	
268	<i>Vernonia cinera</i>	Compositae	Therophyte
269	<i>Vicoa indica</i>	Compositae	Phanerophyte
270	<i>Vitex Negundo</i>	Verbinaceae	Phanerophyte
271	<i>Vitex negungo</i>	Verbinaceae	Therophyte
272	<i>Vitis vermifera</i>	Vitaceae	Therophyte
273	<i>Vivevera zizanoides</i>	Poaceae	Therophyte
274	<i>Wrightia tomentosa</i>	Apocyanaceae	Phanerophyte
275	<i>Xanthium strumariumk</i>	Compositae	Therophyte
276	<i>Yucca gloriosa</i>	Agavaceae	Therophyte
277	<i>Zizyphus jujube</i>	Rhamnaceae	Phanerophyte
278	<i>Zizyphus mauritiana</i>	Rhamanaceae	Phanerophyte
V. Grasslands			
279	<i>Apluda mutica</i>	Poaceae	Hemicryptophyte
280	<i>Chloris dolichosta</i>	Poaceae	Hemicryptophyte
281	<i>Cyanodactylon sp</i>	Poaceae	Geophyte
282	<i>Dichanthium annulatum</i>	Poaceae	Hemicryptophyte
283	<i>Inpurta cylendrica</i>	Poaceae	Hemicryptophyte
284	<i>Sachharum spontanseum</i>	Poaceae	Hemicryptophyte
285	<i>Themeda quadrivalvis</i>	Poaceae	Hemicryprophyte
286	<i>Aristida adscensionsis</i>	Poaceae	Hemicryptophyte
287	<i>Cenchrus ciliaris</i>	Poaceae	Therophyte
288	<i>Cenchrus setifqera</i>	Poaceae	Therophyte
289	<i>Cymbopogon jwarancusa</i>	Cyperaceae	Hemicryptophyte
290	<i>Cyperus aristatus</i>	Cyperaceae	Therophyte
291	<i>Cyperus triceps</i>	Cyperaceae	Therophyte

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

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

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

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

Technical Name	English Name/Local Name	Wild Life Protection Act (1972) Status
Aves		
<i>Phalacrocorax niger</i>	Little cormorant	Sch-IV
<i>Ardea purpurea manilensis</i>	Eastern purple heron	Sch-IV
<i>Nycticorax nycticorax</i>	Night heron	Sch-IV
<i>Ardeola grayii grayii</i>	Paddy bird	Sch-IV
<i>Dupetor flavicollis</i>	Black bittern	Sch-IV
<i>Ardea alba modesta</i>	Large egret	Sch-IV
<i>Bubulcus ibis coromandus</i>	Cattle egret	Sch-IV
<i>Milvus migrans govinda</i>	Common pariah kite	Sch-IV
<i>Haliastur indus indus</i>	Brahminy kite	Sch-IV
<i>Vanellus indicus indicus</i>	Redwattled lapwing	Sch-IV
<i>Tringa hypoleucos</i>	Common sandpiper	Sch-IV
<i>Gelochelidon nilotica nilotica</i>	Gullbilled tern	Sch-IV
<i>Eudynamys scolopacea</i>	Indian koel	Sch-IV
<i>Halcyon smyrnensis fusca</i>	Indian white breasted Kingfisher	Sch-IV
<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>Nectarenia. 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 ceylonensis</i>	Southern magpie-robin	Sch-IV
<i>Orthotomus sutorius</i>	Tailor bird guzurata	Sch-IV
<i>Pavocristatus</i>	Peacock	Part-III of Sch-I
Amphibians		
<i>Rana tigrana</i>	Common frog	Sch-IV
<i>Buto melanosticus</i>	Toad	Sch-IV
Reptiles		
<i>Calotes versicolor</i>	Lizard	Sch-IV
<i>Calotes versicolor</i>	Common garden lizard	Sch-IV
<i>Chamaleon 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>Vipera spp.</i>	Russels viper	Sch-III
<i>Phyton sp</i>	Python sp	Sch-I
Butterflies		
<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>Neptis hylas Moore</i>	Common sailor	-
<i>Eurema hecabe Lin.</i>	Common grass yellow	-
<i>Catopsilla sp.</i>	Emigrant	-
Mammals		
<i>Rattus sp.</i>	Rat	Sch-IV
<i>Lepus nigricollis</i>	Hare	Sch-IV
<i>Canis auries</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 sucrofa</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>Melsurus ursinus</i>	Bear	Sch-III
<i>Hystrix indica</i>	Porcupine	Sch-IV
<i>Axis axis</i>	Spotted deer	Sch-III
<i>Canis lupaspallipes</i>	Indian wolf	Part-I of Sch-I
<i>Mellivora capensis</i>	Indian Ratel	Part-I of Sch-I
<i>Elephas maximas</i>	Indian Elephant	Part-I of Sch-I
<i>Felis chaus</i>	Jungle cat	Part-II of sch-II
<i>Parodoxurus hermophroiditus</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

Hindalco Industries Ltd.
Mines Division, Samripat

Year wise / Lease wise Details of Afforestation

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


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.

(8)

KUDAG

दूरभाष
 Telegram PARYAVARAN
 NEW DELHI
 दूरभाष :
 Telephone :
 टैलेक्स (द्विभाषीय) :
 Telex : (bi-lingual) : W-65185 DOE IN
 FAX : 4360678

भारत सरकार
 पर्यावरण एवं वन मंत्रालय
 GOVERNMENT OF INDIA
 MINISTRY OF ENVIRONMENT & FORESTS
 पर्यावरण भवन, लो. लो. ओ. कॉम्प्लेक्स
 PARYAVARAN BHAWAN, C.G.O. COMPLEX
 लोदी रोड, नई दिल्ली - 110003
 LOOHI ROAD, NEW DELHI - 110003
 Dated: 17 March, 1996.

No. 8-24/95-FC

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

Sub: Diversion of 124.109 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.5/17/95/10/3 dated 9.3.95 on the above mentioned subject seeking prior approval of the Central Government in accordance with Section-2 of the Forest (Conservation) Act, 1980 and to say that the proposal has been examined by the Advisory Committee constituted by the Central Government under Section-3 of the aforesaid Act.

2. After careful consideration of the proposal of the State Government and on the basis of the recommendation of the above mentioned Advisory Committee, the Central Government hereby conveys its approval under Section-2 of the Forest (Conservation) Act, 1980 for diversion of 124.109 ha. of revenue forest land in favour of M/s HINDALCO Industries Ltd. for Bauxite mining in District Sarguja subject to the following conditions:

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

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

Yours faithfully,

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

Copy to:

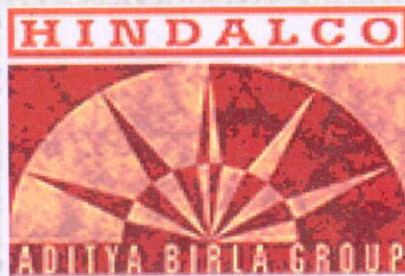
1. The Principal Chief Conservator of Forests
Government of Madhya Pradesh, Bhopal.
2. Nodal Officer, Office of the Principal Chief Conservator
of Forests, Govt. of Madhya Pradesh, Bhopal.
3. The CCF (Central), Regional Office, Bhopal.
4. RO(HQ), New Delhi.
5. Guard file.

19.3.96
(R.K. CHAUDHRY)
AIGF.

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

Duration: January-February-March-2017

Name of Industry



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

M/s. Hindalco Industries Limited.,

Name of Laboratory:-



Recognised by MoEF (GOI) Notifn. No. D.L.33004/99 Dt.24.10.2007
NABL T-1550 (Chemical), T-1826 (Biological), T-2344 (Mechanical) dt.04/10/2016 valid up to 03.10.2018
Accredited under the QCI-NABET Scheme for EIA Consultant
BIS vide No.CL/CQAPD/OSL (7124116) dt.16.12.2011
Certified by ISO 9001:2008, ISO 14001:2004, ISO 18001:2007
Head Office: 60, Bajiprabhu Nagar, Nagpur-440 033, MS
Lab. : FP-34, 35, Food Park, MIDC, Butibori, Nagpur – 441122
Ph.: (0712) 2242077, 9373287475 Fax: (0712) 2242077
Email: labngp@anacon.in
info@anacon.in
Website: www.anaconlaboratories.com,

Foreword

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

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

This report presents the Environmental Status for the period **January-2017 to March-2017** as compliance to the statutory requirements.

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

for **ANACON LABORATORIES PVT. LTD.**



A handwritten signature in blue ink, appearing to read "S. K. Sawant".

Authorized Signatory

Place : Nagpur

Date : March, 2017

1.1 Introduction

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

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

HINDALCO INDUSTRIES LTD., awarded the work to M/s ANACON LABORATORIES PVT. LTD. Nagpur(ALPL) for carrying out Environmental monitoring of parameters for assessing pollution levels and preparation of monthly reports (*Jan-Feb-March-2017*) as per the requirement of Chhattisgarh Environment Conservation Board (CECB) and Ministry of Environment and Forest (MoEF) for Kudag mining lease in Balrampur District, Chhattisgarh State.

1.2 Background Information of Kudag Mine

Hindalco was granted Kudag Bauxite mining lease over an area of 377.116 hec. Kudag village in Post office Dumarkholi, Tehsil Samri(Kusmi) of Balrampur district Chhattisgarh on 24/12/1996 for a period of 20 years. The mining operations were started on 02/07/1997. The production capacity of Bauxite is 0.6 Lakh Tonnes Per Annum (LTPA)

1.3 Salient Features of Kudag Bauxite Mine

The deposits occur in Kudag block, Post office Dumarkholi Tehsil Samri(Kusmi) of Balrampur district. This deposit has been identified as one of the resources to cater the raw material requirements of the Hindalco Alumina refinery at Renukoot, Uttar Pradesh. The salient features of the project are presented below: **(Table 1)**



Table 1

Salient Features of Kudag Bauxite Mines

S.No.	Particulars	Details
1.	Survey of India Toposheet No.	64 M /15
2.	Latitude	23 ^o 26' 02"N to 23 ^o 29' 00"N
3.	Longitude	83 ^o 51' 00"E to 83 ^o 59' 00"E
4.	Elevation	1145-m above Mean Sea Level
5.	Climatic Conditions (as per IMD, Ambikapur)	Annual maximum temperature : 30.3 ^o C Annual minimum temperature : 17.7 ^o C Average annual rainfall : 1401.1 mm
6.	Mining lease area	377.116 Hec.
7.	Method of mining	Open cast (Semi-Mechanized)
8.	Mode of transportation	Trucks
9.	Landuse	Agricultural and Barren land
10.	Nearest Road	Samri to Kusmi (17 km)
11.	Nearest Airport	Ranchi Airport (151.09 Km)
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 condition the monitoring program will serve as an indicator for any deterioration in environment conditions due to mining operation of the project. Suitable mitigation steps will be taken time to safeguard the environment based on monitoring reports. Monitoring is important the control of pollution since the efficiency of control measures can only be determined by monitoring.

In order to find out the impact of mining activity on sensitive receptors, it is necessary to monitor Environmental Quality to know the level of concentrations of pollutants within and around the mining lease area. Accordingly Hindalco Industries through ALPL has been monitoring air, water and noise quality on monthly basis during these months. **(Table-2)**.

1.5 Air Environment

1.5.1 Ambient Air Quality Monitoring

Ambient Air Quality and Fugitive emission monitored at 8 following locations with reference to Kudag mine lease area shown in (Fig. 1).

Table 2

Locations of Ambient Air Quality Monitoring (AAQM) & Fugitive Emission
(377.116 hec.)

Sr. No.	Core Zone	Sr.	Buffer Zone
1	Sairaidh Campus	5	Jaljali Village
2	New Kudag/Nr. Weigh Bridge	6	Samri Chowk/Nr. Old Weigh Bridge
3	Old Kudag/Mining Area	7	Rajendrapur
4	Khas Kudag	8	Tatijharia Village

The sampling stations are selected at the above mentioned locations, in downwind and upwind directions of the mining site. ALPL is carrying out regular monitoring for PM_{2.5}, RPM (PM₁₀), SO₂, NO_x and SPM, RSPM, SO₂, NO_x, Pb, Hg, As and Cr at above Ambient Air Quality Monitoring (AAQM) locations and Fugitive Emission. The dust fall rate was measured in the mining area and Khaskudag during January-February-March-2017. The AAQM sampling sites are selected considering seasonal variation in wind speed and wind direction.

Sampling Duration and Frequency

Ambient air quality monitoring was carried out for the parameters PM_{2.5}, RPM (PM₁₀), SO₂, NO_x and SPM, RSPM, SO₂, NO_x, Pb, Hg, As and Cr from January-February-March-2017 as per CPCB norms. Sampling conducted duration and Frequency is given in (Table 3).

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



MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

Methods and Instruments used for Sampling

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

The levels of Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Pb, Hg, As and Cr were monitored for establishing the baseline status. SPM and RPM was collected with the help of Respirable Particulate Sampler operating 24 hours by drawing air which passes through the cyclone at the rate of 1-1.3 m³/min which collects the particles less than 10 µm diameter over glass fiber filter paper and the bigger particulates from 10 to 100 µm are collected into the cup provided at the bottom of the cyclone. The dust deposited over the filter paper is measured as RPM and the smaller particulates from 2.5 µm are collected into the Membrane Filter Paper. The dust fall rate was measured using dust fall jar. The jar was exposed for one month in the mining area and Samri Chowk during pre and post monsoon period. The jar was filled with 2 lit of distilled water. The water in the jar is mixed with copper sulphate solution (0.02 N solution) to prevent any growth of algae. The water level in the jar is constantly maintained in such a way that 2 lit of water is always retained. The measurement techniques used for various pollutants and other details are given in **(Table 4)**.

Sampling was carried out continuously for 24 hourly monitoring twice a week at each station during the stipulated study period using pre-calibrated Respirable Dust Sampler in each of the stations.

Earmarked samples were collected for Particulate Matter-PM₁₀, Particulate Matter-PM_{2.5}, SO₂ and NO_x for 24 hourly. Collected samples were sent to Laboratories for analysis.

The baseline data of air environment is generated for the parameters namely:

Suspended Particulate Matter (SPM), Particulate Matter (PM₁₀), Particulate Matter (PM_{2.5}), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Lead (Pb), Mercury (Hg), Arsenic (As) and Chromium (Cr). **Table-4.0**



Table-3.0

Parameters	Sampling frequency
Suspended Particulate Matter	24 hourly sample twice a week for Three months
Respirable Particulate Matter	24 hourly sample twice a week for Three months
Particulate Matter 2.5	24 hourly sample twice a week for Three months
Sulphur dioxide (SO ₂)	24 hourly sample twice a week for Three months
Oxides of Nitrogen (NOx)	24 hourly sample twice a week for Three months
Pb, Hg, As, Cr	8 hourly basis for 24 hour sample for three months

Table 4.0

Measurement Techniques for various pollutants

S.No.	Parameter	Technique	Technical Protocol	Minimum Reportable Value (µg/ m ³)
1.	Suspended Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part - 23)	5
2.	Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part-23)	5
3.	Particulate Matter 2.5	Respirable Dust Sampler (Gravimetric Method)	Gravimetric Method	5
4.	Sulphur Dioxide	Modified West and Gaeke	IS-5182 (Part - II)	4
5.	Oxide of Nitrogen	Jacob & Hochheiser Method	IS-5182 (Part - VI)	4
6.	Pb, As, Hg, Cr	Acid Digestion Method	EPA Method	0.1
7.	Mercury (Hg)	By Cold Vapor atomic Absorption	IS-5182 (Part-I)	0.001
8.	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 February-March-2017 are presented in detail in **Table 6.0**. 98th percentile; n and minimum values etc have been computed from the collected raw data from Fugitive monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQ for residential zone.

1.6.1 Presentation of Results.

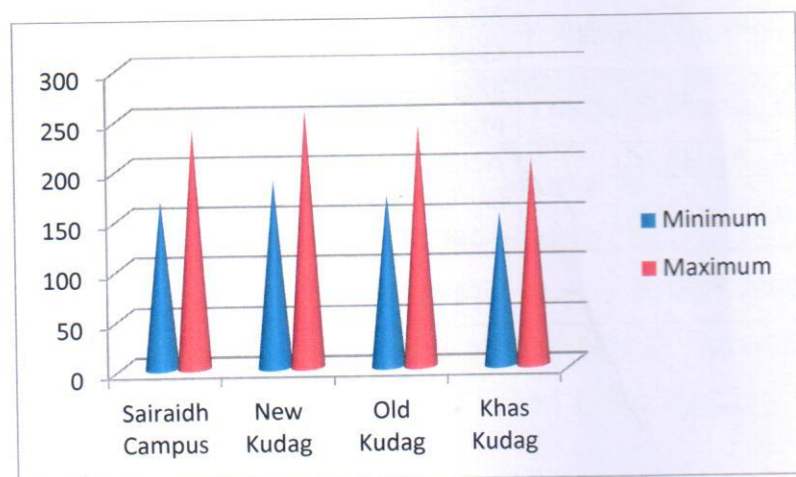
Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 152 $\mu\text{g}/\text{m}^3$ and 258 $\mu\text{g}/\text{m}^3$ respectively. The concentrations were ranged between 161 to 228 $\mu\text{g}/\text{m}^3$. and 98th percentile ranged between 169 to 257 $\mu\text{g}/\text{m}^3$ in the study area

(Table 6).

Graphical Presentation Of Fugitive Emission Monitoring

SPM

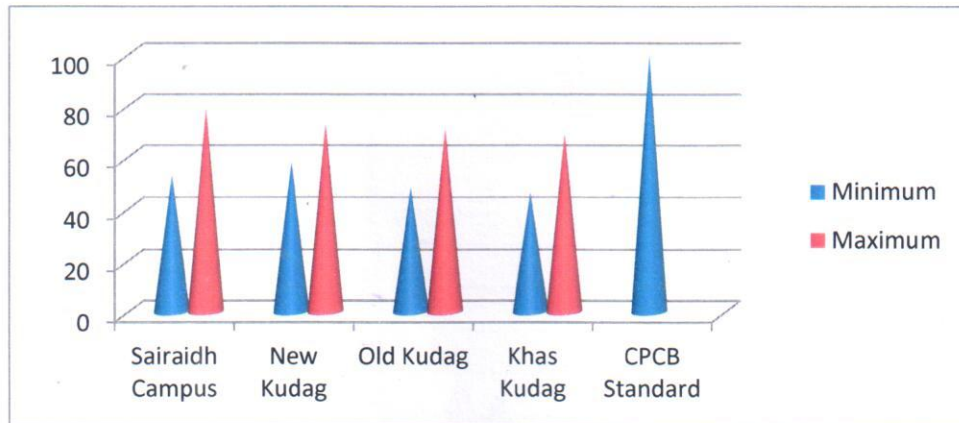


Respirable Suspended Particulate Matter –RSPM

The minimum and maximum concentrations for RSPM were recorded as 4 $\mu\text{g}/\text{m}^3$ and 79 $\mu\text{g}/\text{m}^3$ respectively. The average values were observed to be in the range of 53 to 71 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 59 to 79 $\mu\text{g}/\text{m}^3$ in the study area (**Table 7**).

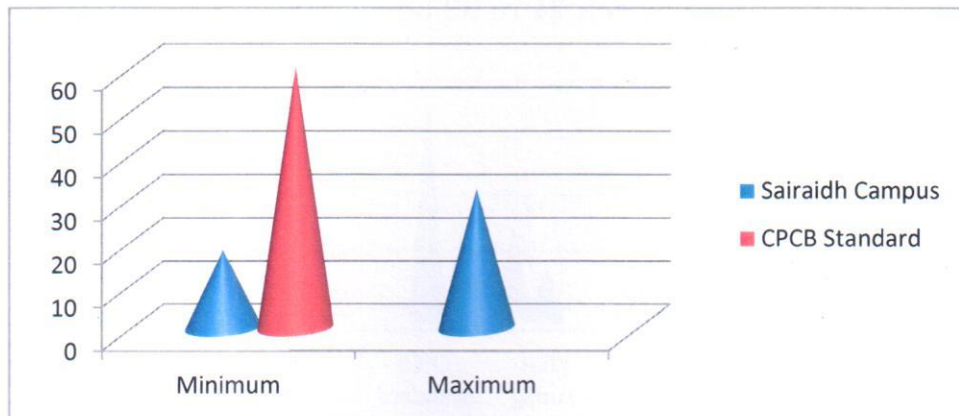
Graphical Presentation Of Fugitive Emission Monitoring

RSPM



Particulate Matter -PM_{2.5}

The minimum and maximum values of PM_{2.5} concentrations varied between 1 to 32 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 21 to 29 $\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 24 to 32 $\mu\text{g}/\text{m}^3$ (**Table 8**).

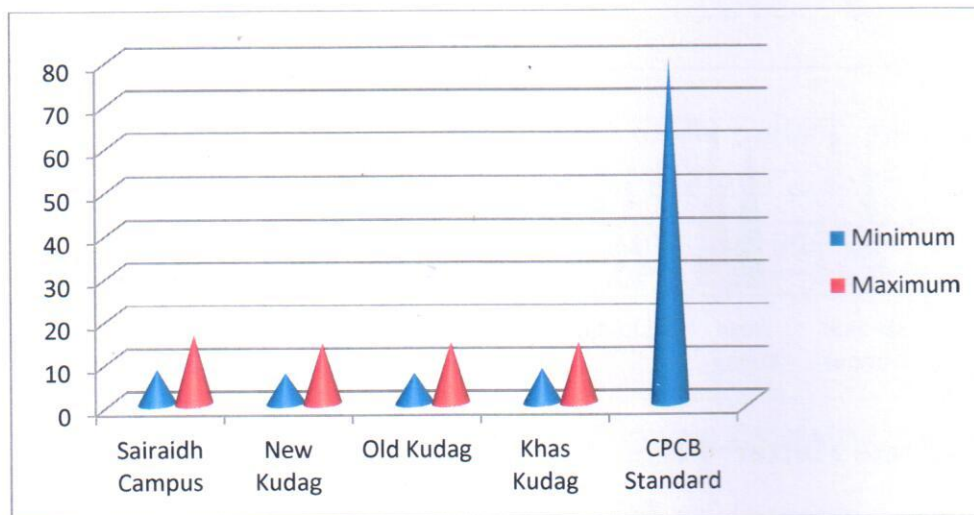


Sulphur Dioxide (SO₂)

The minimum and maximum SO₂ concentrations were recorded as 7 µg/m³ and 16 µg/m³ respectively. The average values were observed to be in the range of 10 to 14 µg/m³ and 98th percentile values varied between 9 to 16 µg/m³. **(Table 9).**

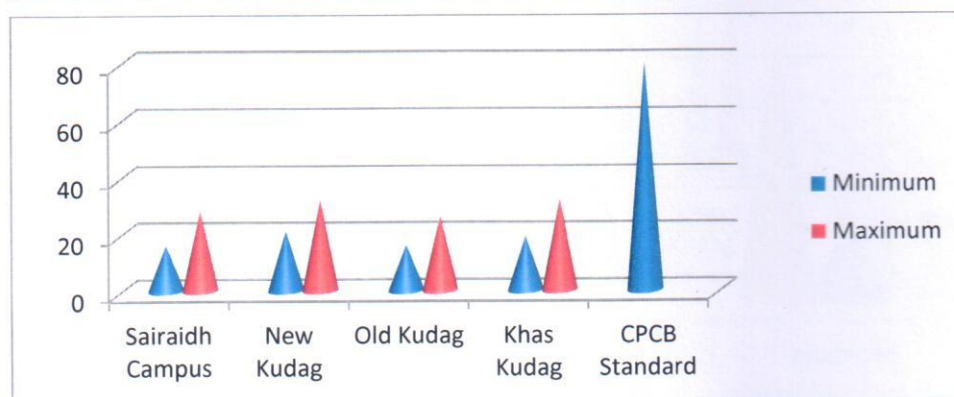
Graphical Presentation Of Fugitive Emission Monitoring

SO₂



Nitrogen Oxide (NO_x)

The minimum and maximum NO_x concentrations were recorded as 16 µg/m³ and 32 µg/m³. The average concentrations were ranged between 19 to 28 µg/m³ and 98th percentile values varied between 21 to 32 µg/m³. **(Table 10).**





Lead (Pb)

The minimum and maximum Lead detected between 0.029 to 0.082 $\mu\text{g}/\text{m}^3$ respectively. The average Lead detected between 0.038 to 0.070 $\mu\text{g}/\text{m}^3$ & 98th percentile values varied between 0.047 to 0.082 $\mu\text{g}/\text{m}^3$ 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, RSPM(PM₁₀), PM_{2.5}, SO₂, NO_x, Pb, Hg, As, Cr and Dust fall are required to compute Buffer Zone. 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**).

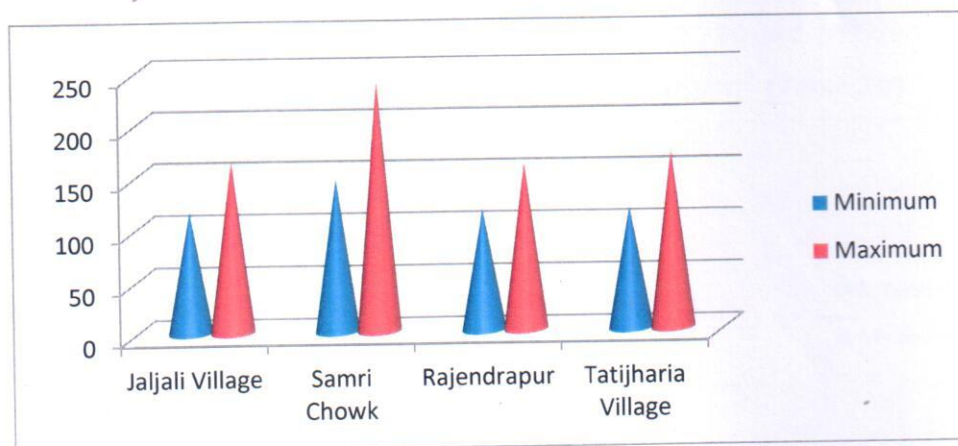
1.7.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the month January-February-March-2017 are presented in detail in **Table 6**. 98th percentile maximum and minimum values etc have been computed from the collected raw data at all the AAQ monitoring station. The data has been compared with the standard 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 Buffer Zone area. The minimum and maximum values varied between 116 to 239 µg/m³ respectively during the study period at all the 4 locations. The average values ranged between 124 to 198 µg/m³ and 98th percentile values ranged between 131 to 237 µg/m³ in the study area.

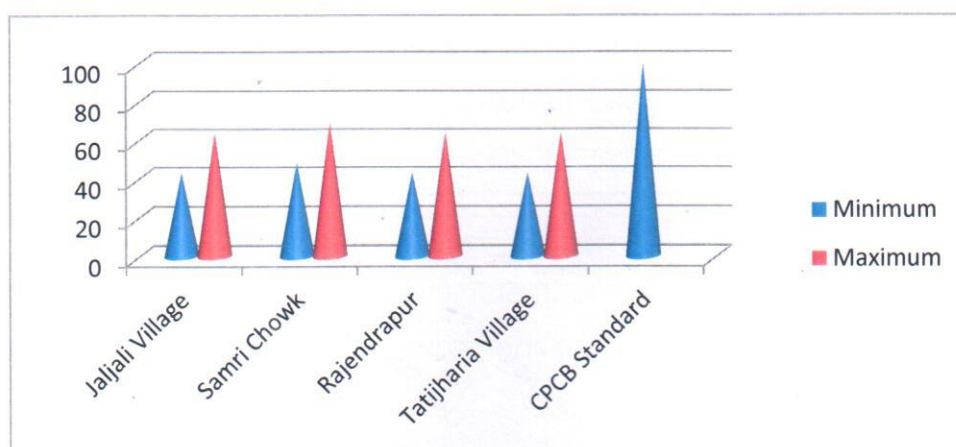
Graphical Presentation Of Ambient Air Quality (Buffer Zone)



Particulate Matter-RSPM

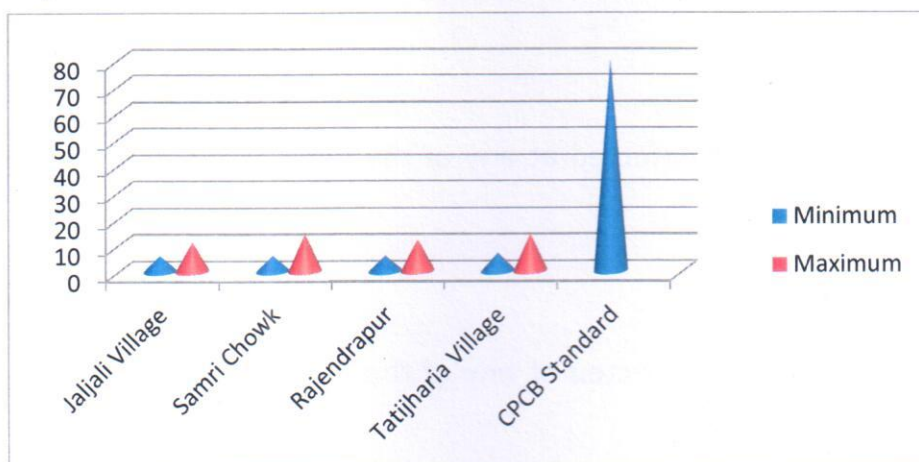
The minimum and maximum values of RSPM varied between 43 to 69 $\mu\text{g}/\text{m}^3$ respectively (**Table 7**). The average values varied between 47 to 62 $\mu\text{g}/\text{m}^3$. The 98 percentile values varied between 51 to 69 $\mu\text{g}/\text{m}^3$ in the mining area. The overall value of SPM and RSPM were well within the CPCB limits prescribe for industrial and residential area in the study area during the study period.

Graphical Presentation Of Ambient Air Quality (Buffer Zone) RSPM



Sulphur Dioxide (SO₂)

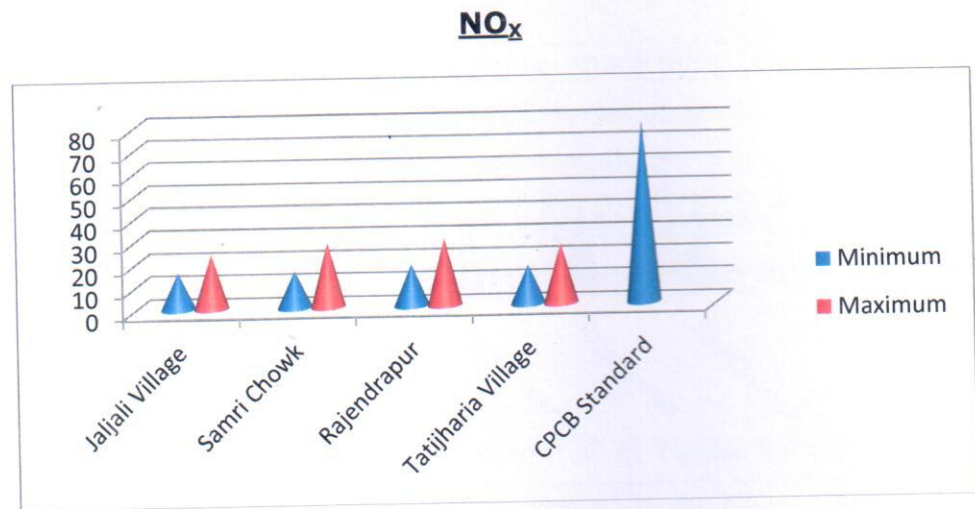
The minimum and maximum values of SO₂ concentrations varied between 7 to 14 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 7 to 13 $\mu\text{g}/\text{m}^3$ and 98 percentile values varied between 8 to 14 $\mu\text{g}/\text{m}^3$ (**Table 9**).



Nitrogen Oxide (NO_x)

The minimum and maximum values of NO_x concentrations varied between 18 to 29 µg/m³ respectively. The average values range between 18 to 25 µg/m³ and 95 percentile values varied between 19 to 29 µg/m³ (**Table 10**).

Graphical Presentation Of Ambient Air Quality (Buffer Zone)



Lead (Pb)

Lead was not detected at any of the locations in SPM samples as well as in RSPM Samples (**Table 11**).

Mercury (Hg)

Mercury was not detected at any of the locations in SPM samples as well as in RSPM Samples (**Table 12**).

Arsenic (As)

Arsenic was not detected at any of the locations in SPM samples as well as in 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 was measured by exposing a jar during January-February-March-2017 in Old Kudag/Mining Area and Khas Kudag village. The dust fall rate was observed to be 22.4 and 19.8 MT/km²/month respectively as given in **(Table 14)**.

Overall the ambient air concentrations of SPM, RSPM, SO₂, NO_x, Pb, As, Cr and Hg 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 (Jan-Feb-March-2017) indicates that wind was blowing predominantly from (NE and SW) directions, during study period, for 2.01 % wind was found to be calm. The details of wind pattern in the form of wind frequency distribution are presented in **table 1**. The wind rose diagram and graphical illustration is presented in **Figures 1 & 2** respectively.

Table.1
Wind Frequency Distribution Data

Sr.No.	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total (%)
1	348.75 - 11.25	1.5850	1.0086	0	0	0	0	2.5937
2	11.25 - 33.75	7.3487	2.8818	0	0	0	0	10.2305
3	33.75 - 56.25	9.0778	2.1614	0	0	0	0	11.2392
4	56.25 - 78.75	5.0432	0.8646	0	0	0	0	5.9078
5	78.75 - 101.25	3.3141	0.2882	0	0	0	0	3.6023
6	101.25 - 123.75	2.8818	1.4409	0	0.2882	0	0	4.6110
7	123.75 - 146.25	5.1873	1.4409	0	0	0	0	6.6282
8	146.25 - 168.75	3.6023	0.4323	0	0	0	0	4.0346
9	168.75 - 191.25	2.5937	0.7205	0	0	0	0	3.3142
10	191.25 - 213.75	1.5850	2.3055	0	0	0	0	3.8905
11	213.75 - 236.25	4.6110	5.3314	0.8646	0.1441	0	0	10.9511
12	236.25 - 258.75	3.6023	6.4841	1.0086	0.1441	0	0	11.2391
13	258.75 - 281.25	2.5937	2.5937	1.8732	0	0	0	7.0606
14	281.25 - 303.75	1.5850	1.4409	0	0	0	0	3.0259
15	303.75 - 326.25	2.3055	2.7378	0	0	0	0	5.0433
16	326.25 - 348.75	2.5937	1.7291	0.1441	0.1441	0	0	4.6110
	Sub-Total	59.5101	33.8617	3.8905	0.7205	0	0	97.9818
	Calms							2.0182
	Missing/Incomplete							0.0000
	Total							100.0000

SUMMARY OF WIND PATTERN

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

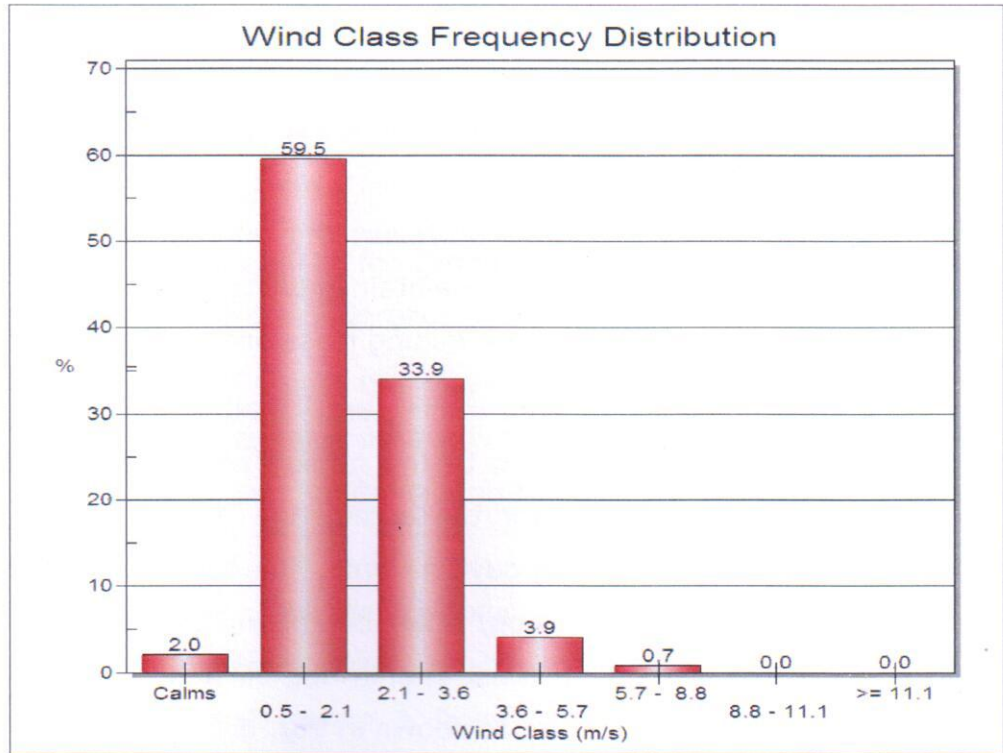


Figure.01: Wind Class Frequency Distribution

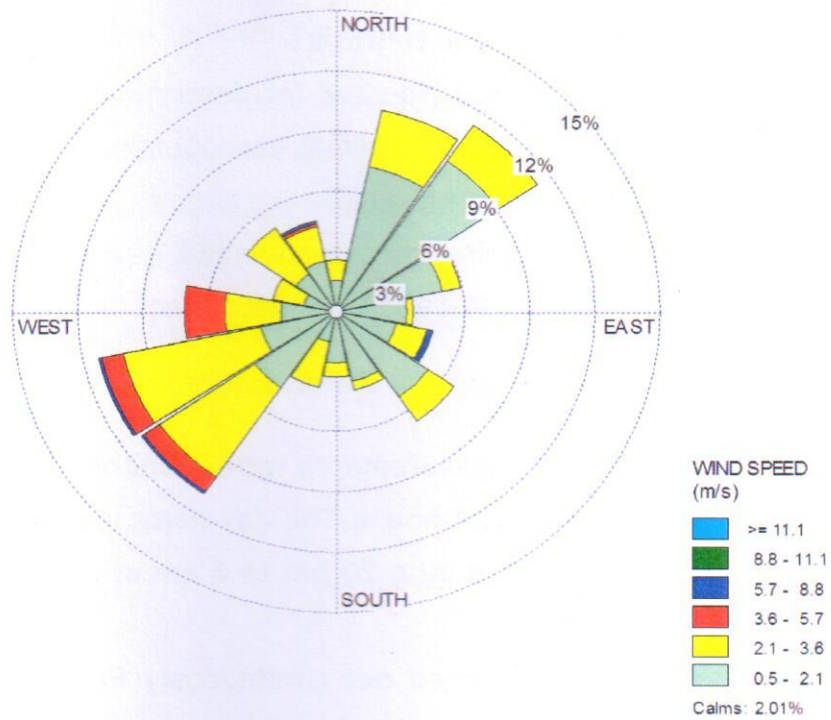


Figure.02: Wind Rose Diagram (Jan-Feb-March-2017)



1.9 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 control equipment. Noise monitoring carried out on monthly basis at mining site, Core Zone and Buffer Zone are as 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.

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.

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 eight locations are found to be below in the Mining Area than the stipulated standard of CPCB for Industrial area as 75dB(A) and 70dB(A) for day and night respectively as given in **(Table15)**.

2.0 Water Quality Monitoring

The existing status of water quality for ground water and surface water was assessed by collecting the water samples from underground wells from the mining area/old kudag.

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

The physico-chemical analysis of water samples collected during the study period is given in **(Table16 and Fig.5)**. The overall water quality found to be below the stipulated standards of IS 10500-2012 for ground water & found to be fit for drinking purpose for tested parameters. Thus the impacts due to mining activities have been found to be insignificant.

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

The water sample from Nallahs near Mines Area was collected to know its chemical characteristics in order to find out the use of water for various utilities in the mine area. As per IS : 10500:2012 for surface water results are within the permissible limit so that the water can be used after chlorination.

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



Table 6
Statistical Analysis of SPM

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2017	173	209	191	191	208
	February-2017	168	192	180	180	192
	March-2017	217	239	228	228	239
New Kudag/Nr. Weigh Bridge	January-2017	193	258	226	226	257
	February-2017	187	241	214	214	240
	March-2017	208	253	231	231	252
Old Kudag/Mining Area	January-2017	171	187	179	179	187
	February-2017	192	216	204	204	216
	March-2017	204	241	223	223	240
Khas Kudag	January-2017	152	169	161	161	169
	February-2017	161	193	177	177	192
	March-2017	169	207	188	188	206
CPCB Standard				---		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Jaljali Village	January-2017	116	131	124	124	131
	February-2017	124	153	139	139	152
	March-2017	139	164	152	152	164
Samri Chowk/ Nr.Old Weigh Bridge	January-2017	146	204	175	175	203
	February-2017	151	218	185	185	217
	March-2017	157	239	198	198	237
Rajendrapur	January-2017	116	147	132	132	146
	February-2017	121	152	137	137	151
	March-2017	129	159	144	144	158
Tatijharia Village	January-2017	116	143	130	130	142
	February-2017	121	156	139	139	155
	March-2017	137	169	153	153	168
CPCB Standard				---		

Conclusion-A:-

- 1) **Sairaidh Campus Lease Area Core Zone :-** For the Months of Jan-Feb-March-2017 Average of SPM is $200 \mu\text{g}/\text{m}^3$
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-**For the Months of Jan-Feb-March-2017 Average of SPM is $220 \mu\text{g}/\text{m}^3$
- 3) **Old Kudag/Mining Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $202 \mu\text{g}/\text{m}^3$.
- 4) **Khas Kudag Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SPM is $188 \mu\text{g}/\text{m}^3$.

- The Average Concentration of SPM within the core zone of Kudag Lease is $200 \mu\text{g}/\text{m}^3$.

Conclusion-B:-

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2017 Average of SPM is $138 \mu\text{g}/\text{m}^3$
- 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2017 Average of SPM is $186 \mu\text{g}/\text{m}^3$
- 3) **Rajendrapur Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2017 Average of SPM is $138 \mu\text{g}/\text{m}^3$
- 4) **Tatijharia Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-Mar-2017 Average of SPM is $141 \mu\text{g}/\text{m}^3$

- The Average Concentration of SPM within the Buffer Zone of Kudag Lease is $151 \mu\text{g}/\text{m}^3$

Monthwise Summary of Statistical Analysis of SPM

2.1 Fugitive Emission (Core Zone):-

2.1.1 Presentation of Results.

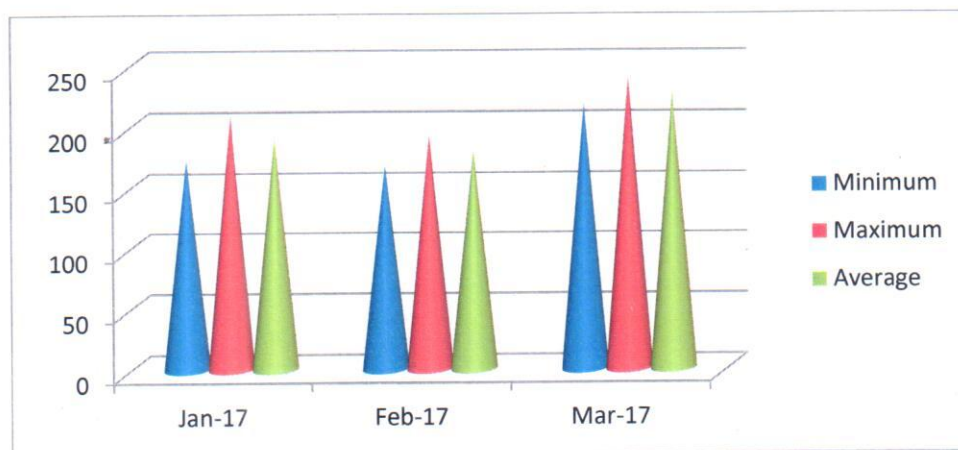
The summary of Statistical Analysis of SPM results for the month of January-2017 to March-2017 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January-2017 the minimum and maximum concentrations for SPM were recorded as 173 $\mu\text{g}/\text{m}^3$ and 209 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 191 $\mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for SPM were recorded as 168 $\mu\text{g}/\text{m}^3$ and 192 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 180 $\mu\text{g}/\text{m}^3$.

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



Graph :- Sairaidh Campus

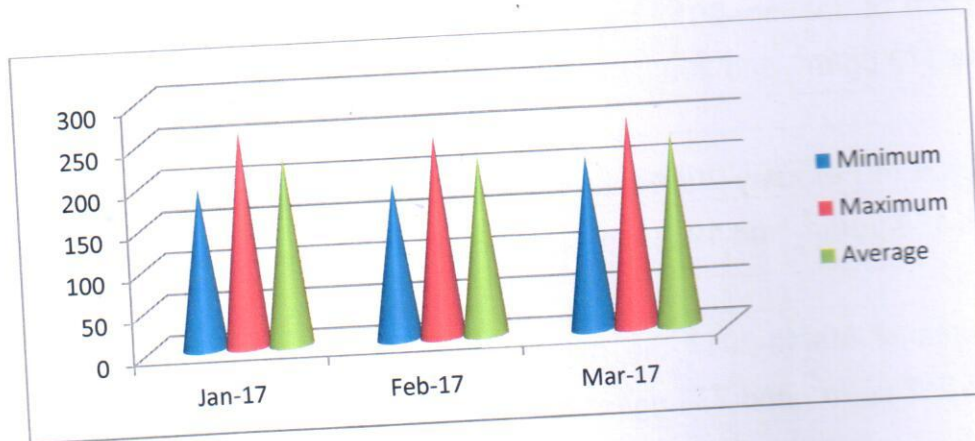


New Kudag/Nr.Weigh Bridge

For the month of January-2017 the minimum and maximum concentrations for SPM were recorded as $193 \mu\text{g}/\text{m}^3$ and $258 \mu\text{g}/\text{m}^3$ respectively and average concentration of $226 \mu\text{g}/\text{m}^3$

For the month of February-2017 the minimum and maximum concentrations for SPM were recorded as $187 \mu\text{g}/\text{m}^3$ and $241 \mu\text{g}/\text{m}^3$ respectively and average concentration of $214 \mu\text{g}/\text{m}^3$

For the month of March-2017 the minimum and maximum concentrations for SPM were recorded as $208 \mu\text{g}/\text{m}^3$ and $253 \mu\text{g}/\text{m}^3$ respectively and average concentration of $231 \mu\text{g}/\text{m}^3$



Graph:- New Kudag/Nr.Weigh Bridge

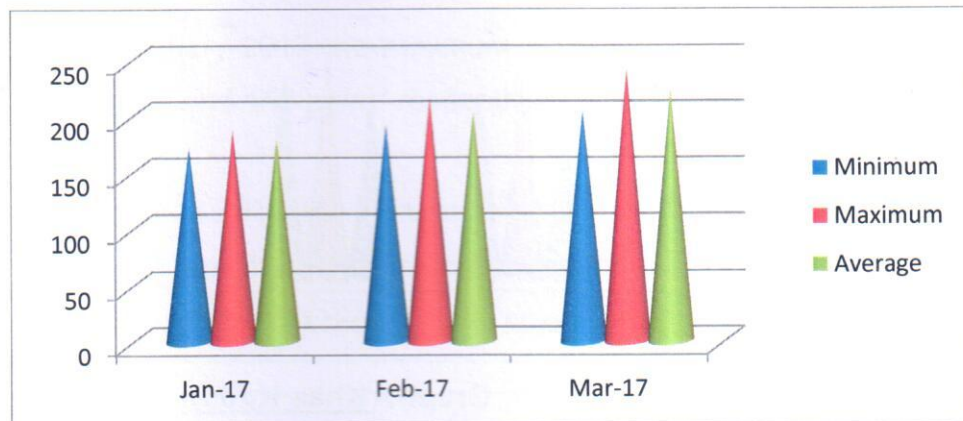


Old Kudag/Mining Area

For the month of January-2017 the minimum and maximum concentrations for SPM were recorded as 171 $\mu\text{g}/\text{m}^3$ and 187 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 179 $\mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for SPM were recorded as 192 $\mu\text{g}/\text{m}^3$ and 216 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 204 $\mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for SPM were recorded as 204 $\mu\text{g}/\text{m}^3$ and 241 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 223 $\mu\text{g}/\text{m}^3$.



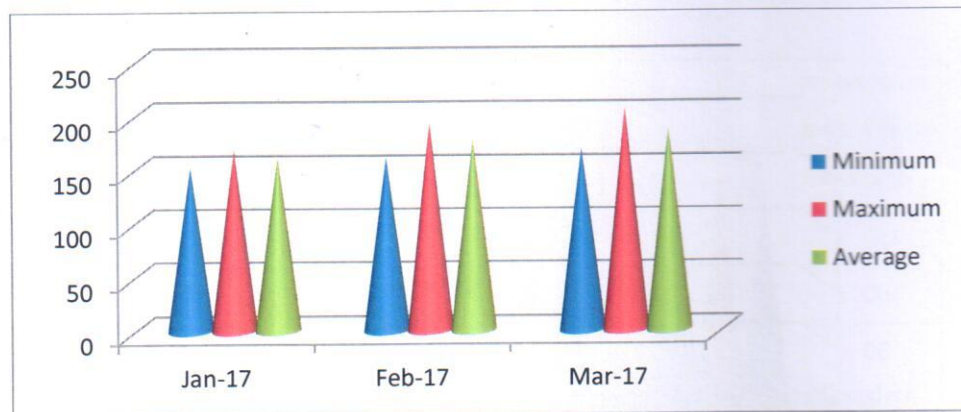
Graph:- Old Kudag/Mining Area

Khas Kudag

For the month of January-2017 the minimum and maximum concentrations for SP recorded as 152 $\mu\text{g}/\text{m}^3$ and 169 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 161

For the month of February-2017 the minimum and maximum concentrations for SP recorded as 161 $\mu\text{g}/\text{m}^3$ and 193 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 177

For the month of March-2017 the minimum and maximum concentrations for SP recorded as 169 $\mu\text{g}/\text{m}^3$ and 207 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 188



Graph:- Khas Kudag

2.2 Fugitive Emission (Buffer Zone):-

2.2.1 Presentation of Results.

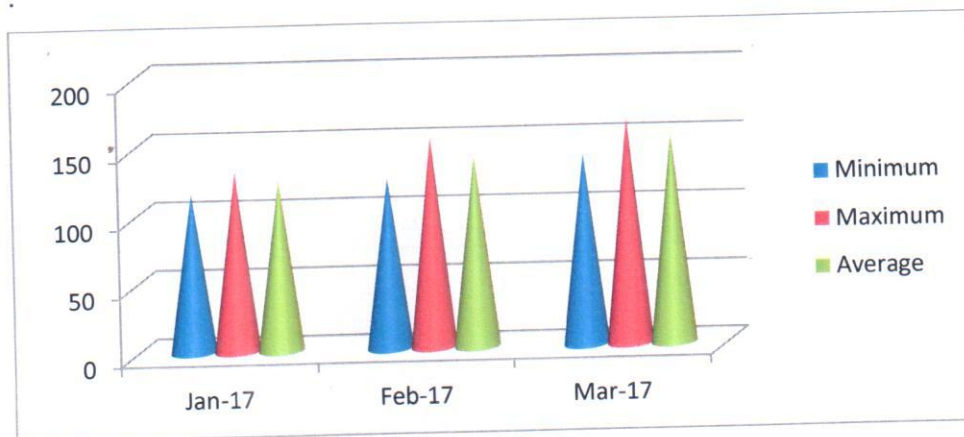
The summary of Statistical Analysis of SPM results for the month of January-2017 to March-2017 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of January-2017 the minimum and maximum concentrations for SPM were recorded as 116 $\mu\text{g}/\text{m}^3$ and 131 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 124 $\mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for SPM were recorded as 124 $\mu\text{g}/\text{m}^3$ and 153 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 139 $\mu\text{g}/\text{m}^3$.

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



Graph:- Jaljali Village

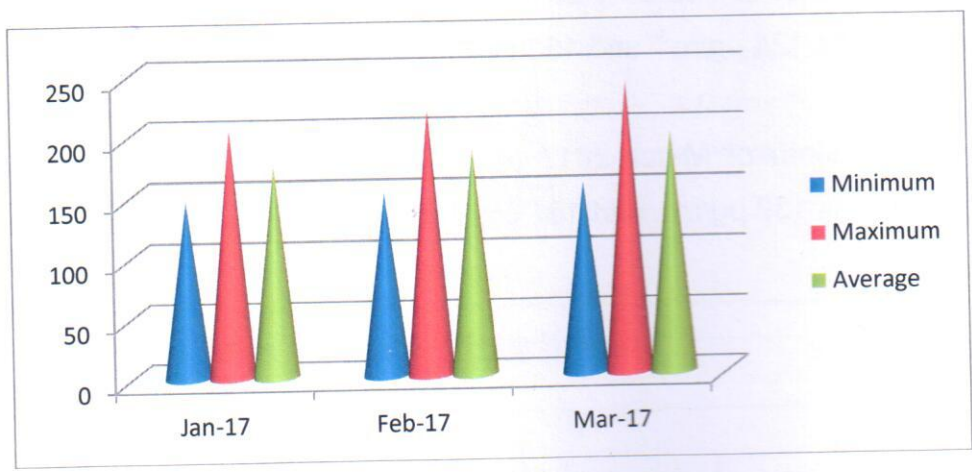


Samri Chowk/Nr.Old Weigh Bridge

For the month of January-2017 the minimum and maximum concentrations for recorded as $146 \mu\text{g}/\text{m}^3$ and $204 \mu\text{g}/\text{m}^3$ respectively and average concentration of

For the month of February-2017 the minimum and maximum concentrations for recorded as $151 \mu\text{g}/\text{m}^3$ and $218 \mu\text{g}/\text{m}^3$ respectively and average concentration of

For the month of March-2017 the minimum and maximum concentrations for recorded as $157 \mu\text{g}/\text{m}^3$ and $239 \mu\text{g}/\text{m}^3$ respectively and average concentration of



Graph:- Samri Chowk/Nr.Old Weigh Bridge

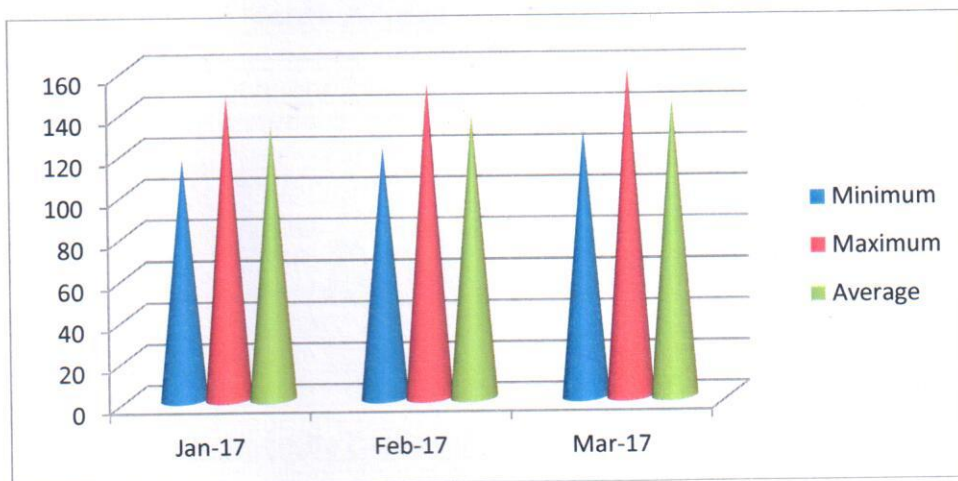


Rajendrapur

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

For the month of February-2017 the minimum and maximum concentrations for SPM were recorded as $121 \mu\text{g}/\text{m}^3$ and $152 \mu\text{g}/\text{m}^3$ respectively and average concentration of $137 \mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for SPM were recorded as $129 \mu\text{g}/\text{m}^3$ and $159 \mu\text{g}/\text{m}^3$ respectively and average concentration of $144 \mu\text{g}/\text{m}^3$.



Graph:- Rajendrapur

Tatijharia Village

For the month of January-2017 the minimum and maximum concentrations for SPM were recorded as $116 \mu\text{g}/\text{m}^3$ and $143 \mu\text{g}/\text{m}^3$ respectively and average concentration of $130 \mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for SPM were recorded as $121 \mu\text{g}/\text{m}^3$ and $156 \mu\text{g}/\text{m}^3$ respectively and average concentration of $139 \mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for SPM were recorded as $137 \mu\text{g}/\text{m}^3$ and $169 \mu\text{g}/\text{m}^3$ respectively and average concentration of $153 \mu\text{g}/\text{m}^3$.



Graph:- Tatijharia Village



Table 7
Statistical Analysis of RSPM

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2017	53	67	60	60	67
	February-2017	58	71	65	65	71
	March-2017	62	79	71	71	79
New Kudag/Nr. Weigh Bridge	January-2017	58	62	60	60	62
	February-2017	61	69	65	65	69
	March-2017	67	73	70	70	73
Old Kudag/Mining Area	January-2017	59	68	64	64	68
	February-2017	62	71	67	67	71
	March-2017	48	62	55	55	62
Khas Kudag	January-2017	46	59	53	53	59
	February-2017	52	67	60	60	67
	March-2017	56	69	63	63	69
CPCB Standard		100 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Jaljali Village	January-2017	46	53	50	50	53
	February-2017	43	51	47	47	51
	March-2017	52	64	58	58	64
Samri Chowk/ Nr.Old Weigh Bridge	January-2017	51	69	60	60	69
	February-2017	48	53	51	51	53
	March-2017	56	68	62	62	68
Rajendrapur	January-2017	43	59	51	51	59
	February-2017	48	61	55	55	61
	March-2017	51	64	58	58	64
Tatijharia Village	January-2017	43	58	51	51	58
	February-2017	46	62	54	54	62
	March-2017	49	64	57	57	64
CPCB Standard		100 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Conclusion: A)

- Sairaidh Campus Lease Area Core Zone :-** For the Months of Jan-Feb-March- 2017 Average of RSPM is $65 \mu\text{g}/\text{m}^3$.
- New Kudag/Nr. Weigh Bridge Lease Area Core Zone :-** For the Months of Jan-Feb-March- 2017 Average of RSPM is $65 \mu\text{g}/\text{m}^3$.
- Old Kudag/Mining Area Lease Area Core Zone :-** For the Months of Jan-Feb-March- 2017 Average of RSPM is $62 \mu\text{g}/\text{m}^3$.
- Khas Kudag Lease Area Core Zone :-** For the Months of Jan-Feb-March- 2017 Average of RSPM is $59 \mu\text{g}/\text{m}^3$.
 - The Average Concentration of RSPM within the Core Zone of Kudag Lease is $63 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion: B)

- Jaljali Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-March- 2017 Average of RSPM is $52 \mu\text{g}/\text{m}^3$.
- Samri Chowk Lease Area Buffer Zone :-** For the Months of Jan-Feb-March- 2017 Average of RSPM is $58 \mu\text{g}/\text{m}^3$.
- Rajendrapur Lease Area Buffer Zone :-** For the Months of Jan-Feb-March- 2017 Average of RSPM is $55 \mu\text{g}/\text{m}^3$.
- Tatijharia Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-March- 2017 Average of RSPM is $54 \mu\text{g}/\text{m}^3$.
 - The Average Concentration of RSPM within the Buffer Zone of Kudag Lease is $55 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Monthwise Summary of Statistical Analysis of RSPM

2.3 Fugitive Emission (Core Zone):-

2.3.1 Presentation of Results.

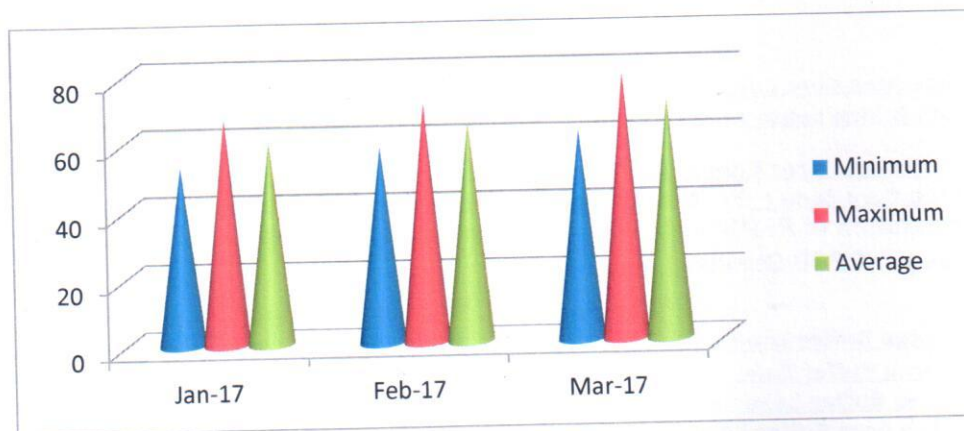
The summary of Statistical Analysis of RSPM results for the month of January-2017 to March-2017 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 53 $\mu\text{g}/\text{m}^3$ and 67 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 58 $\mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 58 $\mu\text{g}/\text{m}^3$ and 71 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 62 $\mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 62 $\mu\text{g}/\text{m}^3$ and 79 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 71 $\mu\text{g}/\text{m}^3$.



Graph :- Sairaidh Campus

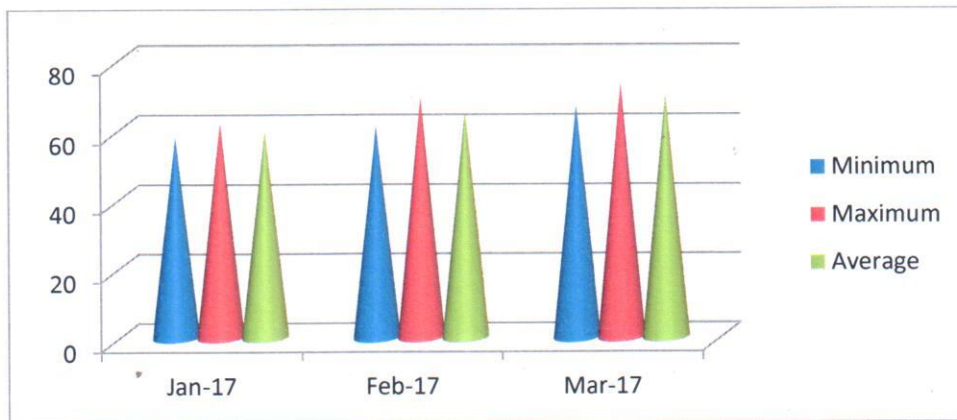


New Kudag/Nr.Weigh Bridge

For the month of January-2017 the minimum and maximum concentrations for RSPM were recorded as $58 \mu\text{g}/\text{m}^3$ and $62 \mu\text{g}/\text{m}^3$ respectively and average concentration of $60 \mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for RSPM were recorded as $61 \mu\text{g}/\text{m}^3$ and $69 \mu\text{g}/\text{m}^3$ respectively and average concentration of $65 \mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for RSPM were recorded as $67 \mu\text{g}/\text{m}^3$ and $73 \mu\text{g}/\text{m}^3$ respectively and average concentration of $70 \mu\text{g}/\text{m}^3$.



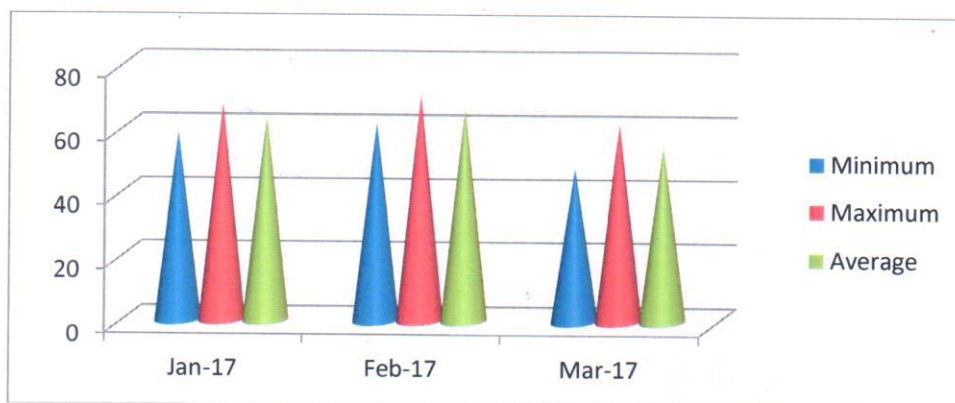
Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

For the month of January-2017 the minimum and maximum concentrations for RSPM were recorded as $59 \mu\text{g}/\text{m}^3$ and $68 \mu\text{g}/\text{m}^3$ respectively and average concentration of $62 \mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for RSPM were recorded as $62 \mu\text{g}/\text{m}^3$ and $71 \mu\text{g}/\text{m}^3$ respectively and average concentration of $66 \mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for RSPM were recorded as $48 \mu\text{g}/\text{m}^3$ and $62 \mu\text{g}/\text{m}^3$ respectively and average concentration of $55 \mu\text{g}/\text{m}^3$.



Graph:- Old Kudag/Mining Area

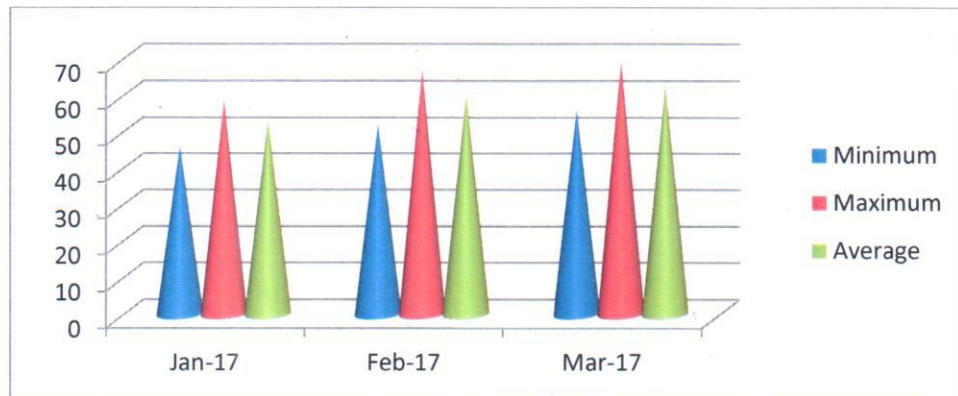


Khas Kudag

For the month of January-2017 the minimum and maximum concentrations for RSPM were recorded as $46 \mu\text{g}/\text{m}^3$ and $59 \mu\text{g}/\text{m}^3$ respectively and average concentration of $53 \mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for RSPM were recorded as $52 \mu\text{g}/\text{m}^3$ and $67 \mu\text{g}/\text{m}^3$ respectively and average concentration of $60 \mu\text{g}/\text{m}^3$.

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



Graph:- Khas Kudag

2.4 Fugitive Emission (Buffer Zone):-

2.4.1 Presentation of Results.

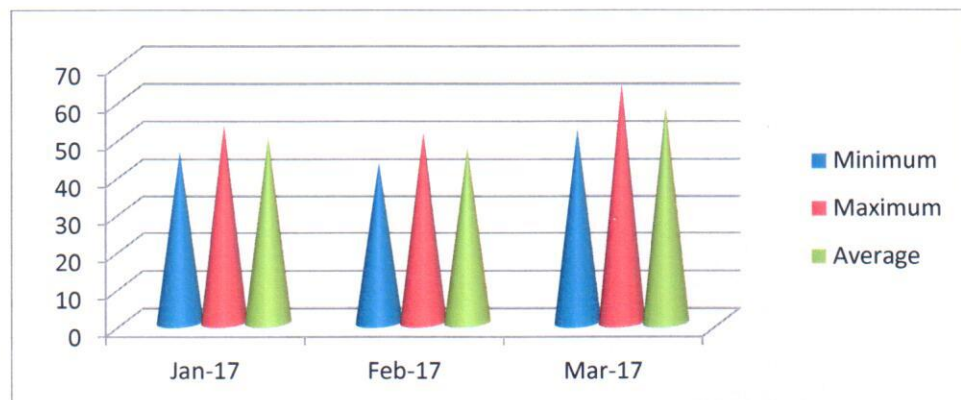
The summary of Statistical Analysis of RSPM results for the month of January-2017 to March-2017 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 46 $\mu\text{g}/\text{m}^3$ and 53 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 49 $\mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 43 $\mu\text{g}/\text{m}^3$ and 51 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 47 $\mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 52 $\mu\text{g}/\text{m}^3$ and 64 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 58 $\mu\text{g}/\text{m}^3$.



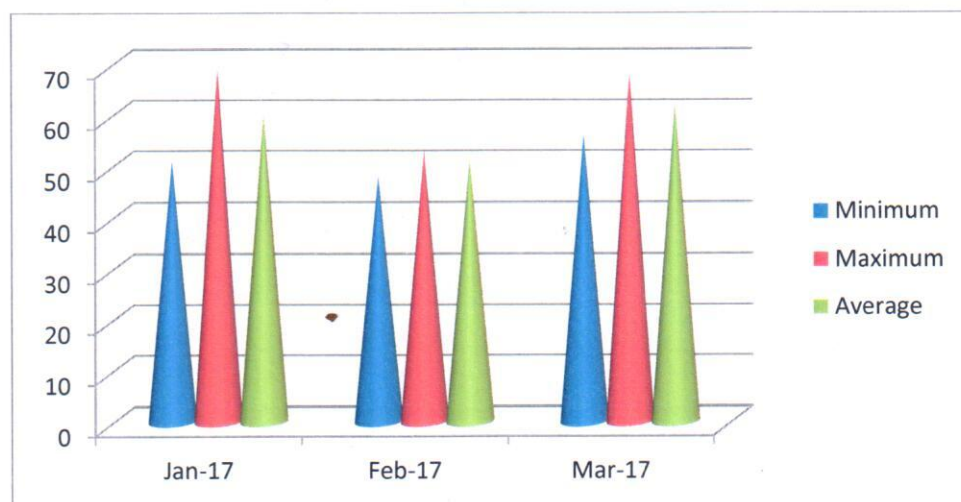
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of January-2017 the minimum and maximum concentrations for RSP were recorded as 51 $\mu\text{g}/\text{m}^3$ and 69 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 62 $\mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for RSP were recorded as 48 $\mu\text{g}/\text{m}^3$ and 53 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 50 $\mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for RSPM were recorded as 56 $\mu\text{g}/\text{m}^3$ and 68 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 62 $\mu\text{g}/\text{m}^3$.



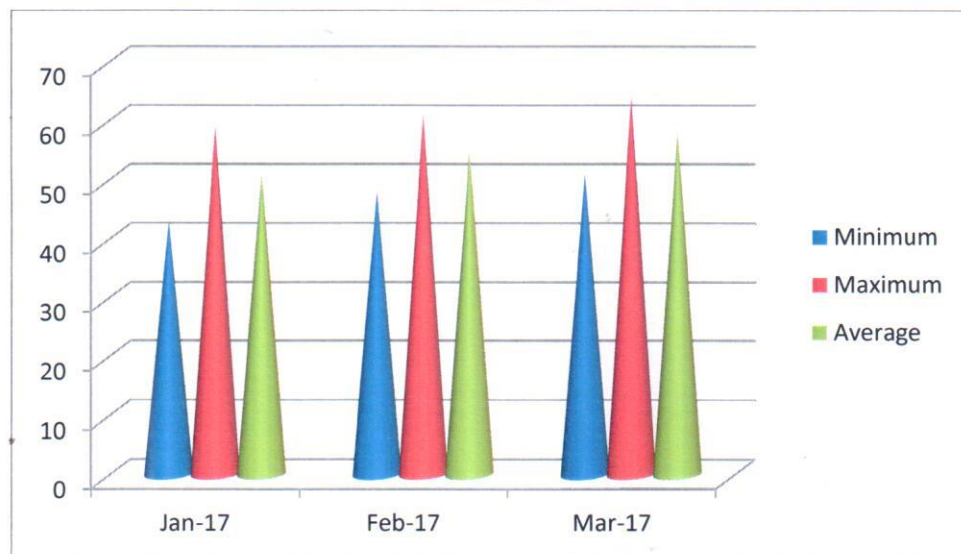
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of January-2017 the minimum and maximum concentrations for RSPM were recorded as $43 \mu\text{g}/\text{m}^3$ and $59 \mu\text{g}/\text{m}^3$ respectively and average concentration of $48 \mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for RSPM were recorded as $48 \mu\text{g}/\text{m}^3$ and $61 \mu\text{g}/\text{m}^3$ respectively and average concentration of $51 \mu\text{g}/\text{m}^3$.

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



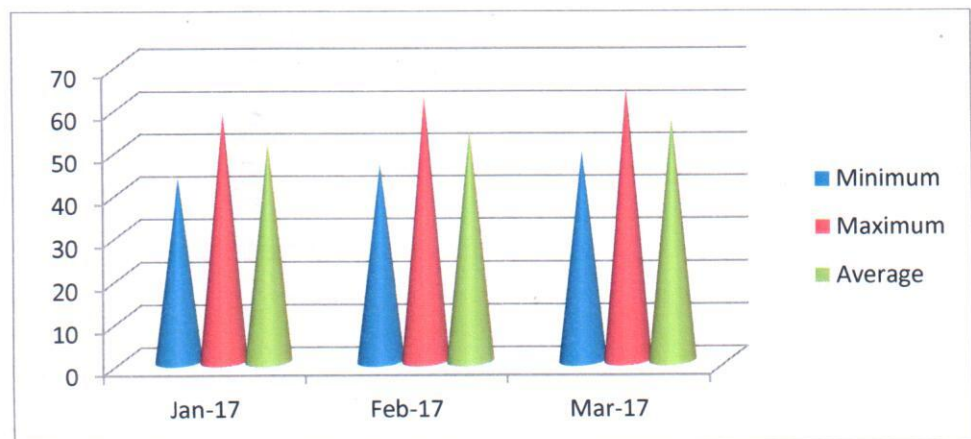
Graph:- Rajendrapur

Tatijharia Village

For the month of January-2017 the minimum and maximum concentrations for RSPM were recorded as 43 $\mu\text{g}/\text{m}^3$ and 58 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 48 $\mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for RSPM were recorded as 46 $\mu\text{g}/\text{m}^3$ and 62 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 54 $\mu\text{g}/\text{m}^3$.

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



Graph:- Tatijharia Village



Table 8
Statistical Analysis of PM_{2.5}

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Sairaidh Campus	January-2017	18	24	21	21	24
	February-2017	23	29	26	26	29
	March-2017	26	32	29	29	32
CPCB Standard				60 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Conclusion :-

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

Monthwise Summary of Statistical Analysis of PM_{2.5}

2.5 Presentation of Results.

The summary of Statistical Analysis of PM_{2.5} results for the month of January-2017 to March-2017 are presented in detail in **Table 8**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January-2017 the minimum and maximum concentrations for PM_{2.5} were recorded as 18 $\mu\text{g}/\text{m}^3$ and 24 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 21 $\mu\text{g}/\text{m}^3$.

For the month of February-2017 the minimum and maximum concentrations for PM_{2.5} were recorded as 23 $\mu\text{g}/\text{m}^3$ and 29 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 26 $\mu\text{g}/\text{m}^3$.

For the month of March-2017 the minimum and maximum concentrations for PM_{2.5} were recorded as 26 $\mu\text{g}/\text{m}^3$ and 32 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 29 $\mu\text{g}/\text{m}^3$.

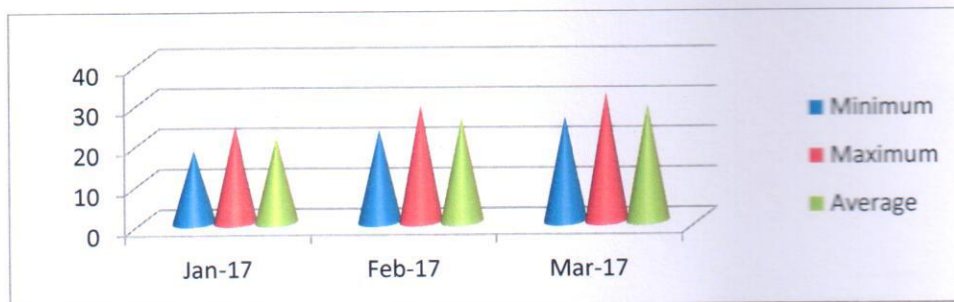




Table 9
Statistical analysis of SO₂

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

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Jaljali Village	January-2017	7	9	8	8	9
	February-2017	6	8	7	7	8
	March-2017	9	11	10	10	11
Samri Chowk/ Nr.Old Weigh Bridge	January-2017	8	12	10	10	12
	February-2017	9	14	12	12	14
	March-2017	6	12	9	9	12
Rajendrapur	January-2017	7	9	8	8	9
	February-2017	6	11	9	9	11
	March-2017	6	12	9	9	12
Tatijharia Village	January-2017	7	13	10	10	13
	February-2017	9	11	10	10	11
	March-2017	11	14	13	13	14
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Conclusion:- A)

- 1) **Sairaidh Campus Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SO₂ is 12 $\mu\text{g}/\text{m}^3$.
- 2) **New Kudag/Nr. Weigh Bridge Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SO₂ is 10 $\mu\text{g}/\text{m}^3$.
- 3) **Old Kudag/Mining Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SO₂ is 10 $\mu\text{g}/\text{m}^3$.
- 4) **Khas Kudag Lease Area Core Zone:-** For the Months of Jan-Feb-March-2017 Average of SO₂ is 11 $\mu\text{g}/\text{m}^3$.

• The Average Concentration of SO₂ within the Core Zone of Kudag Lease during this period (Jan-Feb-March-2017) is 11 $\mu\text{g}/\text{m}^3$ and it is within permissible limit as per CPCB Standard.

Conclusion:- B)

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2017 Average of SO₂ is 8 $\mu\text{g}/\text{m}^3$.
- 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2017 Average of SO₂ is 10 $\mu\text{g}/\text{m}^3$.
- 3) **Rajendrapur Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2017 Average of SO₂ is 9 $\mu\text{g}/\text{m}^3$.
- 4) **Tatijharia Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2017 Average of SO₂ is 11 $\mu\text{g}/\text{m}^3$.

*The Average Concentration of SO₂ within the Buffer Zone of Kudag Lease during this period (Jan-Feb-March-2017) is 10 $\mu\text{g}/\text{m}^3$ and it is within permissible limit as per CPCB Standard.

2.6 Fugitive Emission (Core Zone):-

2.6.1 Presentation of Results.

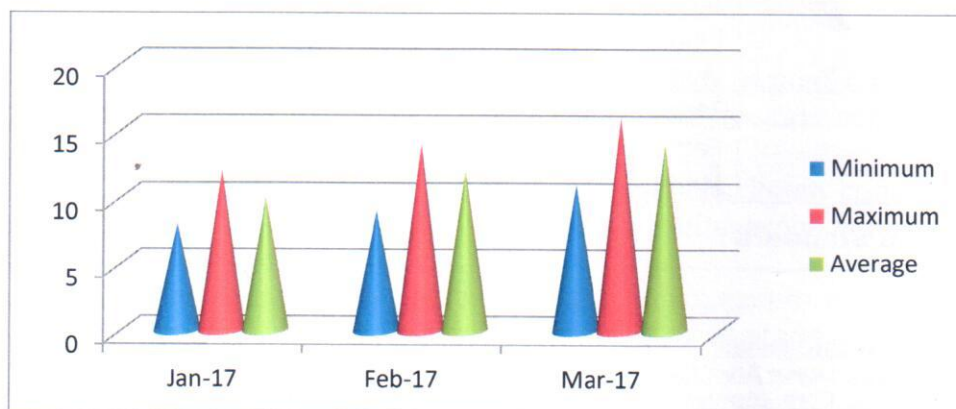
The summary of Statistical Analysis of SO₂ results for the month of January-2017 to March-2017 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

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

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

For the month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 11 µg/m³ and 16 µg/m³ respectively and average concentration of 14 µg/m³.



Graph :- Sairaidh Campus

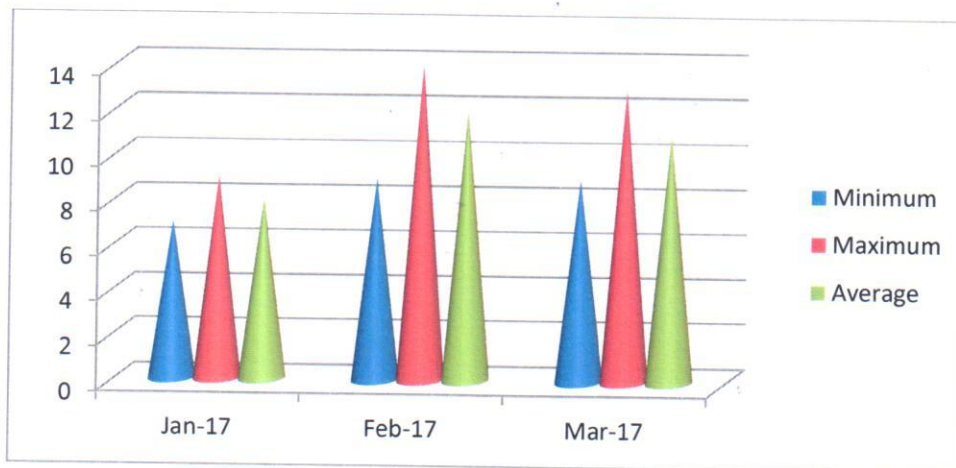


New Kudag/Nr.Weigh Bridge

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

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

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



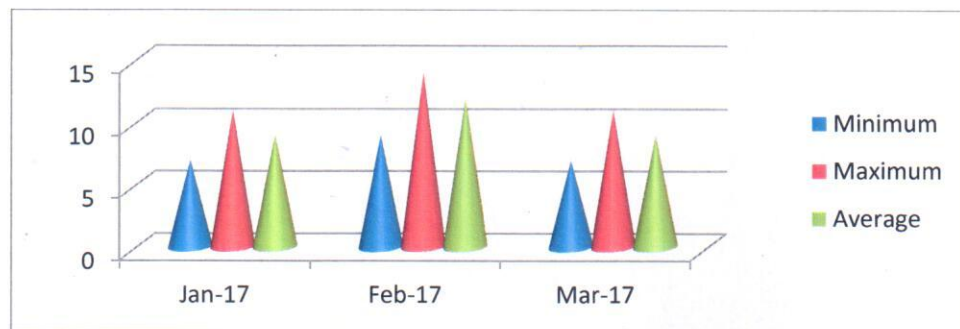
Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

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

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

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



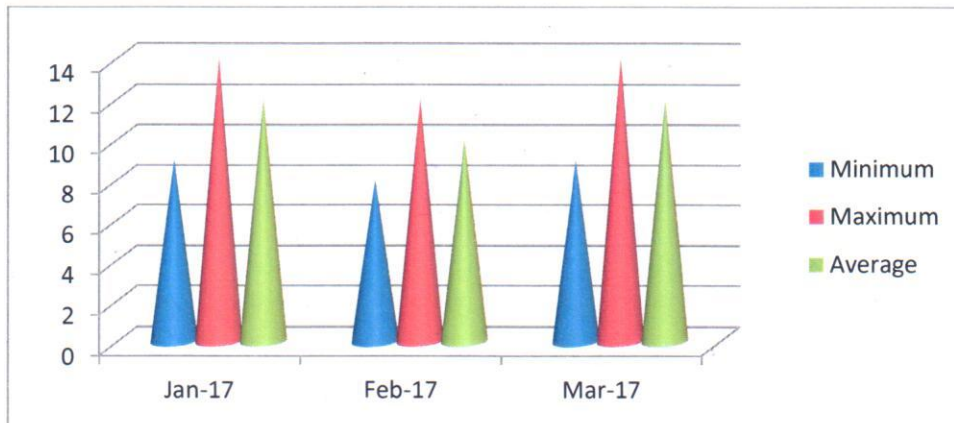
Graph:- Old Kudag/Mining Area

Khas Kudag

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

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

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



Graph:- Khas Kudag

2.7 Fugitive Emission (Buffer Zone):-

2.7.1 Presentation of Results.

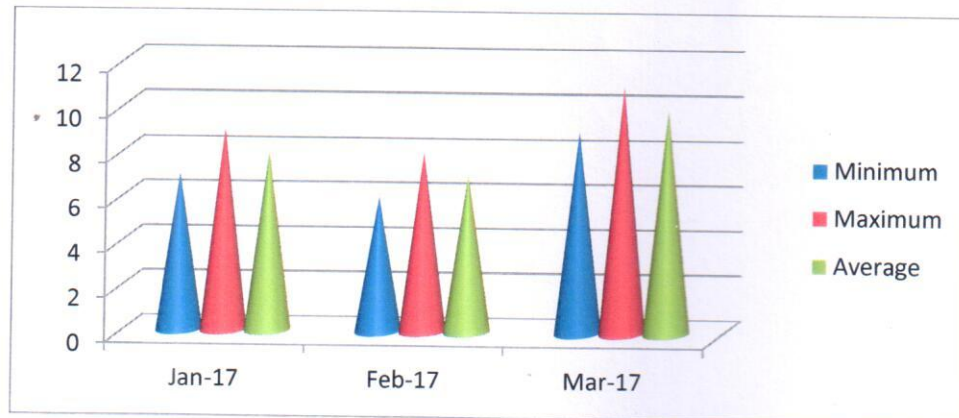
The summary of Statistical Analysis of SO₂ results for the month of January-2017 to March-2017 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

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

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

For the month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.



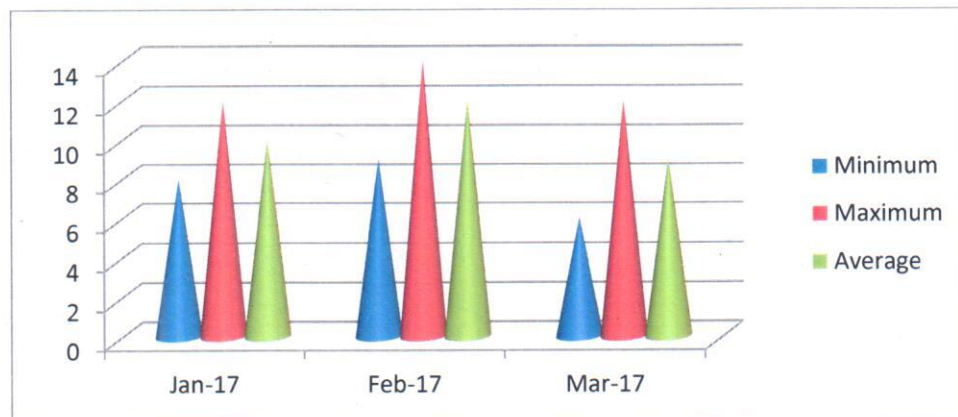
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

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

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

For the month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 12 µg/m³ respectively and average concentration of 9 µg/m³.



Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

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

For the month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 11 µg/m³ respectively and average concentration of 9 µg/m³.

For the month of March-2017 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 12 µg/m³ respectively and average concentration of 9 µg/m³.



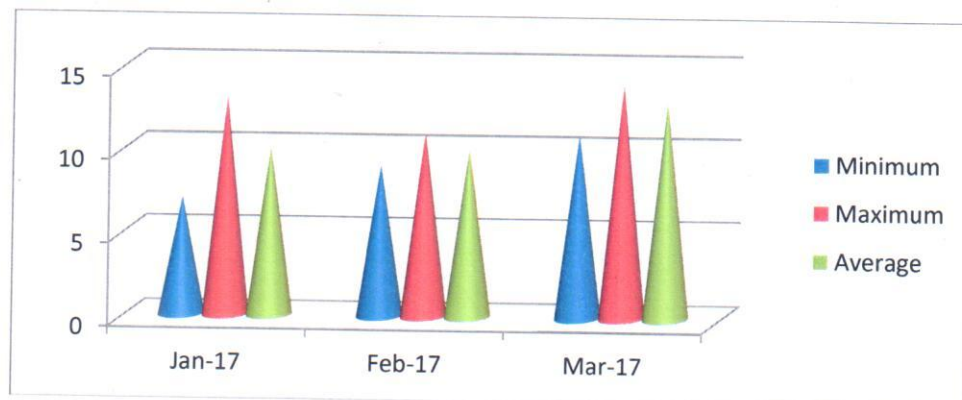
Graph:- Rajendrapur

Tatijharia Village

For the month of January-2017 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 13 µg/m³ respectively and average concentration of 10 µg/m³.

For the month of February-2017 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.

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



Graph:- Tatijharia Village



Table 10
Statistical Analysis of NO_x

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2017	18	26	22	22	26
	February-2017	16	24	20	20	24
	March-2017	21	28	25	25	28
New Kudag/Nr. Weigh Bridge	January-2017	24	32	28	28	32
	February-2017	21	29	25	25	29
	March-2017	23	31	27	27	31
Old Kudag/Mining Area	January-2017	16	23	20	20	23
	February-2017	18	26	22	22	26
	March-2017	16	21	19	19	21
Khas Kudag	January-2017	19	26	23	23	26
	February-2017	21	28	25	25	28
	March-2017	24	32	28	28	32
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Jaljali Village	January-2017	17	21	19	19	21
	February-2017	16	19	18	18	19
	March-2017	18	24	21	21	24
Samri Chowk/ Nr.Old Weigh Bridge	January-2017	16	23	20	20	23
	February-2017	21	28	25	25	28
	March-2017	19	24	22	22	24
Rajendrapur	January-2017	18	26	22	22	26
	February-2017	21	29	25	25	29
	March-2017	19	21	20	20	21
Tatijharia Village	January-2017	18	24	21	21	24
	February-2017	17	26	22	22	26
	March-2017	18	27	23	23	27
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Conclusion: A)

- 1) Sairaidh Campus Lease Area Core Zone:- For the Months of Jan-Feb-March-2017 Average of NO_x is 22 $\mu\text{g}/\text{m}^3$.
 - 2) New Kudag/Nr.Weigh Bridge Lease Area Core Zone:- For the Months of Jan-Feb-March-2017 Average of NO_x is 27 $\mu\text{g}/\text{m}^3$.
 - 3) Old Kudag/Mining Lease Area Core Zone:- For the Months of Jan-Feb-March-2017 Average of NO_x is 20 $\mu\text{g}/\text{m}^3$.
 - 4) Khas Kudag Lease Area Core Zone:- For the Months of Jan-Feb-March-2017 Average of NO_x is 25 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Core Zone of Kudag Lease during this period (Jan-Feb-March-2017) is 24 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion: B)

- 1) Jaljali Village Lease Area Buffer Zone :- For the Months of Jan-Feb-March-2017 Average of NO_x is 19 $\mu\text{g}/\text{m}^3$.
 - 2) Samri Chowk Lease Area Buffer Zone :- For the Months of Jan-Feb-March-2017 Average of NO_x is 22 $\mu\text{g}/\text{m}^3$.
 - 3) Rajendrapur Lease Area Buffer Zone:- For the Months of Jan-Feb-March-2017 Average of NO_x is 22 $\mu\text{g}/\text{m}^3$.
 - 4) Tatijharia Village Lease Area Buffer Zone:- For the Months of Jan-Feb-March-2017 Average of NO_x is 22 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of NO_x within the Buffer Zone of Kudag Lease during this period (Jan-Feb-March-2017) is 22 $\mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Monthwise Summary of Statistical Analysis of NO_x

2.8 Fugitive Emission (Core Zone):-

2.8.1 Presentation of Results.

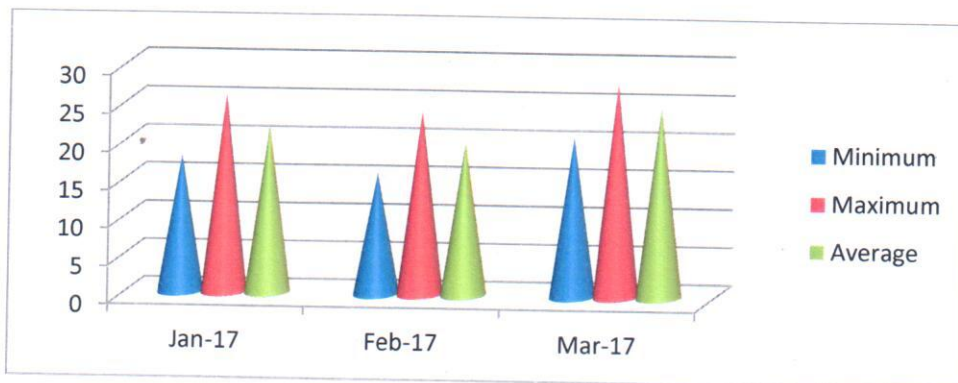
The summary of Statistical Analysis of NO_x results for the month of January-2017 to March-2017 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

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

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

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



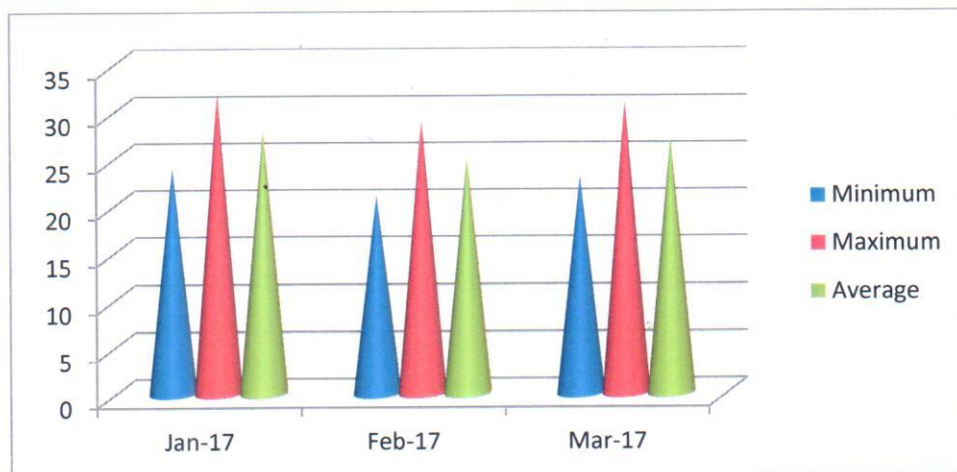
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of January-2017 the minimum and maximum concentrations for NO_x v recorded as $24 \mu\text{g}/\text{m}^3$ and $32 \mu\text{g}/\text{m}^3$ respectively and average concentration of $28 \mu\text{g}/\text{m}^3$

For the month of February-2017 the minimum and maximum concentrations for NO_x v recorded as $21 \mu\text{g}/\text{m}^3$ and $29 \mu\text{g}/\text{m}^3$ respectively and average concentration of $25 \mu\text{g}/\text{m}^3$

For the month of March-2017 the minimum and maximum concentrations for NO_x v recorded as $23 \mu\text{g}/\text{m}^3$ and $31 \mu\text{g}/\text{m}^3$ respectively and average concentration of $27 \mu\text{g}/\text{m}^3$



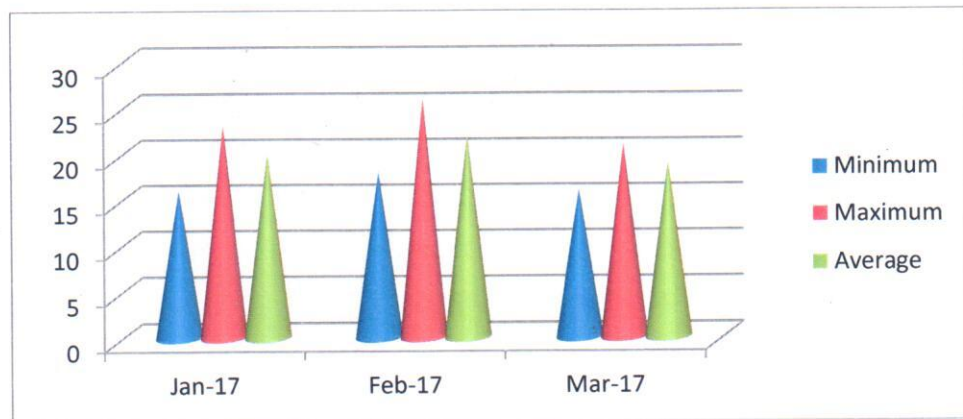
Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

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

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

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



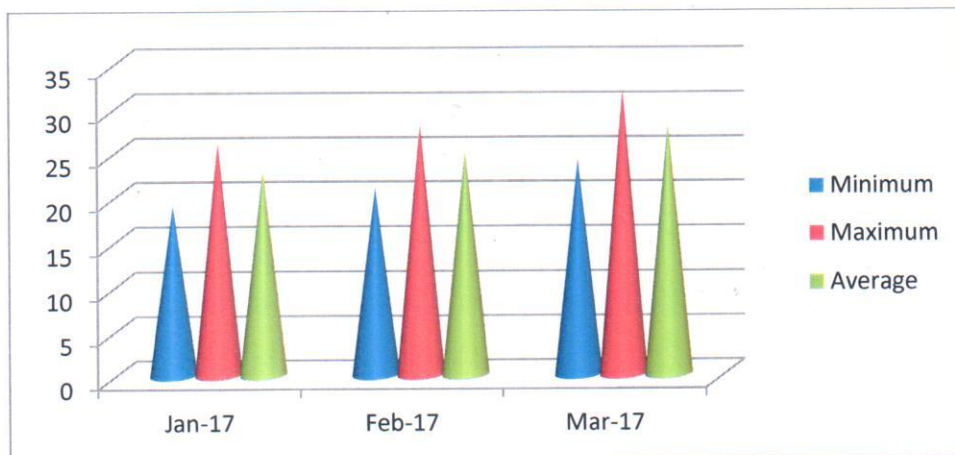
Graph:- Old Kudag/Mining Area

Khas Kudag

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

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

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



Graph:- Khas Kudag

2.9 Fugitive Emission (Buffer Zone):-

2.9.1 Presentation of Results.

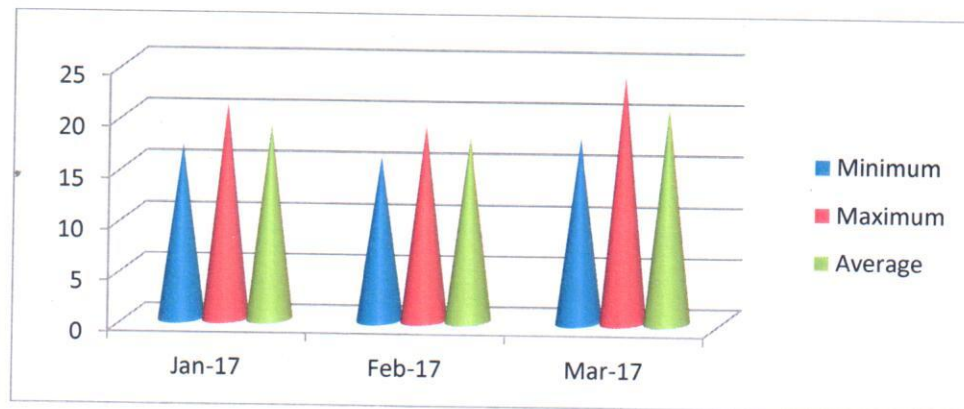
The summary of Statistical Analysis of NO_x results for the month of January-2017 to March-2017 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

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

For the month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 19 µg/m³ respectively and average concentration of 18 µg/m³.

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



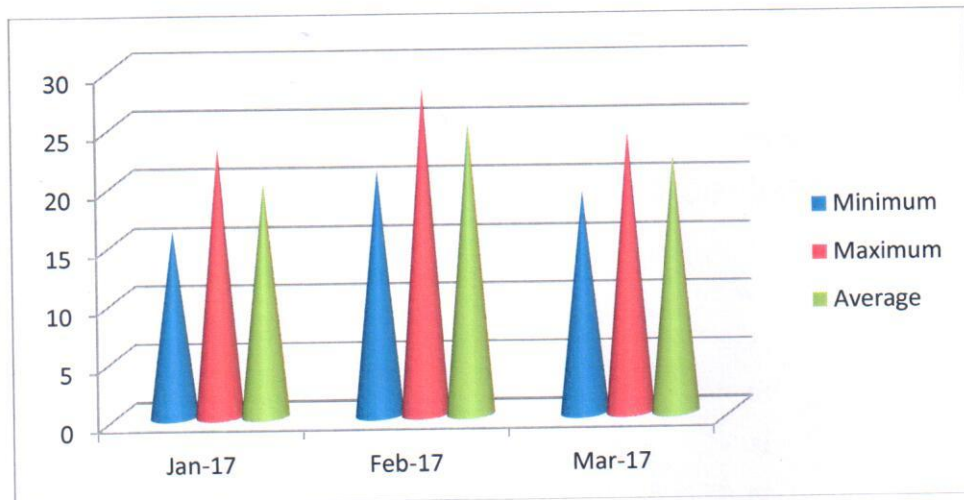
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

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

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

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



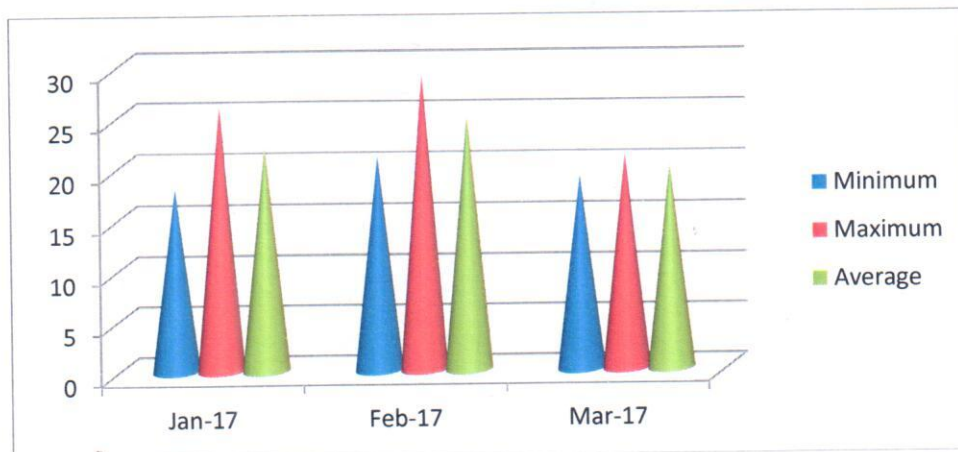
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

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

For the month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 21 µg/m³ and 29 µg/m³ respectively and average concentration of 25 µg/m³.

For the month of March-2017 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 21 µg/m³ respectively and average concentration of 20 µg/m³.



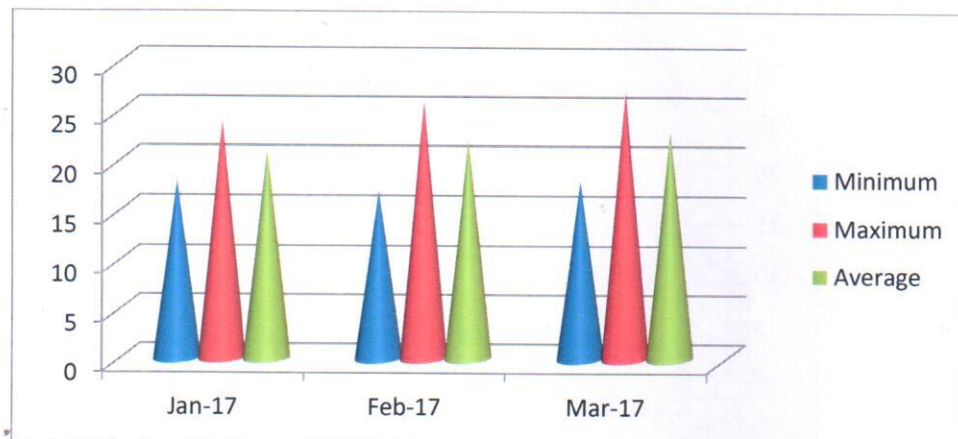
Graph:- Rajendrapur

Tatijharia Village

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

For the month of February-2017 the minimum and maximum concentrations for NO_x were recorded as 17 µg/m³ and 26 µg/m³ respectively and average concentration of 22 µg/m³.

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



Graph:- Tatijharia Village



Table 11
Statistical Analysis of Pb

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2017	0.036	0.052	0.044	0.044	0.052
	February-2017	0.042	0.061	0.052	0.052	0.061
	March-2017	0.029	0.047	0.038	0.038	0.047
New Kudag/Nr. Weigh Bridge	January-2017	0.032	0.068	0.050	0.050	0.067
	February-2017	0.041	0.059	0.050	0.050	0.059
	March-2017	0.037	0.061	0.049	0.049	0.061
Old Kudag/Mining Area	January-2017	0.046	0.073	0.060	0.060	0.072
	February-2017	0.053	0.079	0.066	0.066	0.078
	March-2017	0.057	0.082	0.070	0.070	0.082
Khas Kudag	January-2017	0.031	0.047	0.039	0.039	0.047
	February-2017	0.039	0.048	0.044	0.044	0.048
	March-2017	0.046	0.059	0.053	0.053	0.059
CPCB Standard		1.0 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Buffer Zone :-						
Jaljali Village	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Samri Chowk/ Nr.Old Weigh Bridge	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Rajendrapur	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Tatijharia Village	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
CPCB Standard		1.0 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Conclusion: A)

The Average Concentration of Pb within the Core Zone of Kudag Lease during this period (January to March-2017) is $0.051 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion: B)

The Average Concentration of Pb within the Buffer Zone of Kudag Lease during this period (January to March-2017) was not detected at any of the locations.



Table 12
Statistical Analysis of Hg
 Unit: $\mu\text{g}/\text{m}^3$

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
New Kudag/Nr. Weigh Bridge	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Old Kudag/Mining Area	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Khas Kudag	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Buffer Zone :-						
Jaljali Village	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Samri Chowk/ Nr.Old Weigh Bridge	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Rajendrapur	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Tatijharia Village	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
CPCB Standard	---					

Conclusion: A)

The Average Concentration of Hg within the Core Zone of Kudag Lease during this period (January to March-2017) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.

Conclusion: B)

The Average Concentration of Hg within the Buffer Zone of Kudag Lease during this period (January to March-2017) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.



Table 13
Statistical Analysis of As
Unit: ng/m³


Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
New Kudag/Nr. Weigh Bridge	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Old Kudag/Mining Area	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Khas Kudag	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Buffer Zone :-						
Jaljali Village	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Samri Chowk/ Nr.Old Weigh Bridge	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Rajendrapur	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
Tatijharia Village	January-2017	ND	ND	ND	ND	ND
	February-2017	ND	ND	ND	ND	ND
	March-2017	ND	ND	ND	ND	ND
CPCB Standard			06 ng/m³ (Annual)			

Conclusion: A)

The Average Concentration of As within the Core Zone of Kudag Lease during this period (January to March-2017) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.

Conclusion: B)

The Average Concentration of As within the Buffer Zone of Kudag Lease during this period (January to March-2017) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.

	Hindalco Industries Limited Kudag Mining Environmental Status Report for January-2017 To March-2017	Details of Salient Features
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Free Silica :-

Sr. No.	Location	Measurement Unit	January-2017		February-2017		March-2017	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Old Kudag/Mining Area	g/100gm	0.19	0.08	0.24	0.13	0.27	0.16

Table 14
Dust fall rate

Sl.No.	Location	January-2017	February-2017	March-2017	Average
Rate (mt/km2/month)					
1	Old Kudag/Mining Area	17.3	21.8	28.1	22.4
2	Khas kudag	16.1	19.6	23.8	19.8

Table 15
Noise Level Monitoring

Sl. No.	Location	Unit: dB(A) Leq					
		January-2017		February-2017		March-2017	
		Day	Night	Day	Night	Day	Night
Core Zone							
1	Sairaidh Campus	51.6	37.9	49.2	38.1	52.6	43.9
2	New Kudag/Near Weigh Bridge	64.2	56.1	68.3	51.9	62.8	51.6
3	Old Kudag/Mining Area	61.7	46.2	62.7	42.7	64.1	53.8
4	Khas Kudag	67.1	54.9	57.1	46.3	62.7	49.3
Buffer Zone							
1	Jaljali Village	52.7	43.6	51.9	38.7	49.2	37.1
2	Samri Chowk/Nr.Old Weigh Bridge	51.6	42.9	49.3	37.1	52.7	41.6
3	Rajendrapur	48.3	37.2	52.6	41.9	47.6	38.2
4	Tatijharia Village	52.9	41.6	51.7	39.2	51.2	43.8

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) Leq

Sr. No.	Location	January-2017			February-2017			March-2017		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	New Kudag/Nr.Weigh Bridge	58.1	64.9	61.5	61.7	72.9	67.3	68.2	76.4	72.3



3.0 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: 1) Old Kudag/Mining Area-March-2017

TEST RESULTS

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	7.28 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)	1.0	No relaxation	0.19
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	293
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.24
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	58.31
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	116.54
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	181.11
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	57.38
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	9.17
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	42.69
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	8.16
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	< 0.05
20.	Mercury (as Hg)	mg/l	IS 3025 (Part 2)	0.001	No relaxation	< 0.0005
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	< 0.001
22.	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
23.	Arsenic (as As)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.01
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	< 0.005
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	< 0.1
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.01
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.03
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.01
31.	Sulphide (as H ₂ S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.03
32.	Chloramines (as Cl ₂)	mg/l	APHA 4500-Cl'G	4.0	No relaxation	< 0.01

Contd..

(Contd.....)

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
33.	Molybdenum (as Mo)	mg/l	IS 3025 (Part 2)	0.07	No relaxation	< 0.001
34.	Silver (as Ag)	mg/l				
35.	Polychlorinated Biphenyls (PCB)	µg/l	Annexure J of IS 13428	0.1	No relaxation	< 0.001
36.	Boron (as B)	mg/l	UDECA 508	0.5	No relaxation	< 0.03
37.	Mineral Oil	mg/l	IS 3025 (Part 2)	0.5	1.0	< 0.1
38.	Tri Halo Methane	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
	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 ₆ H ₅ 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	UDECA : 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
Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
44.	Pesticides residues					
	Alpha-HCH	µg/l	UDECA 508			
	Beta HCH	µg/l	UDECA 508	0.01		< 0.01
	Delta- HCH	µg/l	UDECA 508	0.04		< 0.03
	Alachlor	µg/l	UDECA 508	0.04		< 0.03
	Aldrin / Dieldrin	µg/l	UDECA 508	20		< 0.03
	Atrazine	µg/l	UDECA 508	0.03		< 0.03
	Butachlor	µg/l	UDECA 1657	2		< 0.03
	Chlorpyrifos	µg/l	UDECA 508	125		< 0.03
	DDT and its Isomers	µg/l	UDECA 1657	30		< 0.03
	Gamma - HCH (Lindane)	µg/l	UDECA 508	1		< 0.03
	2,4-Dichlorophenoxyacetic acid	µg/l	UDECA 508	2		< 0.03
	Endosulphan	µg/l	UDECA 1657	30		< 0.03
	Ethion	µg/l	UDECA 508	0.4		< 0.03
	Isoproturon	µg/l	UDECA 1657	3		< 0.03
	Malathion	µg/l	UDECA 1657	9		< 0.03
	Methyl Parathion	µg/l	UDECA 1657	190		< 0.03
	Monocrotophos	µg/l	UDECA 1657	0.3		< 0.03
	Phorate	µg/l	UDECA 1657	1		< 0.03
		µg/l	UDECA 1657	2		< 0.03

Results relate to tested sample only. 2. Test report should not be reproduced partially. 3. *Permissible limit in the absence of 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 number. 8. Results for test no. 7 are not applicable.

KS: Based upon request of the party, sample was tested for above mentioned parameters only. Sample complies with IS:10500:2012, for tests conducted, indicating that it is fit for drinking purpose with respect to tested parameters.



Table 17
Monthly Report on Chemical Examination of Surface Water
(Nalags near Mining Area)
March-2017

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	7.93 at 26°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	11
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	6
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	1.0	No relaxation	0.28
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	316
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.27
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	159.26
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	131.64
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	241.97
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	76.19
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	12.54
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	141.68
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	9.57
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	<0.05
20.	Mercury (as Hg)	mg/l	IS 3025 (Part 2)	0.001	No relaxation	< 0.0005
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	< 0.001
22.	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
23.	Arsenic (as As)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.01
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	< 0.005
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	< 0.1
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	< 0.01
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	< 0.03
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	< 0.01
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	< 0.01
31.	Sulphide (as H ₂ S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	< 0.03
32.	Chloramines (as Cl ₂)	mg/l	APHA 4500-Cl ₂ G	4.0	No relaxation	< 0.01

Contd...



Hindalco Industries Limited
Kudag Mining Environmental Status Report for
January-2017 To March-2017

Details of Salient
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(Contd.....)

Sr. No	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
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	UDECA 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 ₆ H ₅ 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	UDECA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	---	---	1600
43.	<i>Escherichia coli</i>	Per100 ml	IS 1622	Absent	Absent	Present

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
44.	Pesticides residues					
i.	Alpha-HCH	µg/l	UDECA 508	0.01		< 0.01
ii.	Beta HCH	µg/l	UDECA 508	0.04		< 0.03
iii.	Delta- HCH	µg/l	UDECA 508	0.04		< 0.03
iv.	Alachlor	µg/l	UDECA 508	20		< 0.03
v.	Aldrin / Dieldrin	µg/l	UDECA 508	0.03		< 0.03
vi.	Atrazine	µg/l	UDECA 1657	2		< 0.03
vii.	Butachlor	µg/l	UDECA 508	125		< 0.03
viii.	Chlorpyrifos	µg/l	UDECA 1657	30		< 0.03
ix.	DDT and its Isomers	µg/l	UDECA 508	1		< 0.03
x.	Gamma - HCH (Lindane)	µg/l	UDECA 508	2		< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	UDECA 1657	30		< 0.03
xii.	Endosulphan	µg/l	UDECA 508	0.4		< 0.03
xiii.	Ethion	µg/l	UDECA 1657	3		< 0.03
xiv.	Isoproturon	µg/l	UDECA 1657	9		< 0.03
xv.	Malathion	µg/l	UDECA 1657	190		< 0.03
xvi.	Methyl Parathion	µg/l	UDECA 1657	0.3		< 0.03
xvii.	Monocrotophos	µg/l	UDECA 1657	1		< 0.03
xviii.	Phorate	µg/l	UDECA 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.

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

Table 18

Report on Soil Analysis, Kudag
Date of collection: March-2017
Sample Location:(Old Kudag/Mining Area)

Sr. No.	Test Parameter	Measurement Unit	S1 Old Kudag/Mining Area
1.	PH (1:5 water extract)	-	6.73 at 26°C
2.	Electrical Conductivity at 25°C (1:5 water extract)	µs/cm	327
3.	Texture	-	Silty Clay
4.	Sand	%	24
5.	Slit	%	46
6.	Clay	%	30
7.	Water Holding Capacity	%	51.29
8.	Bulk Density	g/cc	1.21
9.	Porosity	%	16.58
10.	Exchangeable Calcium (as Ca)	mg/Kg	131.67
11.	Exchangeable Magnesium (as Mg)	mg/Kg	9.26
12.	Exchangeable Manganese (as Mn)	mg/Kg	3.82
13.	Exchangeable Zinc (as Zn)	mg/Kg	0.73
14.	Available Boron (as B)	mg/Kg	0.17
15.	Water Soluble Chloride (as Cl ⁺)	mg/Kg	226.42
16.	Water Soluble Sulphate (as SO ₄)	mg/Kg	119.53
17.	Available Potassium (as K)	mg/Kg	73.91
18.	Available Phosphorous (as P)	Kg/hect	1.68
19.	Available Nitrogen (as N)	Kg/hect	131
20.	Cadmium (as Cd)	mg/Kg	ND
21.	Chromium (as Cr)	mg/Kg	ND
22.	Copper (as Cu)	mg/Kg	ND
23.	Lead (as Pb)	mg/Kg	0.16
24.	Total Iron	mg/Kg	4.02
25.	Organic Matter	g/100g	1.46
26.	Organic Carbon	g/100g	0.82
27.	CEC	meq/100g	12.1

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 parameter only.



Hindalco Industries Limited
Kudag Mining Environmental Status Report for
January-2017 To March-2017

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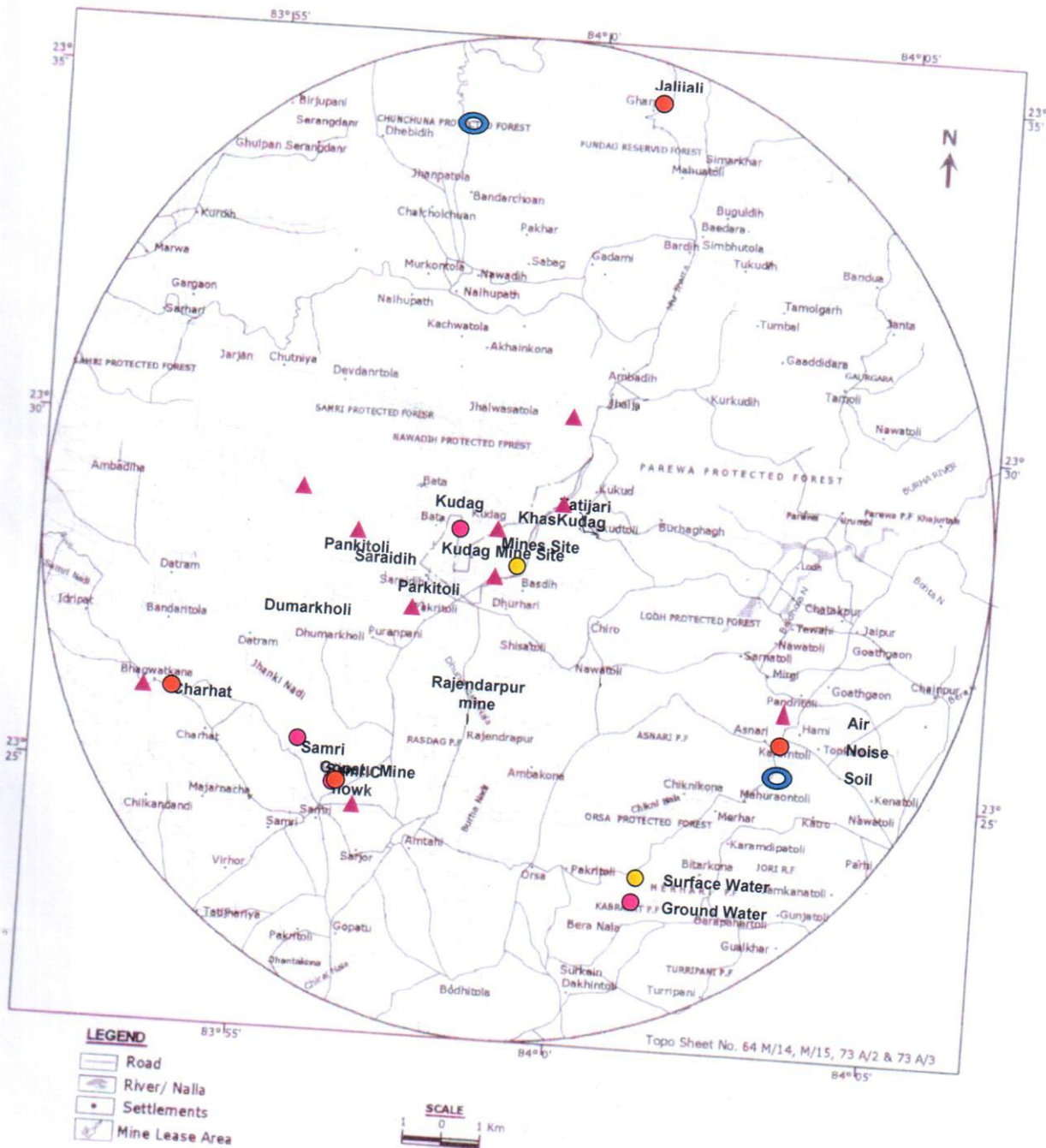


Fig 5: Sampling Locations for Water

Agur/At/R/Dec 2916/1067/01/12/2016



Annexure - IV

REGIONAL OFFICE
CHHATTISGARH ENVIRONMENT CONSERVATION BOARD
Bank Colony, Behind B.T.I., Nawapara, Ambikapur (C.G.) Fax/Phone 07774-231936

No. 1180/RO/TS/CECB/2016
To,

Ambikapur, Dt. 01/12/2016

M/s Hindalco Industries Limited,
(Kudag Bauxite Mine)
Village- Kudag, Tehsil - Samri,
District - Balrampur-Ramanujganj (C.G.)

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

Ref. : Your letter No. HIL/SAM/CECB/117/2016/K dated 18/07/2016 and subsequent correspondence letter ending dated 30/11/2016.

With reference to your above, application consent and license are hereby renewed for a period of One year i.e. from **01/12/2016 to 30/11/2017** with the terms and conditions incorporated in the consent issued by Board Office letter No. 6884/TS/CECB/2007, Raipur, dated 24/12/2007, subsequent renewal of consent issued by Board and additional condition mentioned below:-

NAME	PRODUCTION CAPACITY
Mining of Bauxite Ore	0.6 Lakhs Tones per Annum (Zero point Six Lakhs Tones Per Annum)

Additional Conditions:

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

Please acknowledge the receipt of this letter.



For and on behalf of
CHHATTISGARH ENVIRONMENT CONSERVATION BOARD


01/12/16
Regional Officer,
Chhattisgarh Environment Conservation Board,
Ambikapur

Apur/water/R/Dec. 2016/1067/01/12/2016



Annexure - IV

REGIONAL OFFICE

CHHATTISGARH ENVIRONMENT CONSERVATION BOARD

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

No. 1179/ROTS/CECB/2016

Ambikapur, Dt. 01/12/2016

To,

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

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

Ref. : Your letter No. HIL/SAM/CECB/117/2016/K dated 18/07/2016 and subsequent correspondence letter ending dated 30/11/2016.

With reference to your above, application consent and license are hereby renewed for a period of One year i.e. from 01/12/2016 to 30/11/2017 with the terms and conditions incorporated in the consent issued by Board Office letter No. 6880/TS/CECB/2007, Raipur, dated 24/12/2007, subsequent renewal of consent issued by Board and additional condition mentioned below:-

NAME	PRODUCTION CAPACITY
Mining of Bauxite Ore	0.6 Lakhs Tones per Annum (Zero point Six Lakhs Tones Per Annum)

Additional Conditions:

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

Please acknowledge the receipt of this letter.

Hindalco Industries Ltd Samri Mines Division Kusmi Dist. Balrampur (C.G.)
Date- 11/12/16
Received by [Signature]

For and on behalf of
CHHATTISGARH ENVIRONMENT CONSERVATION BOARD

[Signature]
01/12/16
Regional Officer

Chhattisgarh Environment Conservation Board,
Ambikapur

Hindalco Industries Ltd.
Mines Division, Samri

Lease wise Production 2016-17

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


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.

Hindalco Industries Ltd.
Mines Division, Samri

Lease wise Details 2016-17

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


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

Actual Expenditure incurred in Environment Management Plan:-

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

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

- Environment monitoring jobs has been out sourced to Annacon Lab, recognized by MoEF (GOI) & NABL etc.
- One centralized nursery has been established at Samri mines 'for, Samri, Tatijharia & Kudag lease.
- Reclamation of mined out land has been out sourced along with production. Average cost of reclamation considered @ Rs. 30.0 Lac per Ha.


Agent of
Samri Mines Division
Hindalco Industries Ltd