

ADITYA BIRLA



HINDALCO

HIL/SAMIAPCCF/46/2016/K

09.5.2016.

To,

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

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

Sub:- Status of compliance of EC condition (Half yearly status of compliance report) of Kudag Bauxite Mine (Lease area- 377.116 Ha.) of Hindalco Industries Limited of Chhattisgarh state from October-2015 to March-2016.

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- Ramanujanj, district, Chhattisgarh state, PIN-497224 from Oct-2015 to mar-2016.

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

Thanking you,

Yours' faithfully

For Hindalco Industries Limited

(M. K. Nayak)

Agent of Mines

Encl:-

1. Half Yearly Status of compliance of Environment condition as annexure-I.
2. Copy of Diversion of Revenue Forest Land enclosed as annexure -II.
3. Environment Status Report from Jan-2016 to Mar-2016 enclosed as annexure -III
4. Renewal copy of Consent to Operate from CECB enclosed as annexure -IV
5. Yearly Production report enclosed as annex-V.
6. Status report of mined out, reclaimed and afforested land as annexure-VI.
7. Actual expenditure incurred in environment measure from Oct-2015 to Mar-2016 as annex-VII.

HINDALCO INDUSTRIES LIMITED

Samri Mines Division, Baba Chowk
At & Post - Kusmi, PIN : 497 224,
Distt. - Balrampur-Ramanujanj (CG), 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- L27020MH1958PLC011238.

06.5.2016.

Status of Compliance from October-2015 to March-2016 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 during 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.

(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 are 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.


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.

Encl. : As Above

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

अरण्य गवन मेडिकल कॉलेज रोड, रायपुर

ईमेल: pccw@nic.nic.in

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

क्रमांक/व.प्रा./प्रबंध-12/13/2967

रायपुर दिनांक 07/10/2013

प्रति

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

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

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

—0—

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 (SLTPA) 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।

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

सभी 10 वर्षों के लिये राशि रुपये 160 लाख प्रावधानित की गयी है। जिसका क्रियान्वयन प्रस्ताव 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	

- क) परियोजना मूल्यांकन का जमा जो लगभग ₹ 160.00 लाख वर्तमान दरों पर है, परियोजना में देरी होने से यह लागत बढ़ने का कारण बनने का खतरा है। परियोजना के क्रियान्वयन के समय जो भी लागत आयेंगी वह परियोजना के परमानन्त वन वन विभाग में एकमुश्त जमा करानी होगी। जिससे मूल्य वृद्धि के प्रभाव को समाप्त करने का उपाय वन विभाग एकमुश्त जमा की गई राशि से वन्यप्राणी संरक्षण योजना क्रियान्वित करेगा।
- ख) अनुमोदित वन्यप्राणी संरक्षण योजना की एक प्रति सलग्न प्रेषित है। कृपया वन्यप्राणी संरक्षण योजना में प्रावधानित राशि रु 160.00 लाख एकमुश्त जमा करने हेतु परियोजना प्रस्तावकों को आदेशित करने का कष्ट करें।

संलग्न:-उपरोक्तानुसार।

Ramprakash
(रामप्रकाश) 01/12/13

प्रधान मुख्य वन संरक्षक (वन्यप्राणी)
छत्तीसगढ़, रायपुर

रायपुर दिनांक 01/12/2013

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।

Ramprakash
प्रधान मुख्य वन संरक्षक (वन्यप्राणी) 01/12/13
छत्तीसगढ़, रायपुर

Annexure - B

Annexure-08

Details of Flora and Fauna


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.

ANNEXURE-6
DETAILS OF FLORA & FAUNA

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

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

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

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

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

Sr. No.	Technical Name	Family	Life Form
95	<i>Chloris 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 fastuosa</i>	Solanaceae	Therophyte
105	<i>Datura metal</i>	Solanaceae	Therophyte
106	<i>Desmodium triflorum</i>	Asclepiadaceae	Therophyte
107	<i>Diospyros melanoxyton</i>	Lythraceae	Phanerophyte
108	<i>Diospyros Montana</i>	Lythraceae	Phanerophyte
109	<i>Echinops echinatus</i>	Compositae	Therophyte
110	<i>Eclipta prostrate</i>	Compositae	Hemicryptophyte
111	<i>Embllica officinale</i>	Euphorbiaceae	Phanerophyte
112	<i>Emilia lajerium</i>	Compositae	Hemicryptophyte
113	<i>Erythrina indica</i>	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 rellisiosa</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>Gmelina arborea</i>	Rubiaceae	Phanerophyte
136	<i>Gomphrena globosa</i>	Amaranthaceae	Therophyte
137	<i>Gossypium herbaceum</i>	Malvaceae	Therophyte
138	<i>Grewia abutifolia</i>	Tiliaceae	Phanerophyte
139	<i>Grewia salivifolia</i>	Tiliaceae	Phanerophyte
140	<i>Grewia subinaqualis</i>	Tiliaceae	Phanerophyte
141	<i>Gynandropis gynandra</i>	Capparidaceae	Hemicryptophyte
142	<i>Helictis isora</i>	Rubiaceae	Phanerophyte
143	<i>Heliotropium indicum</i>	Rubiaceae	Hemicryptophyte
144	<i>Helitropium ovalifolium</i>	Rubiaceae	Hemicryptophyte
145	<i>Hemidesmus indicus</i>	Asclepiadaceae	Phanerophyte
146	<i>Hibiscus caesus</i>	Malvaceae	Hemicryptophyte
147	<i>Holarrhena antidycenterica</i>	Asclepiadaceae	Phanerophyte
148	<i>Holostemma annularia</i>	Asclepiadaceae	Phanerophyte
149	<i>Hygrophylla auriculata</i>	Acanthaceae	Hemicryptophyte
150	<i>Hyptis suavalens</i>	Labiatae	Therophyte
151	<i>Ichnocarpus frutens</i>	Poaceae	Hemicryptophyte
152	<i>Impatiens balasamania</i>	Balsaminaceae	Therophyte
153	<i>Indigofera hirsute</i>	Caesalpinaceae	Therophyte
154	<i>Indigofera limnacea</i>	Caesalpinaceae	Therophyte
155	<i>Indigofera tinctoria</i>	Caesalpinaceae	Therophyte
156	<i>Ipomea aquatica</i>	Convolvulaceae	Hydrophyte
157	<i>Ipomea coccinea</i>	Convolvulaceae	Therophyte
158	<i>Ipomea tuba</i>	Convolvulaceae	Hemicryptophyte
159	<i>Ixora arborea</i>	Rubiaceae	Phanerophyte
160	<i>Ixora parviflora</i>	Rubiaceae	Phanerophyte

Sr. No.	Technical Name	Family	Life Form
161	<i>Ixora singapuriens</i>	Rubiaceae	Phanerophyte
162	<i>Jasmimum arborens</i>	Oleaceae	Phanerophyte
163	<i>Jatropha gossypifolia</i>	Euphorbiaceae	Therophyte
164	<i>Jussiaea suffraticosa</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>Lindenbergia indica</i>	Scrophulariaceae	Therophyte
180	<i>Lindernbergia 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 paradistica</i>	Musaceae	Therophyte
204	<i>Nymphia sp</i>	Magnoliaceae	Hydrophyte
205	<i>Ocimum americanum</i>	Labiatae	Therophyte
206	<i>Ocimum basillum</i>	Labiatae	Therophyte
207	<i>Ocimum canum</i>	Labiatae	Therophyte
208	<i>Ocimum sanctum</i>	Labiatae	Therophyte
209	<i>Oldenlandia umbellate</i>	Convolvulaceae	Therophyte
210	<i>Oldenlandia corymbosa</i>	Rubiaceae	Therophyte
211	<i>Ooqenia oojensis</i>	Papilionaceae	Phanerophyte
212	<i>Opuntia dillinii</i>	Opuntiaceae	Therophyte
213	<i>Opuntia elator</i>	Cacataceae	Therophyteq
214	<i>Oxalis corniculata</i>	Oxalidaceae	Therophyte
215	<i>Panicum milliria</i>	Poaceae	Hemicryptophyte
216	<i>Panicum notatum</i>	Poaceae	Hemicryptophyte
217	<i>Papaver somniferum</i>	Papaveraceae	Hemicryptophyte
218	<i>Parkinsonia aculata</i>	Mimosaceae	Phanerophyte
219	<i>Parthenium hysterophorus</i>	Compositae	Therophyte
220	<i>Paspalum strobilanthus</i>	Passifloraceae	Hemicryptophyte
221	<i>Passiflora foetida</i>	Passifloraceae	Phanerophyte
222	<i>Pavonia zeylanica</i>	Malvaceae	Phanerophyte
223	<i>Peltophorum ferrusinum</i>	Caesalpinaceae	Phanerophyte
224	<i>Phoenix aculis</i>	Palmae	Phanerophyte
225	<i>Phyllanthus asperulatus</i>	Euphorbiaceae	Phanerophyte
226	<i>Phyllanthus emblica</i>	Euphorbiaceae	Phanerophyte

Sr. No.	Technical Name	Family	Life Form
227	<i>Phyllanthes niruri</i>	Euphorbiaceae	Therophyte
228	<i>Phyllanthes reticulatus</i>	Euphorbiaceae	Therophyte
229	<i>Physalis minima</i>	Solanaceae	Therophyte
230	<i>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>	Portulacaceae	Therophyte
235	<i>Psidium guava</i>	Myrtaceae	Phanerophyte
236	<i>Punica granatum</i>	Puniaceae	Therophyte
237	<i>Randia dumetorum</i>	Rubiaceae	Phanerophyte
238	<i>Rosa indica</i>	Rosaceae	Therophyte
239	<i>Rosa machata</i>	Rosaceae	Therophyte
240	<i>Saccharum munja</i>	Poaceae	Hemicryptophyte
241	<i>Saccharum officinarum</i>	Poaceae	Therophyte
242	<i>Salmalia malabarica</i>	Salmaliaceae	Phanerophyte
243	<i>Sapindus emarginatus</i>	Sapindaceae	Phanerophyte
244	<i>Schleichera trijuga</i>	Combretaceae	Phanerophyte
245	<i>Scherebera 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 vernanifolia</i>	Malvaceae	Hemicryptophyte
251	<i>Solanum nigrum</i>	Solanaceae	Therophyte
252	<i>Solanum xanthocarpum</i>	Solanaceae	Therophyte
253	<i>Sterculia villosa</i>	Tiliaceae	Therophyte
254	<i>Stereospermum chelinoides</i>	Bignoniaceae	Phanerophyte
255	<i>Sygygium cumini</i>	Myrtaceae	Phanerophyte
256	<i>Tamarindus indica</i>	Caesalpinaceae	Phanerophyte
257	<i>Tecomella undulate</i>	Bignoniaceae	Therophyte
258	<i>Tectona grandis</i>	Verbinaceae	Phanerophyte
259	<i>Tephrosia purpuria</i>	Fabaceae	Therophyte
260	<i>Terminalia bellarica</i>	Combretaceae	Phanerophyte
261	<i>Terminalia chebula</i>	Combretaceae	Phanerophyte
262	<i>Terminalia tomentosa</i>	Combretaceae	Phanerophyte
263	<i>Tinospora cordifolia</i>	Rhamnaceae	Therophyte
264	<i>Tragus biflorus</i>	Poaceae	Hemicryptophyte
265	<i>Tribulus terrestris</i>	Zygophyllaceae	Therophyte
266	<i>Tridax procumbens</i>	Compositae	Therophyte
267	<i>Triumferta pilosa</i>	Tiliaceae	
268	<i>Vernonia cinera</i>	Compositae	Therophyte
269	<i>Vicoa indica</i>	Compositae	Phanerophyte
270	<i>Vitex Negundo</i>	Verbinaceae	Phanerophyte
271	<i>Vitex negundo</i>	Verbinaceae	Therophyte
272	<i>Vitis vermifera</i>	Vitaceae	Therophyte
273	<i>Vivevera zizanoides</i>	Poaceae	Therophyte
274	<i>Wrightia tomentosa</i>	Apocyanaceae	Phanerophyte
275	<i>Xanthium strumariumk</i>	Compositae	Therophyte
276	<i>Yucca gloriosa</i>	Agavaceae	Therophyte
277	<i>Zizyphus jujube</i>	Rhamnaceae	Phanerophyte
278	<i>Zizyphus mauritiana</i>	Rhamnaceae	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 spontaneseum</i>	Poaceae	Hemicryptophyte
285	<i>Themeda quadrivalvis</i>	Poaceae	Hemicryptophyte
286	<i>Aristida adscensionsis</i>	Poaceae	Hemicryptophyte
287	<i>Cenchrus ciliaris</i>	Poaceae	Therophyte
288	<i>Cenchrus setifera</i>	Poaceae	Therophyte
289	<i>Cymbopogon jwarancusa</i>	Cyperaceae	Hemicryptophyte
290	<i>Cyperus aristatus</i>	Cyperaceae	Therophyte
291	<i>Cyperus triceps</i>	Cyperaceae	Therophyte

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

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

Technical Name	English Name/ Local Name	Wild Life Protection Act (1972) Status
Aves		
<i>Phalacrocorax niger</i>	Little cormorant	Sch-IV
<i>Nycticorax nycticorax</i>	Night heron	Sch-IV
<i>Ardeola grayii grayii</i>	Paddy bird	Sch-IV
<i>Bubulcus ibis coromandus</i>	Cattle egret	Sch-IV
<i>Eudynamys scolopacea</i>	Indian koel	Sch-IV
<i>Meops philippinus philippinus</i>	Bluetailed bee-eater	Sch-IV
<i>Dinopium benghalense tehminae</i>	Malabar golden backed Woodpecker	Sch-IV
<i>Acridotheres tristis tristis</i>	Common myna	Sch-IV
<i>Nectarinia minima</i>	Small sunbird	Sch-IV
<i>Passer domesticus indicus</i>	Indian house sparrow	Sch-IV
Butterflies		
<i>Hypolimnas bolina Lin.</i>	Great eggfly	-
<i>Euploea core Cramer</i>	Common crow	-
<i>Neptis hylas Moore</i>	Common sailor	-
<i>Eurema hecabe Lin.</i>	Common grass yellow	-
<i>Parantica 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)
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

Technical Name	English Name/Local Name	Wild Life Protection Act (1972)
<i>Meops philippinus philippinus</i>	Bluetailed bee-eater	Sch-IV
<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 ceyonensis</i>	Southern magpie-robin	Sch-IV
<i>Orthotomus sutorius</i>	Tailor bird guzurata	Sch-IV
<i>Pavocristatus</i>	Peacock	Part-III of Sch-I
Amphibians		
<i>Rana tigrina</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>Pachllopta hector Lin.</i>	Crimson rose	-
<i>Papillo demoleus Lin.</i>	Lime butterfly	-
<i>Graphium agamemnon Lin.</i>	Tailed jay	-
<i>Junoria 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

KUDAG

शर

Telegram : PARYAVARAN.
NEW DELHI

दूरभाष :

Telephone :

टेलेक्स (द्विभाषीय) :

Telex : (bi-lingual) : W-66185 DOE IN

FAX : 4360678

भारत सरकार

पर्यावरण एवं वन मंत्रालय

GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT & FORESTS

पर्यावरण भवन, सी० जी० ओ० कॉम्प्लेक्स

PARYAVARAN BHAWAN, C.G.O. COMPLEX

लोदी रोड, नई दिल्ली - 110003

LODHI ROAD, NEW DELHI - 110003

Dated: 12th March, 1996.

No.8-34/95-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 P rincipal 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-2016

Name of Industry




Agent of Mines
Samri Mines Division
Hindalco Industries Ltd

M/s. Hindalco Industries Limited.,

Name of Laboratory:-



Recognised by MoEF (GOI) Notifn. No. D.L.33004/99 Dt.24.10.2007
NABL T-1550 (Chemical), T-1826 (Biological), T-2344 (Mechanical) dt.04/10/2012 valid up to
03.10.2016

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-2016 to March-2016** as compliance to the statutory requirements.

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

for ANACON LABORATORIES PVT. LTD.



Stamp

Authorized Signatory

Place : Nagpur

Date : March, 2016



1.1 Introduction

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

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

HINDALCO INDUSTRIES LTD., awarded the work to M/s ANACON LABORATORIES PVT. LTD. Nagpur(ALPL) for carrying out Environmental monitoring of parameters for assessing pollution levels and preparation of monthly reports (*January-February-March-2016*) 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. in 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 ⁰ 26' 02"N to 23 ⁰ 29' 00"N
3.	Longitude	83 ⁰ 51' 00"E to 83 ⁰ 59' 00"E
4.	Elevation	1145-m above Mean Sea Level
5.	Climatic Conditions (as per IMD, Ambikapur)	Annual maximum temperature : 30.3 ⁰ C Annual minimum temperature : 17.7 ⁰ 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 conditions, the monitoring program will serve as an indicator for any deterioration in environmental conditions due to mining operation of the project. Suitable mitigation steps will be taken in time to safeguard the environment based on monitoring reports. Monitoring is important in 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-2016. The AAQM sampling sites are selected considering seasonal variation in wind speed and wind direction.

Sampling Duration and Frequency

Ambient air quality monitoring was carried out for the parameters PM_{2.5}, RPM (PM₁₀), SO₂, NO_x and SPM, RSPM, SO₂, NO_x, Pb, Hg, As and Cr from January-February-March-2016 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) (August-20, 1994) and as per consent conditions mentioned in consent letter.

MONITORED PARAMETERS AND FREQUENCY OF SAMPLING

Methods and Instruments used for Sampling

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

The levels of Suspended Particulate Matter (SPM), Respirable Particulate Matter



(RPM), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Pb, Hg, As and Cr were monitored for establishing the baseline status. SPM and RPM was collected with the help of Respirable Particulate Sampler operating 24 hours by drawing air which passes through the cyclone at the rate of 1.0 -1.3 m³/min which collects the particles less than 10 µm diameter over glass fiber filter paper and the bigger particulates from 10 to 100 µm are collected into the cup provided at the bottom of the cyclone. The dust deposited over the filter paper is measured as RPM 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 Samplers 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 (NO _x)	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 ($\mu\text{g}/\text{m}^3$)
1.	Suspended Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part - 23)	5
2.	Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part-23)	5
3.	Particulate Matter 2.5	Respirable Dust Sampler (Gravimetric Method)	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 Fall	Gravimetric	IS-5182 (Part-I)	—

1.6 Fugitive Emission Monitoring (Core Zone)

The summary of Fugitive Emission monitoring results for the month of January-February-March-2016 are presented in detail in **Table 6.0**. 98th percentile; maximum and minimum values etc have been computed from the collected raw data for all the Fugitive monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQ for residential and rural zone.

1.6.1 Presentation of Results.

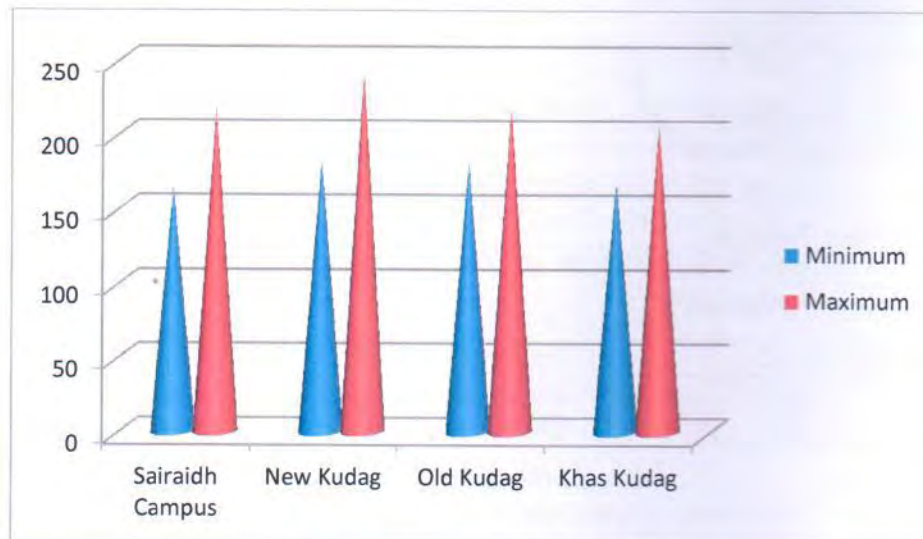
Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as $164 \mu\text{g}/\text{m}^3$ and $241 \mu\text{g}/\text{m}^3$ respectively. The average concentrations were ranged between 171 to $224 \mu\text{g}/\text{m}^3$. and 98th percentile values ranged between 174 to $240 \mu\text{g}/\text{m}^3$ in the study area

(Table 6).

Graphical Presentation Of Fugitive Emission Monitoring

SPM

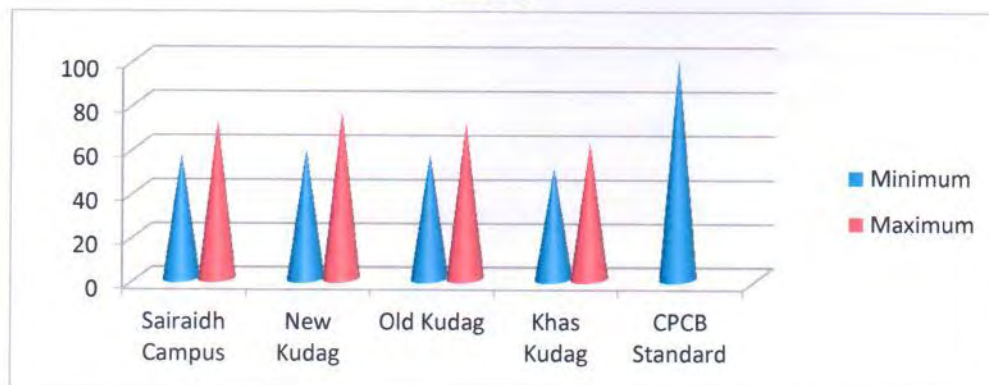


Respirable Suspended Particulate Matter –RSPM

The minimum and maximum concentrations for RSPM were recorded as 51 µg/m³ and 76 µg/m³ respectively. The average values were observed to be in the range of 54 to 72 µg/m³ and 98th percentile values ranged between 57 to 76 µg/m³ in the study area (Table 7).

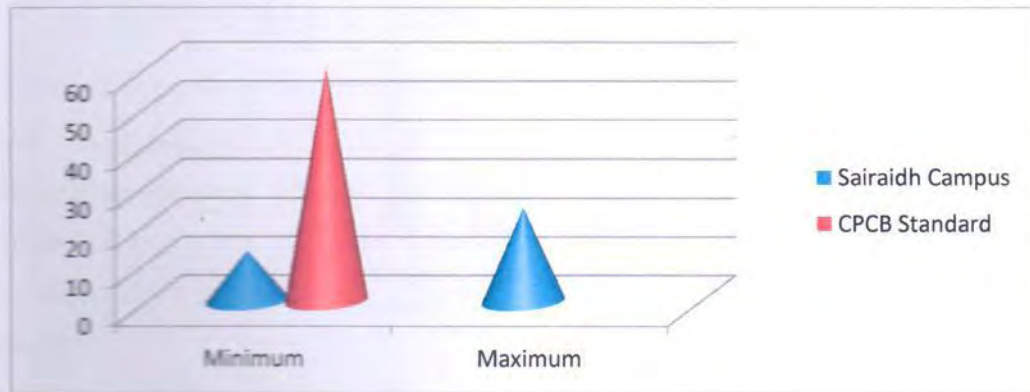
Graphical Presentation Of Fugitive Emission Monitoring

RSPM



Particulate Matter -PM_{2.5}

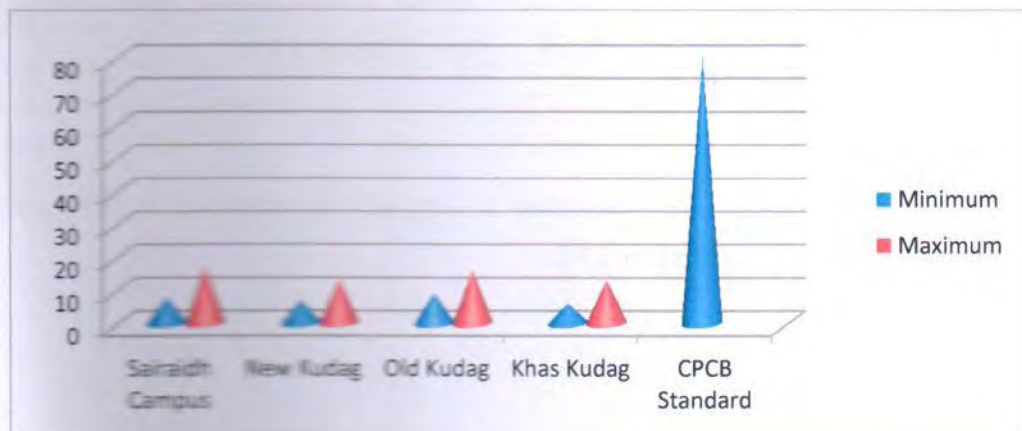
The minimum and maximum values of PM_{2.5} concentrations varied between 13 to 24 µg/m³ respectively. The average values range between 16 to 21 µg/m³ and 98th percentile values varied between 19 to 24 µg/m³ (Table 8).



Sulphur Dioxide (SO₂)

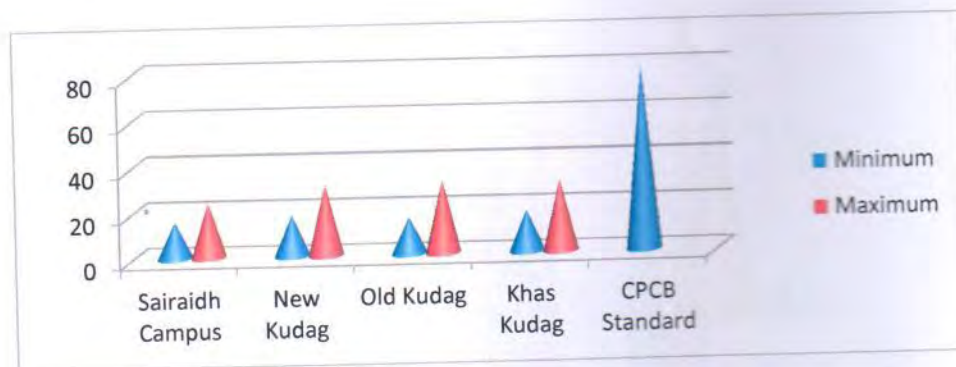
The minimum and maximum SO₂ concentrations were recorded as 6 µg/m³ and 17 µg/m³ respectively. The average values were observed to be in the range of 8 to 14 µg/m³ and 98th percentile values varied between 9 to 17 µg/m³ (Table 9).

Graphical Presentation Of Fugitive Emission Monitoring
SO₂



Nitrogen Oxide (NO_x)

The minimum and maximum NO_x concentrations were recorded as 16 µg/m³ and 32 µg/m³. The average concentrations were ranged between 18 to 28 µg/m³ and 98th percentile values varied between 19 to 32 µg/m³ (Table 10).



Lead (Pb)

The minimum and maximum Lead detected between <0.005 to 0.047 µg/m³ respectively. The average Lead detected between <0.005 to 0.036 µg/m³ & 98th percentile values varied between <0.005 to 0.047 µg/m³ in the study region. (Table 11).

Mercury (Hg)

The maximum concentrations of Hg varied 0.031 µg/m³ respectively. The average concentration varied 0.028 µg/m³ 98th percentiles values varied 0.031 µg/m³ in the study region. (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.

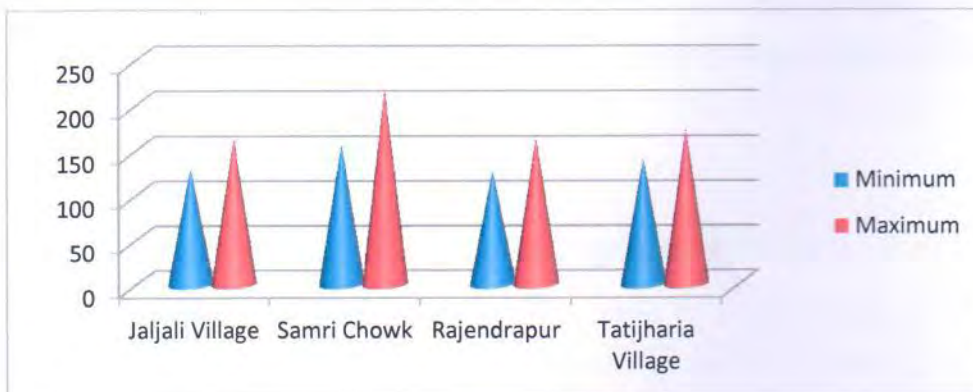
The summary of Ambient Air Quality monitoring results for the month of January-February-March-2016 are presented in detail in **Table 6**. 98th percentile; maximum and minimum values etc have been computed from the

collected raw data for all the AAQ monitoring station. The data has been compared with the standards prescribed by Central Pollution Control Board (CPCB)/NAAQ for residential and rural zone.

Suspended Particulate Matter-SPM

The statistical analysis of SPM is presented in **Table 6** for the Buffer Zone area. The minimum and maximum values varied between 127 to 217 $\mu\text{g}/\text{m}^3$ respectively during study period at all the 4 locations. The average values ranged between 133 to 203 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 138 to 216 $\mu\text{g}/\text{m}^3$ in the study area.

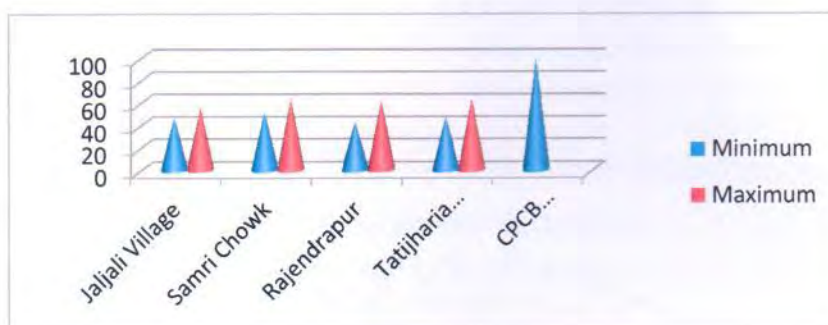
Graphical Presentation Of Ambient Air Quality (Buffer Zone)



Particulate Matter-RSPM

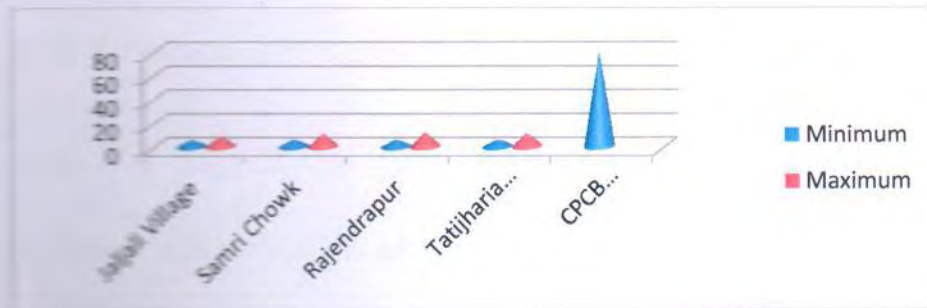
The minimum and maximum values of RSPM varied between 43 to 64 $\mu\text{g}/\text{m}^3$ respectively (**Table 7**). The average values varied between 47 to 61 $\mu\text{g}/\text{m}^3$. The 98th percentile values varied between 51 to 64 $\mu\text{g}/\text{m}^3$ in the mining area. The overall values of SPM and RSPM were well within the CPCB limits prescribe for industrial and residential area in the study area during the study period.

Graphical Presentation Of Ambient Air Quality (Buffer Zone)
RSPM



Sulphur Dioxide (SO₂)

The minimum and maximum values of SO₂ concentrations varied between 6 to 12 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 7 to 11 $\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 8 to 12 $\mu\text{g}/\text{m}^3$ (**Table 9**).

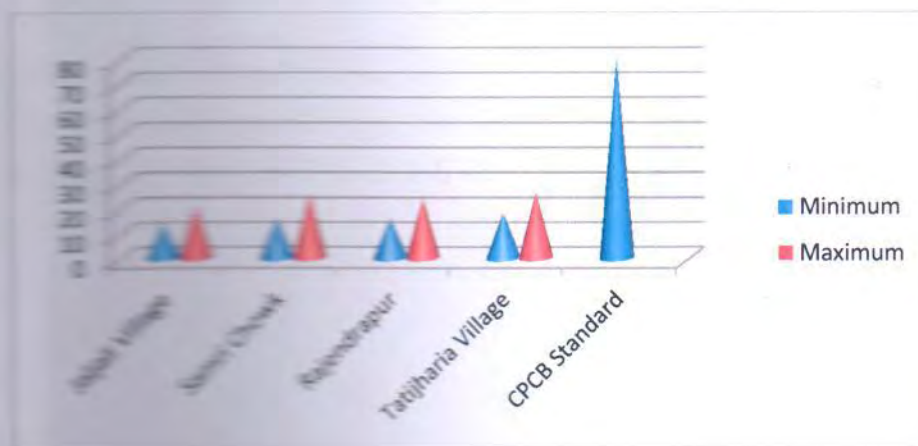


Nitrogen Oxide (NO_x)

The minimum and maximum values of NO_x concentrations varied between 14 to 26 µg/m³ respectively. The average values range between 16 to 24 µg/m³ and 98th percentile values varied between 18 to 26 µg/m³ (Table 10).

Graphical Presentation Of Ambient Air Quality (Buffer Zone)

NO_x



Lead (Pb)

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

The dust fall rate was measured by exposing a jar during January-February-March-2016 in Old Kudag/Mining Area and Khas Kudag village. The dust fall rate was observed to be 23.3 and 19.9 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.

8 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (**Jan-Feb-March 2016**) indicates that the wind was blowing predominantly from (NNE and NE) directions, during study period, for 6.67 % 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	0.08368	0.01255	0	0	0	0	0.09583
2	11.25 - 33.75	0.14226	0.01674	0	0	0	0	0.15833
3	33.75 - 56.25	0.12552	0	0	0	0	0	0.125
4	56.25 - 78.75	0.05021	0.00837	0	0	0	0	0.05833
5	78.75 - 101.25	0.05858	0.00418	0	0	0	0	0.0625
6	101.25 - 123.75	0.0251	0.00418	0	0	0	0	0.02917
7	123.75 - 146.25	0.0251	0.01255	0	0	0	0	0.0375
8	146.25 - 168.75	0.01674	0.00418	0	0	0	0	0.02083
9	168.75 - 191.25	0.00418	0	0	0	0	0	0.00417
10	191.25 - 213.75	0.03756	0.00418	0	0	0	0	0.04167
11	213.75 - 236.25	0.01255	0.01255	0.00418	0	0	0	0.02917
12	236.25 - 258.75	0.00418	0.00837	0.00418	0	0	0	0.01667
13	258.75 - 281.25	0.00837	0.0251	0	0	0	0	0.03333
14	281.25 - 303.75	0.02929	0.02929	0.00418	0	0	0	0.05417
15	303.75 - 326.25	0.03347	0.04184	0.00837	0	0	0	0.08333
16	326.25 - 348.75	0.04625	0.02929	0.00418	0	0	0	0.07917
	Sub-Total	0.69167	0.2125	0.025	0	0	0	0.92917
	Calms							0.06667
	Missing/Incomplete							0.00417
	Total							1

SUMMARY OF WIND PATTERN

Season	First Predominant Wind Direction	Second Predominant Direction	Wind	Calm Condition
Jan-Feb-March 2016	NNE (15.8%)	NE (12.5%)		6.67 %

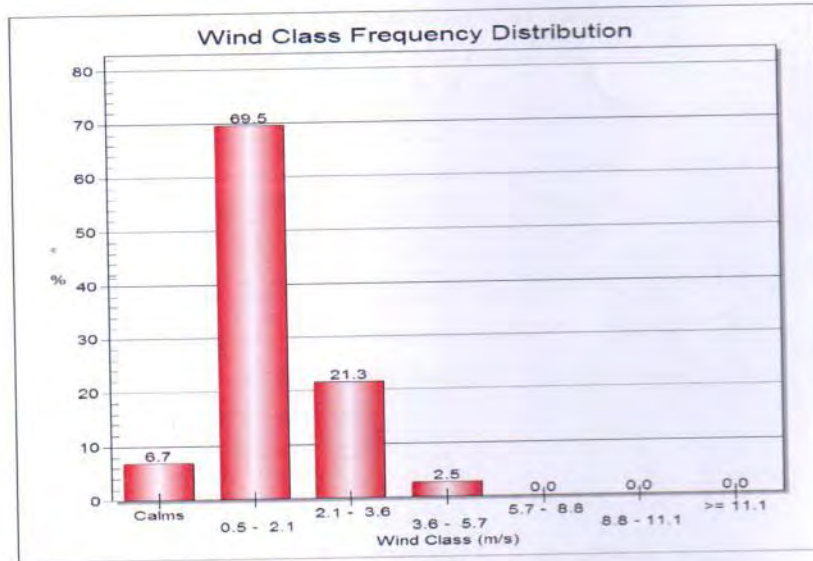


Figure.01: Wind Class Frequency Distribution

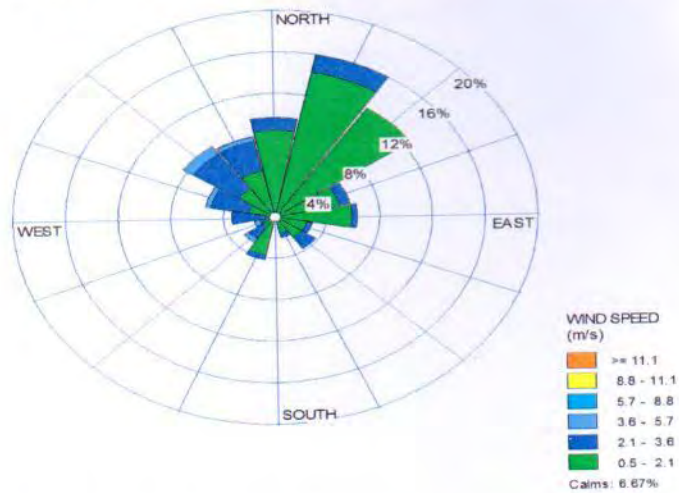


Figure.02: Wind Rose Diagram (Jan-Feb-March, 2016)



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 6 am to 10 pm and night levels during 10 pm to 6 am at eight locations within 10-km radius of the study area.

 <p>HINDALCO ADITYA BIRLA GROUP</p>	<p>Hindalco Industries Limited Kudag Mining Environmental Status Report for January To March-2016</p>	<p>Details of Salient Features</p>
---	--	---

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 may 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 may 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%ile
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2016	171	189	180	180	189
	February-2016	164	178	171	171	178
	March-2016	201	217	209	209	217
New Kudag/Nr. Weigh Bridge	January-2016	194	238	216	216	237
	February-2016	207	241	224	224	240
	March-2016	182	193	188	188	193
Old Kudag/Mining Area	January-2016	181	209	195	195	208
	February-2016	193	217	205	205	217
	March-2016	187	193	190	190	193
Khas Kudag	January-2016	172	181	177	177	181
	February-2016	168	174	171	171	174
	March-2016	192	207	200	200	207
CPCB Standard		---				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Buffer Zone :-						
Jaljali Village	January-2016	131	147	139	139	147
	February-2016	142	164	153	153	164
	March-2016	139	153	146	146	153
Samri Chowk/ Nr.Old Weigh Bridge	January-2016	173	201	187	187	200
	February-2016	189	217	203	203	216
	March-2016	157	183	170	170	182
Rajendrapur	January-2016	131	149	140	140	149
	February-2016	127	138	133	133	138
	March-2016	138	164	151	151	163
Tatijharia Village	January-2016	149	167	158	158	167
	February-2016	158	173	166	166	173
	March-2016	141	159	150	150	159
CPCB Standard		---				


Conclusion-A:-

- 1) Sairaidh Campus Lease Area Core Zone :-** For the Months of Jan-Feb-March-2016 Average of SPM is $187 \mu\text{g}/\text{m}^3$.
- 2) New Kudag/Nr. Weigh Bridge Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2016 Average of SPM is $209 \mu\text{g}/\text{m}^3$.
- 3) Old Kudag/Mining Lease Area Core Zone:-** For the Months of Jan-Feb-March-2016 Average of SPM is $197 \mu\text{g}/\text{m}^3$.
- 4) Khas Kudag Lease Area Core Zone:-** For the Months of Jan-Feb-March-2016 Average of SPM is $183 \mu\text{g}/\text{m}^3$.

• The Average Concentration of SPM within the core zone of Kudag Lease is $194 \mu\text{g}/\text{m}^3$.

Conclusion-B:-

- 1) Jaljali Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2016 Average of SPM is $146 \mu\text{g}/\text{m}^3$.

	<p align="center">Hindalco Industries Limited Kudag Mining Environmental Status Report for January To March-2016</p>	<p align="center">Details of Salient Features</p>
--	---	--

- 2) **Samri Chowk Lease Area Buffer Zone** :- For the Months of Jan-Feb-March-2016 Average of SPM is 187 $\mu\text{g}/\text{m}^3$.
 - 3) **Rajendrapur Lease Area Buffer Zone** :- For the Months of Jan-Feb-March-2016 Average of SPM is 141 $\mu\text{g}/\text{m}^3$.
 - 4) **Tatijharia Village Lease Area Buffer Zone** :- For the Months of Jan-Feb-Mar-2016 Average of SPM is 158 $\mu\text{g}/\text{m}^3$.
- The Average Concentration of SPM within the Buffer Zone of Kudag Lease is 158 $\mu\text{g}/\text{m}^3$

Monthwise Summary of Statistical Analysis of SPM

2.1 Fugitive Emission (Core Zone):-

2.1.1 Presentation of Results.

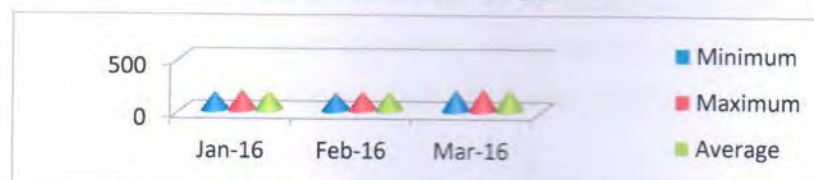
The summary of Statistical Analysis of SPM results for the month of January-2016 to March-2016 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January-2016 the minimum and maximum concentrations for SPM were recorded as 171 $\mu\text{g}/\text{m}^3$ and 189 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 180 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for SPM were recorded as 164 $\mu\text{g}/\text{m}^3$ and 178 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 171 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for SPM were recorded as 201 $\mu\text{g}/\text{m}^3$ and 217 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 209 $\mu\text{g}/\text{m}^3$.



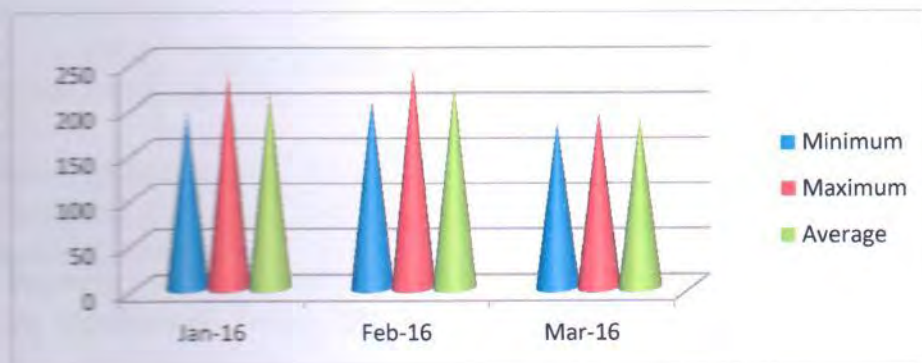
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of January-2016 the minimum and maximum concentrations for SPM were recorded as 194 $\mu\text{g}/\text{m}^3$ and 238 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 216 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for SPM were recorded as 207 $\mu\text{g}/\text{m}^3$ and 241 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 224 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for SPM were recorded as 182 $\mu\text{g}/\text{m}^3$ and 193 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 188 $\mu\text{g}/\text{m}^3$.



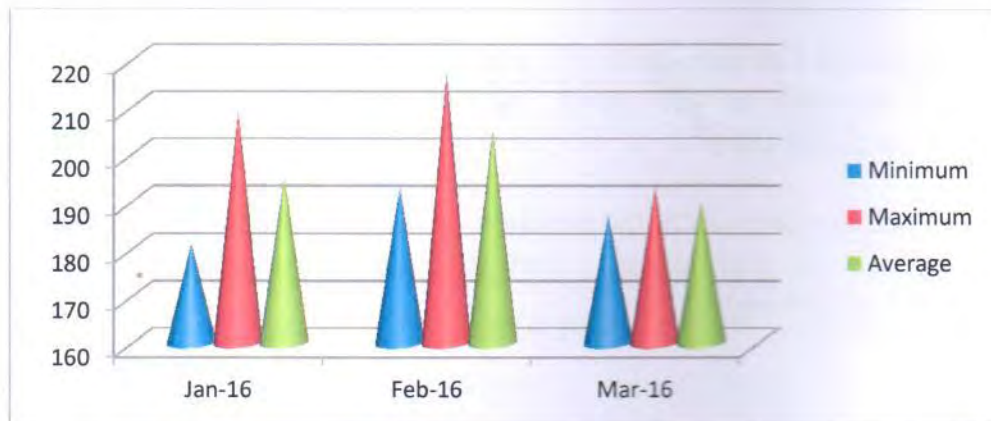
Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

For the month of January-2016 the minimum and maximum concentrations for SPM were recorded as 181 $\mu\text{g}/\text{m}^3$ and 209 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 195 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for SPM were recorded as 193 $\mu\text{g}/\text{m}^3$ and 217 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 205 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for SPM were recorded as 187 $\mu\text{g}/\text{m}^3$ and 193 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 190 $\mu\text{g}/\text{m}^3$.



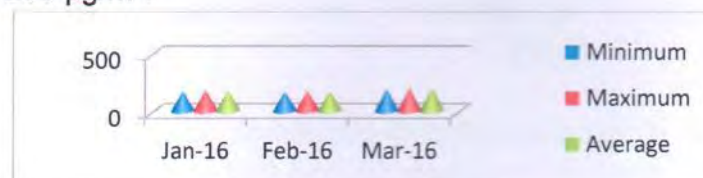
Graph:- Old Kudag/Mining Area

Khas Kudag

For the month of January-2016 the minimum and maximum concentrations for SPM were recorded as 172 $\mu\text{g}/\text{m}^3$ and 181 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 177 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for SPM were recorded as 168 $\mu\text{g}/\text{m}^3$ and 174 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 171 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for SPM were recorded as 192 $\mu\text{g}/\text{m}^3$ and 207 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 200 $\mu\text{g}/\text{m}^3$.



Graph:- Khas Kudag



2.2 Fugitive Emission (Buffer Zone):-

2.2.1 Presentation of Results.

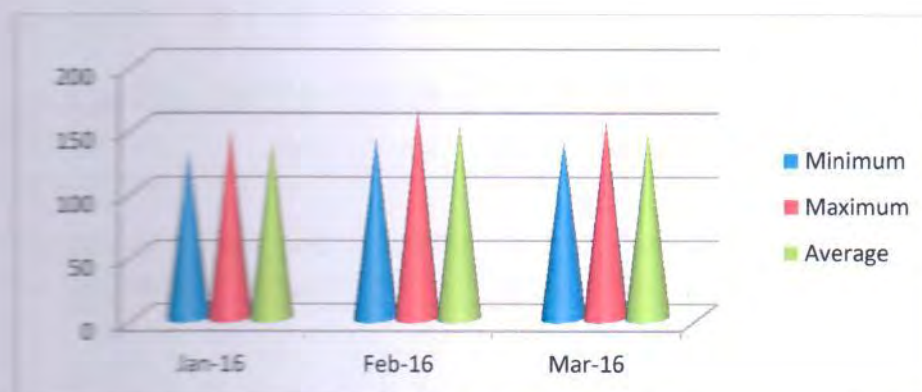
The summary of Statistical Analysis of SPM results for the month of January-2016 to March-2016 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of January-2016 the minimum and maximum concentrations for SPM were recorded as $131 \mu\text{g}/\text{m}^3$ and $147 \mu\text{g}/\text{m}^3$ respectively and average concentration of $139 \mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for SPM were recorded as $142 \mu\text{g}/\text{m}^3$ and $164 \mu\text{g}/\text{m}^3$ respectively and average concentration of $153 \mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for SPM were recorded as $139 \mu\text{g}/\text{m}^3$ and $153 \mu\text{g}/\text{m}^3$ respectively and average concentration of $146 \mu\text{g}/\text{m}^3$.



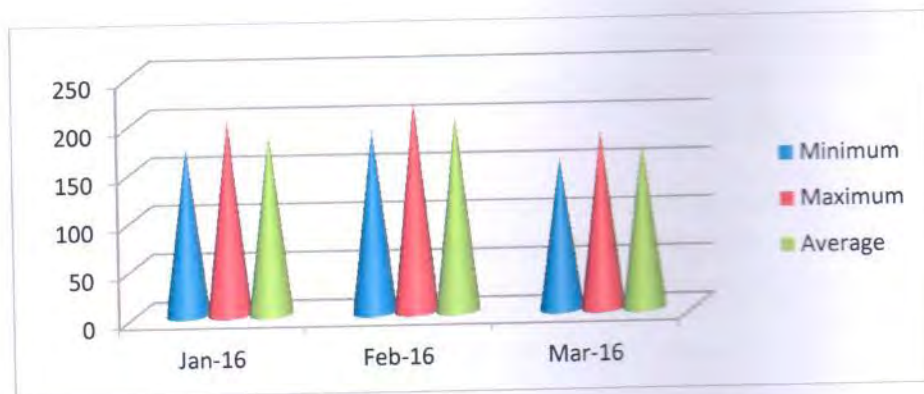
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of January-2016 the minimum and maximum concentrations for SPM were recorded as 173 $\mu\text{g}/\text{m}^3$ and 201 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 187 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for SPM were recorded as 189 $\mu\text{g}/\text{m}^3$ and 217 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 203 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for SPM were recorded as 157 $\mu\text{g}/\text{m}^3$ and 183 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 170 $\mu\text{g}/\text{m}^3$.



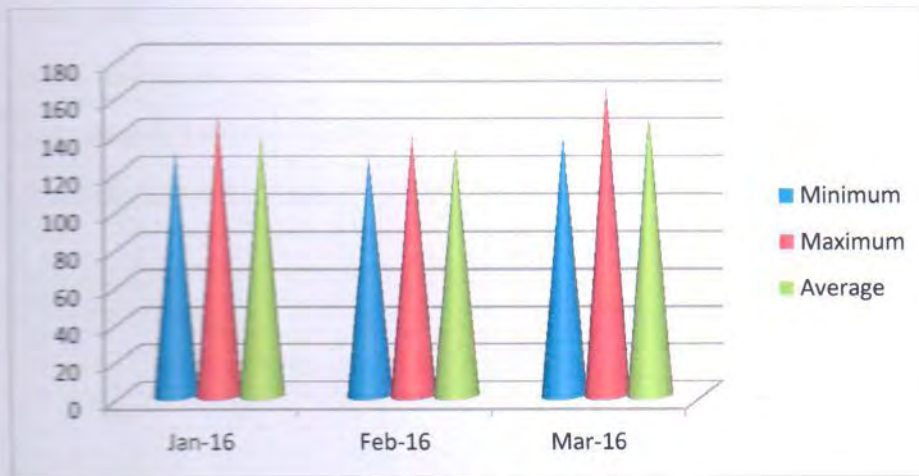
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of January-2016 the minimum and maximum concentrations for SPM were recorded as 131 $\mu\text{g}/\text{m}^3$ and 149 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 140 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for SPM were recorded as 127 $\mu\text{g}/\text{m}^3$ and 138 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 133 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for SPM were recorded as 138 $\mu\text{g}/\text{m}^3$ and 164 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 151 $\mu\text{g}/\text{m}^3$.



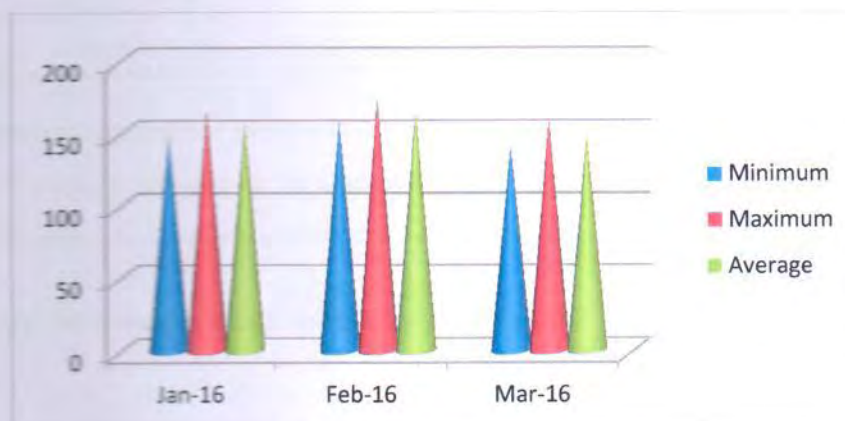
Graph:- Rajendrapur

Tatijharia Village

For the month of January-2016 the minimum and maximum concentrations for SPM were recorded as $149 \mu\text{g}/\text{m}^3$ and $167 \mu\text{g}/\text{m}^3$ respectively and average concentration of $158 \mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for SPM were recorded as $158 \mu\text{g}/\text{m}^3$ and $173 \mu\text{g}/\text{m}^3$ respectively and average concentration of $166 \mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for SPM were recorded as $141 \mu\text{g}/\text{m}^3$ and $159 \mu\text{g}/\text{m}^3$ respectively and average concentration of $150 \mu\text{g}/\text{m}^3$.



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-2016	57	61	59	59	61
	February-2016	62	67	65	65	67
	March-2016	64	72	68	68	72
New Kudag/Nr. Weigh Bridge	January-2016	59	64	62	62	64
	February-2016	64	73	69	69	73
	March-2016	68	76	72	72	76
Old Kudag/Mining Area	January-2016	57	63	60	60	63
	February-2016	62	67	65	65	67
	March-2016	63	71	67	67	71
Khas Kudag	January-2016	54	59	57	57	59
	February-2016	51	57	54	54	57
	March-2016	56	62	59	59	62
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-2016	47	53	50	50	53
	February-2016	51	56	54	54	56
	March-2016	49	52	51	51	52
Samri Chowk/ Nr.Old Weigh Bridge	January-2016	57	63	60	60	63
	February-2016	52	59	56	56	59
	March-2016	58	64	61	61	64
Rajendrapur	January-2016	43	51	47	47	51
	February-2016	46	58	52	52	58
	March-2016	51	62	57	57	62
Tatijharia Village	January-2016	48	59	54	54	59
	February-2016	51	62	57	57	62
	March-2016	53	64	59	59	64
CPCB Standard		100 $\mu\text{g}/\text{m}^3$ (24 hrs)				

Conclusion: A)

- 1) **Sairaidh Campus Lease Area Core Zone :-** For the Months of Jan-Feb-March-2016 Average of RSPM is 64 $\mu\text{g}/\text{m}^3$.
- 2) **New Kudag/Nr. Weigh Bridge Lease Area Core Zone :-** For the Months of Jan-Feb-March-2016 Average of RSPM is 68 $\mu\text{g}/\text{m}^3$.
- 3) **Old Kudag/Mining Area Lease Area Core Zone :-** For the Months of Jan-Feb-Mar-2016 Average of RSPM is 64 $\mu\text{g}/\text{m}^3$.
- 4) **Khas Kudag Lease Area Core Zone :-** For the Months of Jan-Feb-March-2016 Average of RSPM is 57 $\mu\text{g}/\text{m}^3$.

- 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)



- 1) Jaljali Village Lease Area Buffer Zone :- For the Months of Jan-Feb-March-2016 Average of RSPM is 52 $\mu\text{g}/\text{m}^3$.
 - 2) Samri Chowk Lease Area Buffer Zone :- For the Months of Jan-Feb-March-2016 Average of RSPM is 59 $\mu\text{g}/\text{m}^3$.
 - 3) Rajendrapur Lease Area Buffer Zone :- For the Months of Jan-Feb-March-2016 Average of RSPM is 52 $\mu\text{g}/\text{m}^3$.
 - 4) Tatijharia Village Lease Area Buffer Zone :- For the Months of Jan-Feb-March-2016 Average of RSPM is 57 $\mu\text{g}/\text{m}^3$.
- 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-2016 to March-2016 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-2016 the minimum and maximum concentrations for RSPM were recorded as 57 $\mu\text{g}/\text{m}^3$ and 61 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 59 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for RSPM were recorded as 62 $\mu\text{g}/\text{m}^3$ and 67 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 65 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for RSPM were recorded as 64 $\mu\text{g}/\text{m}^3$ and 72 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 68 $\mu\text{g}/\text{m}^3$.



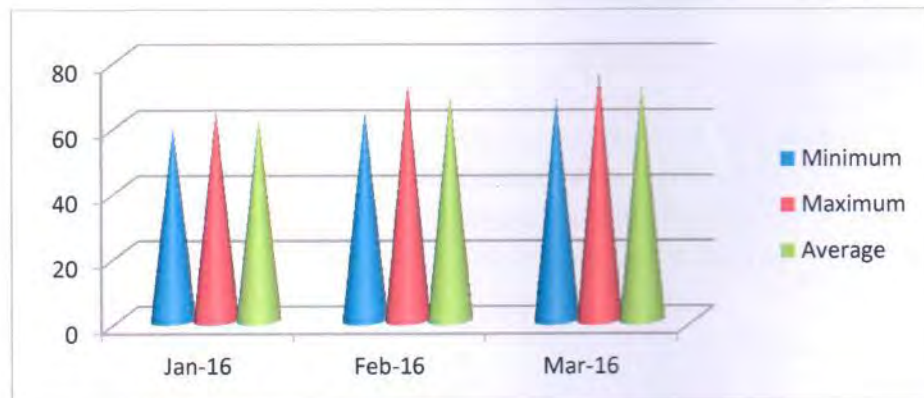
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of January-2016 the minimum and maximum concentrations for RSPM were recorded as 59 $\mu\text{g}/\text{m}^3$ and 64 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 62 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for RSPM were recorded as 64 $\mu\text{g}/\text{m}^3$ and 73 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 69 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for RSPM were recorded as 68 $\mu\text{g}/\text{m}^3$ and 76 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 72 $\mu\text{g}/\text{m}^3$.



Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

For the month of January-2016 the minimum and maximum concentrations for RSPM were recorded as 57 $\mu\text{g}/\text{m}^3$ and 63 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 60 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for RSPM were recorded as 62 $\mu\text{g}/\text{m}^3$ and 67 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 65 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for RSPM were recorded as 63 $\mu\text{g}/\text{m}^3$ and 71 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 67 $\mu\text{g}/\text{m}^3$.



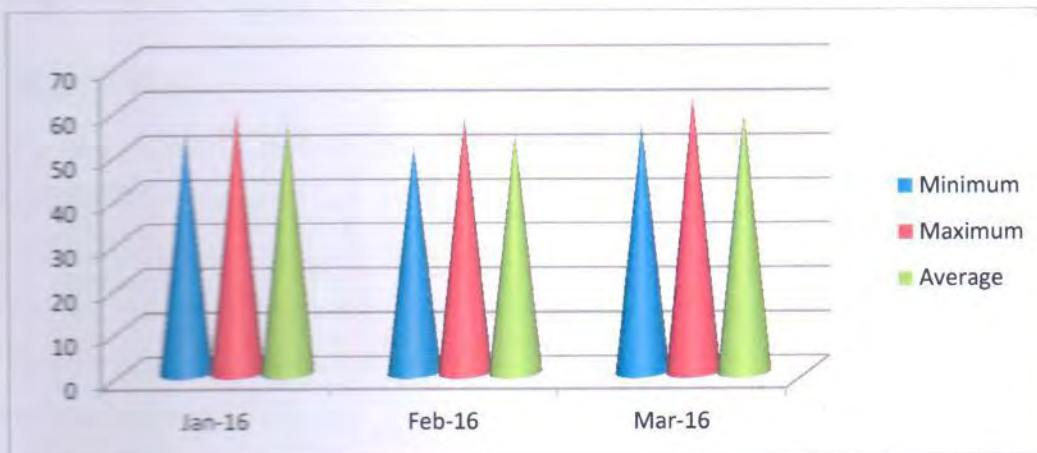
Graph:- Old Kudag/Mining Area

Khas Kudag

For the month of January-2016 the minimum and maximum concentrations for RSPM were recorded as 54 µg/m³ and 59 µg/m³ respectively and average concentration of 57 µg/m³.

For the month of February-2016 the minimum and maximum concentrations for RSPM were recorded as 51 µg/m³ and 57 µg/m³ respectively and average concentration of 54 µg/m³.

For the month of March-2016 the minimum and maximum concentrations for RSPM were recorded as 56 µg/m³ and 62 µg/m³ respectively and average concentration of 59 µg/m³.



Graph:- Khas Kudag



2.4 Fugitive Emission (Buffer Zone):-

2.4.1 Presentation of Results.

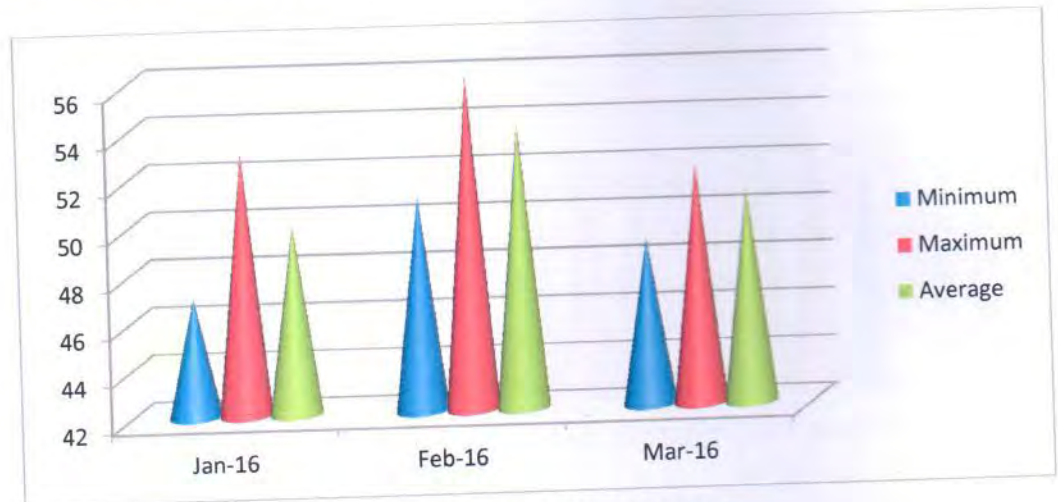
The summary of Statistical Analysis of RSPM results for the month of January-2016 to March-2016 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of January-2016 the minimum and maximum concentrations for RSPM were recorded as 47 $\mu\text{g}/\text{m}^3$ and 53 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 50 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 56 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 54 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for RSPM were recorded as 49 $\mu\text{g}/\text{m}^3$ and 52 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 51 $\mu\text{g}/\text{m}^3$.



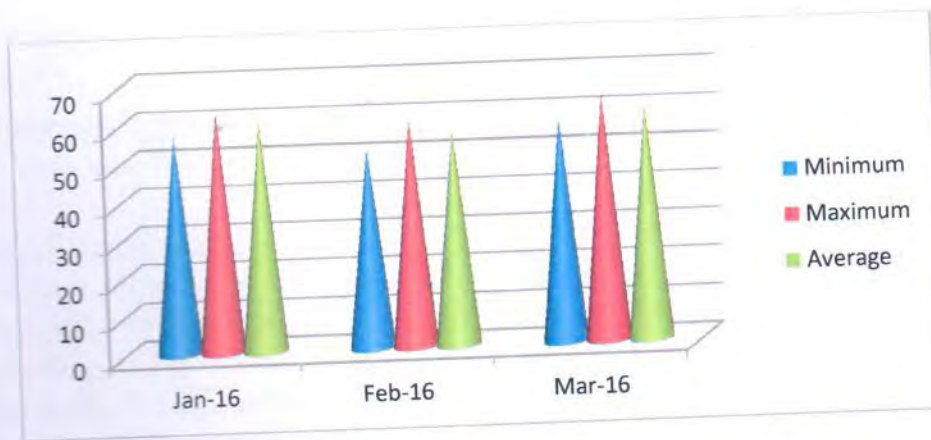
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of January-2016 the minimum and maximum concentrations for RSPM were recorded as 57 $\mu\text{g}/\text{m}^3$ and 63 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 60 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for RSPM were recorded as 52 $\mu\text{g}/\text{m}^3$ and 59 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 56 $\mu\text{g}/\text{m}^3$.

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



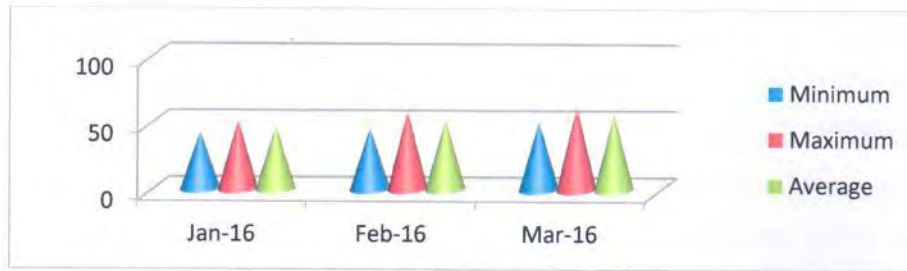
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of January-2016 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 February-2016 the minimum and maximum concentrations for RSPM were recorded as 46 $\mu\text{g}/\text{m}^3$ and 58 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 52 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 62 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 57 $\mu\text{g}/\text{m}^3$.



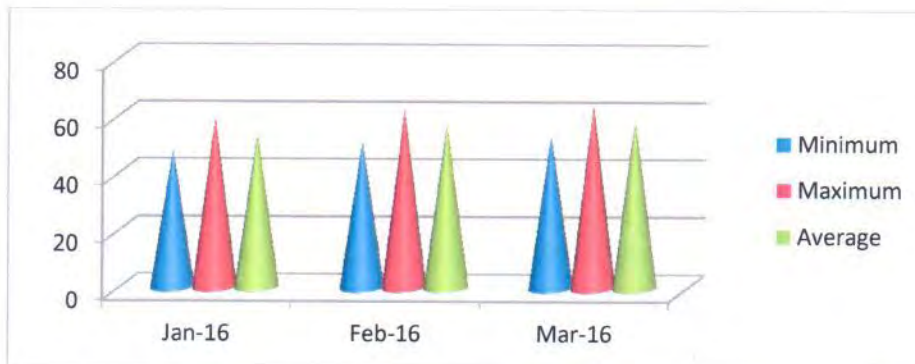
Graph:- Rajendrapur

Tatijharia Village

For the month of January-2016 the minimum and maximum concentrations for RSPM were recorded as 48 $\mu\text{g}/\text{m}^3$ and 59 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 54 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 62 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 57 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for RSPM were recorded as 53 $\mu\text{g}/\text{m}^3$ and 64 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 59 $\mu\text{g}/\text{m}^3$.



Graph:- 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-2016	13	19	16	16	19
	February-2016	17	24	21	21	24
	March-2016	16	21	19	19	21
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 (Jan to Mar-2016) is

19 $\mu\text{g}/\text{m}^3$ 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-2016 to March-2016 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-2016 the minimum and maximum concentrations for PM_{2.5} were recorded as 13 $\mu\text{g}/\text{m}^3$ and 19 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 16 $\mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for PM_{2.5} were recorded as 17 $\mu\text{g}/\text{m}^3$ and 24 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 21 $\mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for PM_{2.5} were recorded as 16 $\mu\text{g}/\text{m}^3$ and 21 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 19 $\mu\text{g}/\text{m}^3$.

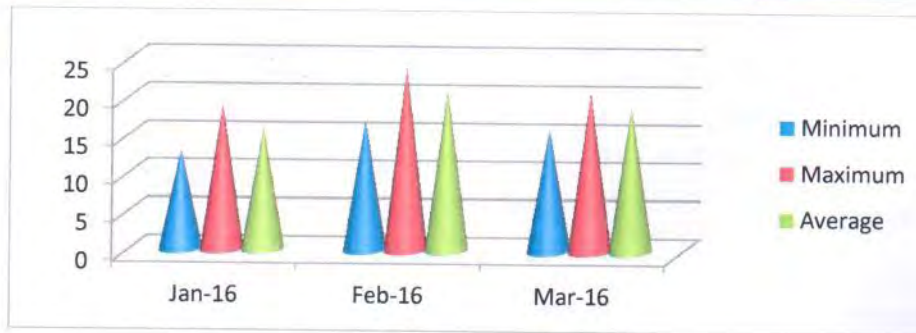


Table 9
Statistical analysis of SO₂
Unit: µg/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2016	8	13	11	11	13
	February-2016	11	17	14	14	17
	March-2016	9	14	12	12	14
New Kudag/Nr. Weigh Bridge	January-2016	8	11	10	10	11
	February-2016	9	13	11	11	13
	March-2016	7	9	8	8	9
Old Kudag/Mining Area	January-2016	9	13	11	11	13
	February-2016	11	16	14	14	16
	March-2016	9	12	11	11	12
Khas Kudag	January-2016	7	11	9	9	11
	February-2016	6	9	8	8	9
	March-2016	9	13	11	11	13
CPCB Standard		80 µg/m³ (24 hrs)				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Jaljali Village	January-2016	7	9	8	8	9
	February-2016	6	8	7	7	8
	March-2016	7	9	8	8	9
Samri Chowk/ Nr.Old Weigh Bridge	January-2016	8	11	10	10	11
	February-2016	7	9	8	8	9
	March-2016	6	9	8	8	9
Rajendrapur	January-2016	9	12	11	11	12
	February-2016	8	11	10	10	11
	March-2016	6	9	8	8	9
Tatijharia Village	January-2016	6	8	7	7	8
	February-2016	8	11	10	10	11
	March-2016	6	9	8	8	9
CPCB Standard		80 µg/m³ (24 hrs)				



Conclusion:- A)

- 1) **Sairaidh Campus Lease Area Core Zone:-** For the Months of Jan-Feb-March-2016 Average of SO₂ is 12 µg/m³.
- 2) **New Kudag/Nr. Weigh Bridge Lease Area Core Zone:-** For the Months of Jan-Feb-Mar-2016 Average of SO₂ is 10 µg/m³.
- 3) **Old Kudag/Mining Lease Area Core Zone:-** For the Months of Jan-Feb-March-2016 Average of SO₂ is 12 µg/m³.
- 4) **Khas Kudag Lease Area Core Zone:-** For the Months of Jan-Feb-March-2016 Average of SO₂ is 9 µg/m³.

- The Average Concentration of SO₂ within the Core Zone of Kudag Lease during this period (Jan-Feb-March-2016) is 11 µg/m³ 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-2016 Average of SO₂ is 8 µg/m³.
- 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2016 Average of SO₂ is 9 µg/m³.
- 3) **Rajendrapur Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2016 Average of SO₂ is 10 µg/m³.
- 4) **Tatijharia Village Lease Area Buffer Zone :-** For the Months of Jan-Feb-March-2016 Average of SO₂ is 8 µg/m³.

- The Average Concentration of SO₂ within the Buffer Zone of Kudag Lease during this period (Jan-Feb-March-2016) is 9 µg/m³ and it is within permissible limit as per CPCB Standard.

2.6 Fugitive Emission (Core Zone):-

2.6.1 Presentation of Results.

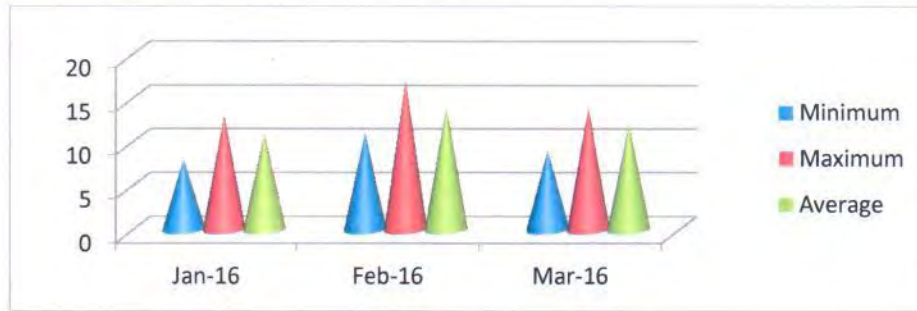
The summary of Statistical Analysis of SO₂ results for the month of January-2016 to March-2016 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January-2016 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 13 µg/m³ respectively and average concentration of 11 µg/m³.

For the month of February-2016 the minimum and maximum concentrations for SO₂ were recorded as 11 µg/m³ and 17 µg/m³ respectively and average concentration of 14 µg/m³.

For the month of March-2016 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.



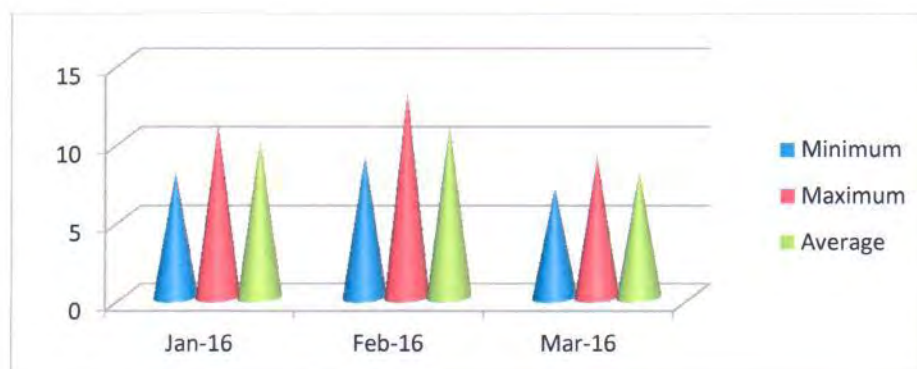
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of January-2016 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.

For the month of February-2016 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.

For the month of March-2016 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.



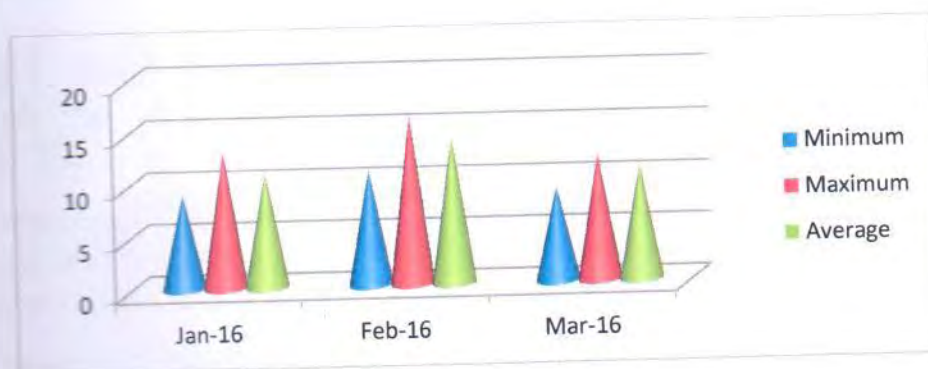
Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

For the month of January-2016 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.

For the month of February-2016 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.

For the month of March-2016 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 12 µg/m³ respectively and average concentration of 11 µg/m³.



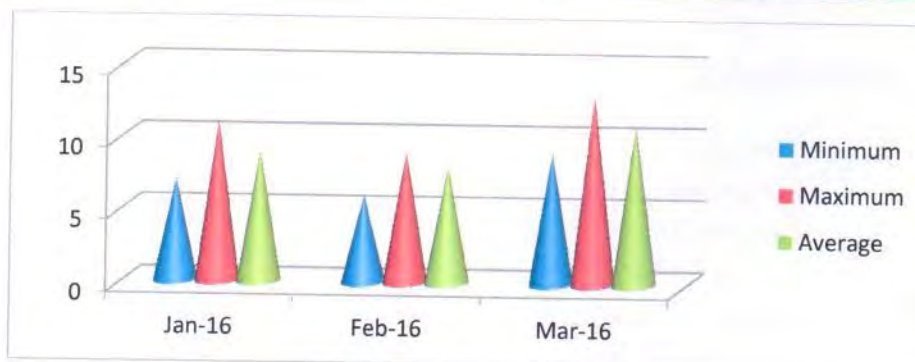
Graph:- Old Kudag/Mining Area

Khas Kudag

For the month of January-2016 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-2016 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of March-2016 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:- Khas Kudag

2.7 Fugitive Emission (Buffer Zone):-

2.7.1 Presentation of Results.

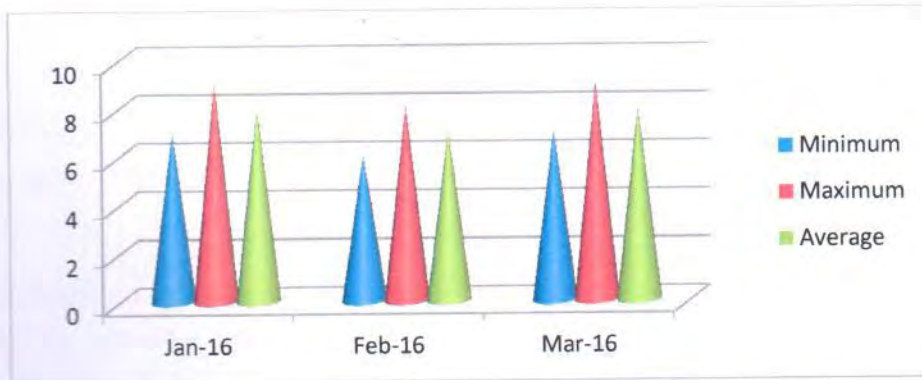
The summary of Statistical Analysis of SO₂ results for the month of January-2016 to March-2016 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of January-2016 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-2016 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-2016 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.



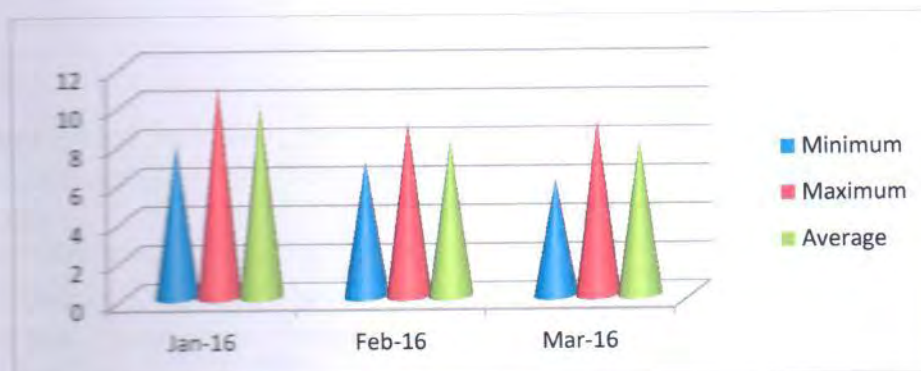
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of January-2016 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.

For the month of February-2016 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of March-2016 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.



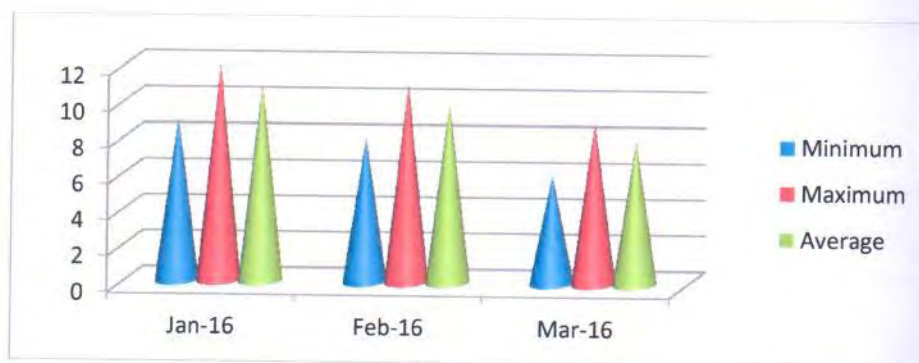
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of January-2016 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 12 µg/m³ respectively and average concentration of 11 µg/m³.

For the month of February-2016 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.

For the month of March-2016 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.



Graph:- Rajendrapur

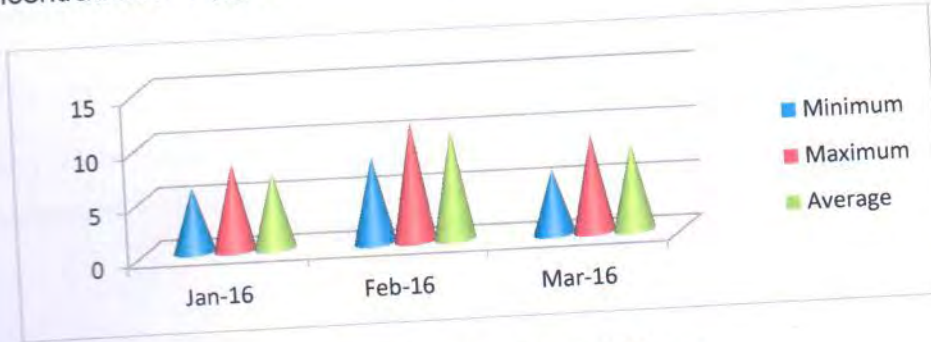
Tatijharia Village

For the month of January-2016 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 8 µg/m³ respectively and average concentration of 7 µg/m³.

For the month of February-2016 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.



For the month of March-2016 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³.



Graph:- Tatijharia Village

Table 10
Statistical Analysis of NOx
Unit: µg/m³

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	January-2016	17	21	19	19	21
	February-2016	19	24	22	22	24
	March-2016	16	19	18	18	19
New Kudag/Nr. Weigh Bridge	January-2016	23	31	27	27	31
	February-2016	18	24	21	21	24
	March-2016	21	29	25	25	29
Old Kudag/Mining Area	January-2016	16	21	19	19	21
	February-2016	19	23	21	21	23
	March-2016	24	32	28	28	32
Khas Kudag	January-2016	18	23	21	21	23
	February-2016	21	26	24	24	26
	March-2016	23	31	27	27	31
CPCB Standard		80 µg/m³ (24 hrs)				

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Buffer Zone :-						
Jaljali Village	January-2016	14	18	16	16	18
	February-2016	16	19	18	18	19
	March-2016	18	21	20	20	21
Samri Chowk/ Nr.Old Weigh Bridge	January-2016	16	23	20	20	23
	February-2016	17	26	22	22	26
	March-2016	21	24	23	23	24
Rajendrapur	January-2016	19	23	21	21	23
	February-2016	16	19	18	18	19
	March-2016	18	24	21	21	24
Tatijharia Village	January-2016	21	26	24	24	26
	February-2016	19	23	21	21	23
	March-2016	18	21	20	20	21
CPCB Standard		80 µg/m³ (24 hrs)				



Conclusion: A)

1)Sairaidh Campus Lease Area Core Zone:- For the Months of Jan-Feb-March-2016 Average of NO_x is 20 µg/m³.

2)New Kudag/Nr.Weigh Bridge Lease Area Core Zone:- For the Months of Jan-Feb-Mar-2016 Average of NO_x is 24 µg/m³.

3)Old Kudag/Mining Lease Area Core Zone:- For the Months of Jan-Feb-March-2016 Average of NO_x is 23 µg/m³.

4)Khas Kudag Lease Area Core Zone:- For the Months of Jan-Feb-March-2016 Average of NO_x is 24 µg/m³.

- The Average Concentration of NO_x within the Core Zone of Kudag Lease during this period (Jan-Feb-March-2016) is 23 µg/m³ 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-2016 Average of NO_x is 18 µg/m³.

2)Samri Chowk Lease Area Buffer Zone :- For the Months of Jan-Feb-March-2016 Average of NO_x is 22 µg/m³.

3)Rajendrapur Lease Area Buffer Zone:- For the Months of Jan-Feb-March-2016 Average of NO_x is 20 µg/m³.

4)Tatijharia Village Lease Area Buffer Zone:- For the Months of Jan-Feb-March-2016 Average of NO_x is 22 µg/m³.

- The Average Concentration of NO_x within the Buffer Zone of Kudag Lease during this period (Jan-Feb-March-2016) is 20 µg/m³ 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.

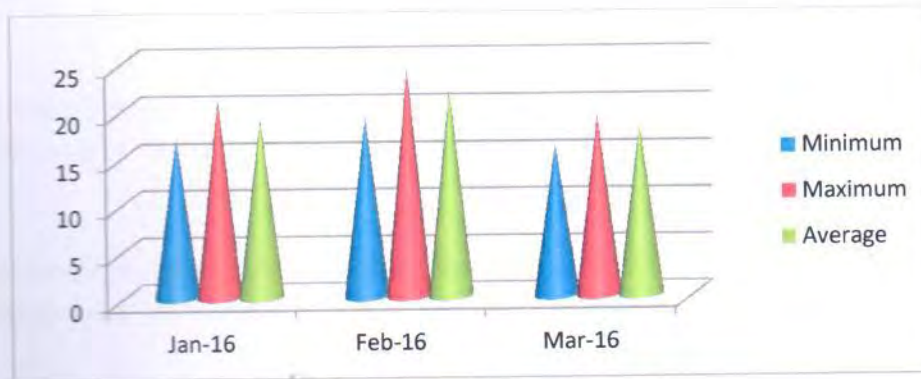
The summary of Statistical Analysis of NO_x results for the month of January-2016 to March-2016 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of January-2016 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-2016 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 24 µg/m³ respectively and average concentration of 22 µg/m³.

For the month of March-2016 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.



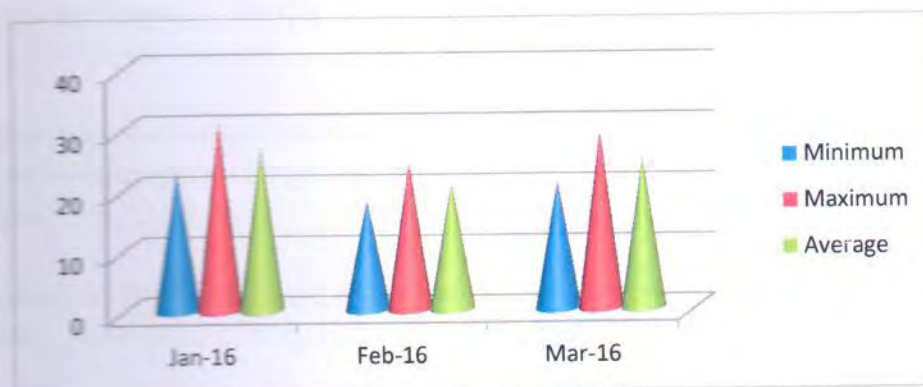
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of January-2016 the minimum and maximum concentrations for NO_x were recorded as 23 µg/m³ and 31 µg/m³ respectively and average concentration of 27 µg/m³.

For the month of February-2016 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 24 µg/m³ respectively and average concentration of 21 µg/m³.

For the month of March-2016 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.



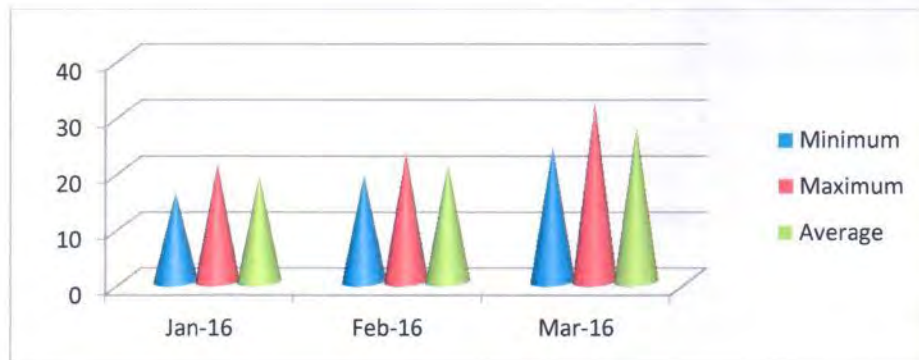
Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

For the month of January-2016 the minimum and maximum concentrations for NO_x were recorded as $16 \mu\text{g}/\text{m}^3$ and $21 \mu\text{g}/\text{m}^3$ respectively and average concentration of $19 \mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for NO_x were recorded as $19 \mu\text{g}/\text{m}^3$ and $23 \mu\text{g}/\text{m}^3$ respectively and average concentration of $21 \mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for NO_x were recorded as $24 \mu\text{g}/\text{m}^3$ and $32 \mu\text{g}/\text{m}^3$ respectively and average concentration of $28 \mu\text{g}/\text{m}^3$.



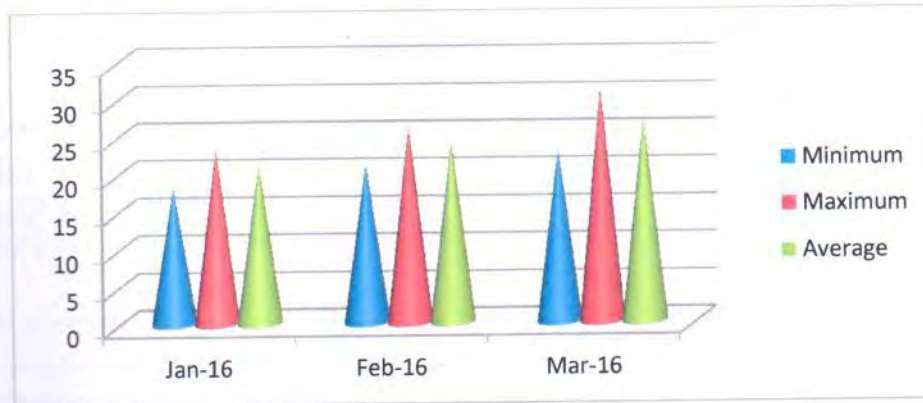
Graph:- Old Kudag/Mining Area

Khas Kudag

For the month of January-2016 the minimum and maximum concentrations for NO_x were recorded as $18 \mu\text{g}/\text{m}^3$ and $23 \mu\text{g}/\text{m}^3$ respectively and average concentration of $21 \mu\text{g}/\text{m}^3$.

For the month of February-2016 the minimum and maximum concentrations for NO_x were recorded as $21 \mu\text{g}/\text{m}^3$ and $26 \mu\text{g}/\text{m}^3$ respectively and average concentration of $24 \mu\text{g}/\text{m}^3$.

For the month of March-2016 the minimum and maximum concentrations for NO_x were 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:- Khas Kudag

2.9 Fugitive Emission (Buffer Zone):-

2.9.1 Presentation of Results.

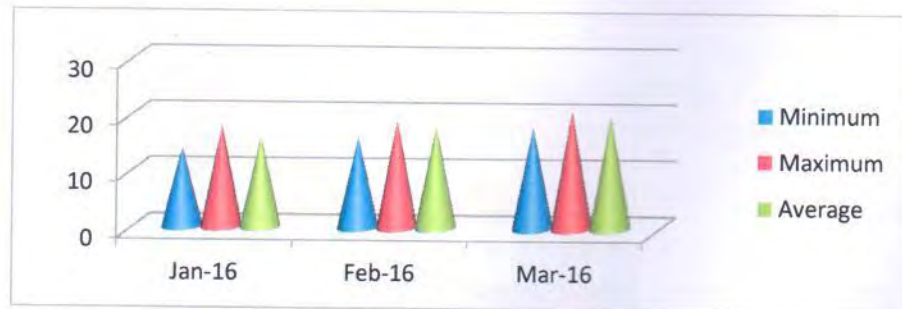
The summary of Statistical Analysis of NO_x results for the month of January-2016 to March-2016 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of January-2016 the minimum and maximum concentrations for NO_x were recorded as 14 µg/m³ and 18 µg/m³ respectively and average concentration of 16 µg/m³.

For the month of February-2016 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-2016 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 21 µg/m³ respectively and average concentration of 20 µg/m³.



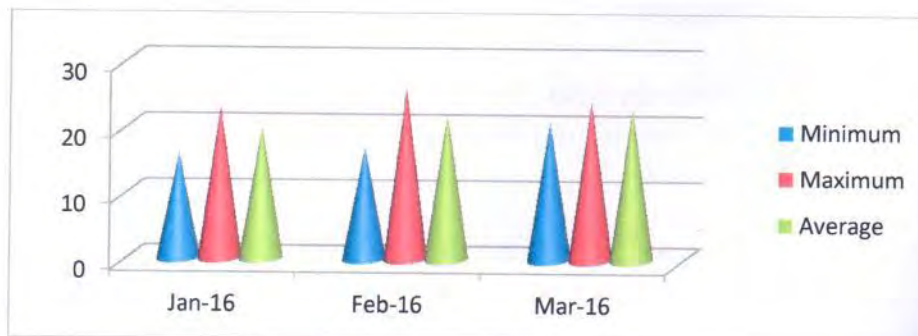
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of January-2016 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-2016 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-2016 the minimum and maximum concentrations for NO_x were recorded as 21 µg/m³ and 24 µg/m³ respectively and average concentration of 23 µg/m³.



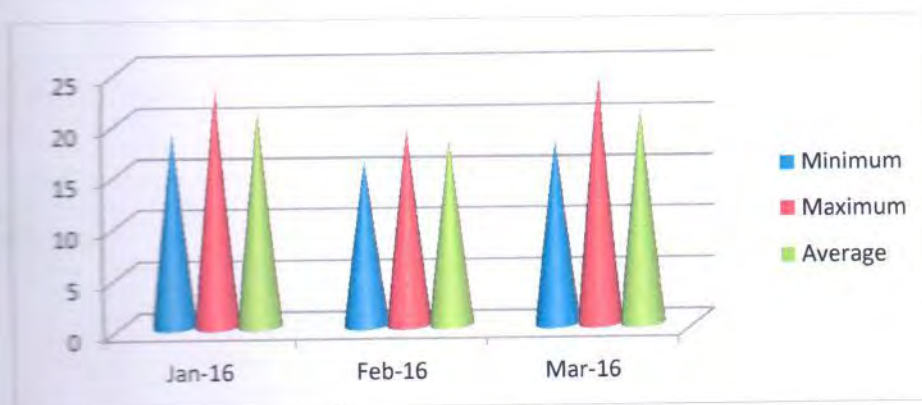
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of January-2016 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 23 µg/m³ respectively and average concentration of 21 µg/m³.

For the month of February-2016 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-2016 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.



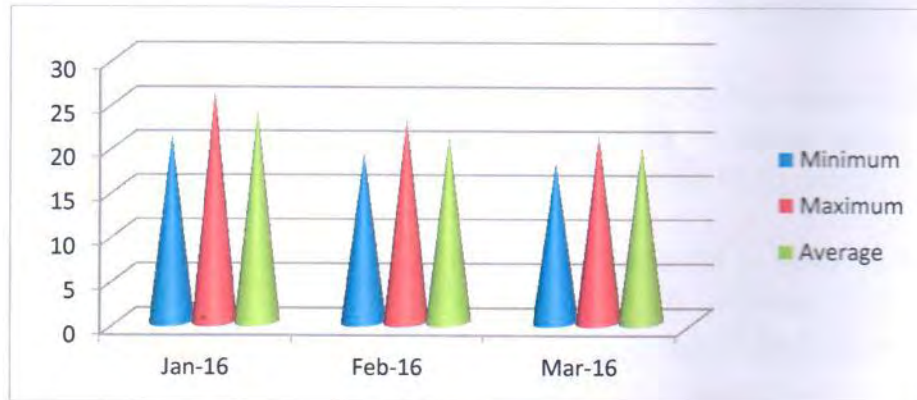
Graph:- Rajendrapur

Tatijharia Village

For the month of January-2016 the minimum and maximum concentrations for NO_x were recorded as 21 µg/m³ and 26 µg/m³ respectively and average concentration of 24 µg/m³.

For the month of February-2016 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 23 µg/m³ respectively and average concentration of 21 µg/m³.

For the month of March-2016 the minimum and maximum concentrations for NO_x were recorded as $18 \mu\text{g}/\text{m}^3$ and $21 \mu\text{g}/\text{m}^3$ respectively and average concentration of $20 \mu\text{g}/\text{m}^3$.



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-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	February-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	March-2016	<0.005	<0.005	<0.005	<0.005	<0.005
New Kudag/Nr. Weigh Bridge	January-2016	0.018	0.024	0.021	0.021	0.024
	February-2016	0.021	0.038	0.030	0.030	0.038
	March-2016	0.024	0.047	0.036	0.036	0.047
Old Kudag/Mining Area	January-2016	0.023	0.043	0.033	0.033	0.043
	February-2016	0.019	0.027	0.023	0.023	0.027
	March-2016	0.021	0.031	0.026	0.026	0.031
Khas Kudag	January-2016	0.018	0.024	0.021	0.021	0.024
	February-2016	0.021	0.027	0.024	0.024	0.027
	March-2016	0.019	0.021	0.020	0.020	0.021
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-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	February-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	March-2016	<0.005	<0.005	<0.005	<0.005	<0.005
Samri Chowk/ Nr.Old Weigh Bridge	January-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	February-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	March-2016	<0.005	<0.005	<0.005	<0.005	<0.005
Rajendrapur	January-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	February-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	March-2016	<0.005	<0.005	<0.005	<0.005	<0.005
Tatijharia Village	January-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	February-2016	<0.005	<0.005	<0.005	<0.005	<0.005
	March-2016	<0.005	<0.005	<0.005	<0.005	<0.005
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-2016) is 0.026 $\mu\text{g}/\text{m}^3$ 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-2016) is $<0.005 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

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-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2016	<0.01	<0.01	<0.01	<0.01	<0.01
New Kudag/Nr. Weigh Bridge	January-2016	0.017	0.023	0.020	0.020	0.023
	February-2016	0.021	0.029	0.025	0.025	0.029
	March-2016	0.024	0.031	0.028	0.028	0.031
Old Kudag/Mining Area	January-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2016	<0.01	<0.01	<0.01	<0.01	<0.01
Khas Kudag	January-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2016	<0.01	<0.01	<0.01	<0.01	<0.01
Buffer Zone :-						
Jaljali Village	January-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2016	<0.01	<0.01	<0.01	<0.01	<0.01
Samri Chowk/ Nr.Old Weigh Bridge	January-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2016	<0.01	<0.01	<0.01	<0.01	<0.01
Rajendrapur	January-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2016	<0.01	<0.01	<0.01	<0.01	<0.01
Tatijharia Village	January-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	February-2016	<0.01	<0.01	<0.01	<0.01	<0.01
	March-2016	<0.01	<0.01	<0.01	<0.01	<0.01
CPCB Standard		---				

Conclusion: A)

The Average Concentration of Hg within the Core Zone of Kudag Lease during this period (October to

December-2015) is $0.024 \mu\text{g}/\text{m}^3$.

Conclusion: B)

The Average Concentration of Hg within the Buffer Zone of Kudag Lease during this period (January to March-2016) was not detected at any of the locations.



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-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2016	<0.1	<0.1	<0.1	<0.1	<0.1
New Kudag/Nr. Weigh Bridge	January-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2016	<0.1	<0.1	<0.1	<0.1	<0.1
Old Kudag/Mining Area	January-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2016	<0.1	<0.1	<0.1	<0.1	<0.1
Khas Kudag	January-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2016	<0.1	<0.1	<0.1	<0.1	<0.1
Buffer Zone :-						
Jaljali Village	January-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2016	<0.1	<0.1	<0.1	<0.1	<0.1
Samri Chowk/ Nr.Old Weigh Bridge	January-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2016	<0.1	<0.1	<0.1	<0.1	<0.1
Rajendrapur	January-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2016	<0.1	<0.1	<0.1	<0.1	<0.1
Tatijharia Village	January-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	February-2016	<0.1	<0.1	<0.1	<0.1	<0.1
	March-2016	<0.1	<0.1	<0.1	<0.1	<0.1
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-2016) is <0.1 ng/m³ 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-2016) is <0.1 ng/m³ and it is within permissible limits as per CPCB Standard



Free Silica :-

Sr. No.	Location	Measurement Unit	January-2016		February-2016		March-2016	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Old Kudag/Mining Area	g/100gm	0.17	0.08	0.24	0.15	0.29	0.18

Table 14
Dust fall rate

Sl.No.	Location	January-2016	February-2016	March-2016	Average
Rate (mt/km2/month)					
1	Old Kudag/Mining Area	17.3	24.8	27.9	23.3
2	Khas kudag	14.7	21.3	23.7	19.9

Table 15
Noise Level Monitoring
 Unit: dB(A) Leq

Sl. No.	Location	January-2016		February-2016		March-2016	
		Day	Night	Day	Night	Day	Night
Core Zone							
1	Sairaidh Campus	64.9	53.8	71.3	62.4	68.1	57.3
2	New Kudag/Near Weigh Bridge	59.7	46.1	63.7	54.9	61.8	52.4
3	Old Kudag/Mining Area	63.1	51.9	67.2	59.3	58.7	46.8
4	Khas Kudag	54.9	46.8	61.4	52.7	56.3	47.2
Buffer Zone							
1	Jaljali Village	48.3	37.9	52.7	41.6	46.9	38.1
2	Samri Chowk/Nr.Old Weigh Bridge	51.6	42.7	53.9	43.7	48.4	37.9
3	Rajendrapur	46.2	36.1	49.3	38.2	51.6	42.7
4	Tatijharia Village	52.7	41.8	48.2	37.9	49.3	38.6

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-2016			February-2016			March-2016		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	New Kudag/Nr.Weigh Bridge	68.1	74.9	71.5	72.8	81.6	77.2	73.1	83.6	78.4

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-2016

TEST RESULTS

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	7.26 at 26°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	0.7
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	1
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	0.3	No relaxation	0.16
7.	Free residual chlorine	mg/l	IS 3025 (Part 26)	Min. 0.2	Min. 1	< 0.1
8.	Total dissolved solids	mg/l	IS 3025 (Part 16)	500	2000	347
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	0.18
10.	Cyanide (as CN)	mg/l	IS 3025 (Part 27)	0.05	No relaxation	< 0.005
11.	Chloride (as Cl)	mg/l	IS 3025 (Part 32)	250	1000	58.94
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	117.64
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	184.30
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	61.29
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	7.57
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	41.63
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	< 2
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	<0.05
20.	Mercury (as Hg)	mg/l	IS 3025 (Part 2)	0.001	No relaxation	< 0.0005
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	< 0.001
22.	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
23.	Arsenic (as As)	mg/l	IS 3025 (Part 2)	0.01	0.05	< 0.01
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	< 0.005
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	0.11
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 To March-2016

Details of Salient
Features

(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	USEPA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	1.0	< 0.1
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform	mg/l	APHA 6232	0.1	No relaxation	Absent
	b. Dibromochloromethane			0.1	No relaxation	Absent
	c. Bromodichloromethane			0.06	No relaxation	Absent
	d. Chloroform			0.2	No relaxation	Absent
39.	Phenolic compounds (as C 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	USEPA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	---	---	< 2
43.	Escherichia coli	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					
i.	Alpha-HCH	µg/l	USEPA 508	0.01		< 0.01
ii.	Beta HCH	µg/l	USEPA 508	0.04		< 0.03
iii.	Delta- HCH	µg/l	USEPA 508	0.04		< 0.03
iv.	Alachlor	µg/l	USEPA 508	0		< 0.03
v.	Aldrin / Dieldrin	µg/l	USEPA 508	0.03		< 0.03
vi.	Atrazine	µg/l	USEPA 1657			< 0.03
vii.	Butachlor	µg/l	USEPA 508	25		< 0.03
viii.	Chlorpyrifos	µg/l	USEPA 1657	0		< 0.03
ix.	DDT and its isomers	µg/l	USEPA 508			< 0.03
x.	Gamma - HCH (Lindane)	µg/l	USEPA 508	2		< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30		< 0.03
xii.	Endosulphan	µg/l	USEPA 508	0.4		< 0.03
xiii.	Ethion	µg/l	USEPA 1657			< 0.03
xiv.	Isoproturon	µg/l	USEPA 1657			< 0.03
xv.	Malathion	µg/l	USEPA 1657	90		< 0.03
xvi.	Methyl Parathion	µg/l	USEPA 1657	0.3		< 0.03
xvii.	Monocrotophos	µg/l	USEPA 1657			< 0.03
xviii.	Phorate	µg/l	USEPA 1657			< 0.03

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

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



Table 17
Monthly Report on Chemical Examination of Surface Water

(Nalags near Mining Area)
March-2016

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	8.07 at 26°C
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	9
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	3
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	0.3	No relaxation	0.26
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	341
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	112.74
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	183.92
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	222.70
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	73.86
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	9.27
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	117.82
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	< 2
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	< 0.03
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	<0.05
20.	Mercury (as Hg)	mg/l	IS 3025 (Part 2)	0.001	No relaxation	< 0.0005
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	< 0.001
22.	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	< 0.001
23.	Arsenic (as As)	mg/l	IS 3025 (Part 2)	0.01	0.05	< 0.01
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	0.021
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	0.16
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.....



(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	USEPA 508	0.5	No relaxation	< 0.03
36.	Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	1.0	< 0.1
37.	Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
38.	Tri Halo Methane					
	a. Bromoform	mg/l	APHA 6232	0.1	No relaxation	Absent
	b. Dibromochloromethane			0.1	No relaxation	Absent
	c. Bromodichloromethane			0.06	No relaxation	Absent
	d. Chloroform			0.2	No relaxation	Absent
39.	Phenolic compounds (as C 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	USEPA : 550	0.1	No relaxation	< 0.03
42.	Total coliform	MPN/100 ml	IS 1622	---	---	1600
43.	Escherichia coli	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
44.	Pesticides residues					
i.	Alpha-HCH	µg/l	JSEPA 508	0.01		< 0.01
ii.	Beta HCH	µg/l	JSEPA 508	0.04		< 0.03
iii.	Delta- HCH	µg/l	JSEPA 508	0.04		< 0.03
iv.	Alachlor	µg/l	JSEPA 508	0		< 0.03
v.	Aldrin / Dieldrin	µg/l	JSEPA 508	0.03		< 0.03
vi.	Atrazine	µg/l	JSEPA 1657			< 0.03
vii.	Butachlor	µg/l	JSEPA 508	25		< 0.03
viii.	Chlorpyrifos	µg/l	JSEPA 1657	30		< 0.03
ix.	DDT and its isomers	µg/l	USEPA 508			< 0.03
x.	Gamma - HCH (Lindane)	µg/l	USEPA 508	2		< 0.03
xi.	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30		< 0.03
xii.	Endosulphan	µg/l	USEPA 508	0.4		< 0.03
xiii.	Ethion	µg/l	JSEPA 1657			< 0.03
xiv.	Isoproturon	µg/l	USEPA 1657			< 0.03
xv.	Malathion	µg/l	USEPA 1657	90		< 0.03
xvi.	Methyl Parathion	µg/l	USEPA 1657	0.3		< 0.03
xvii.	Monocrotophos	µg/l	USEPA 1657			< 0.03
xviii.	Phorate	µg/l	USEPA 1657			< 0.03

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

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



Table 18

Report on Soil Analysis, Kudag
Date of collection: March-2016
Sample Location:(Old Kudag/Mining Area)

Sr. No.	Test Parameter	Measurement Unit	S1 Old Kudag/Mining Area
1.	PH (1:5 water extract)	-	6.81 at 26°C
2.	Electrical Conductivity at 25°C (1:5 water extract)	µs/cm	239
3.	Texture	-	Silty Clay
4.	Sand	%	26
5.	Slit	%	43
6.	Clay	%	31
7.	Water Holding Capacity	%	46.59
8.	Bulk Density	g/cc	1.16
9.	Porosity	%	26.42
10.	Exchangeable Calcium (as Ca)	mg/Kg	112.74
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	1.07
14.	Available Boron (as B)	mg/Kg	0.24
15.	Water Soluble Chloride (as Cl ⁺)	mg/Kg	217.54
16.	Water Soluble Sulphate (as SO ₄)	mg/Kg	103.92
17.	Available Potassium (as K)	mg/Kg	63.86
18.	Available Phosphorous (as P)	Kg/hect	1.73
19.	Available Nitrogen (as N)	Kg/hect	139
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	0.26
24.	Total Iron	mg/Kg	4.07
25.	Organic Matter	g/100g	1.64
26.	Organic Carbon	g/100g	1.19
27.	CEC	meq/100g	11.6

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.

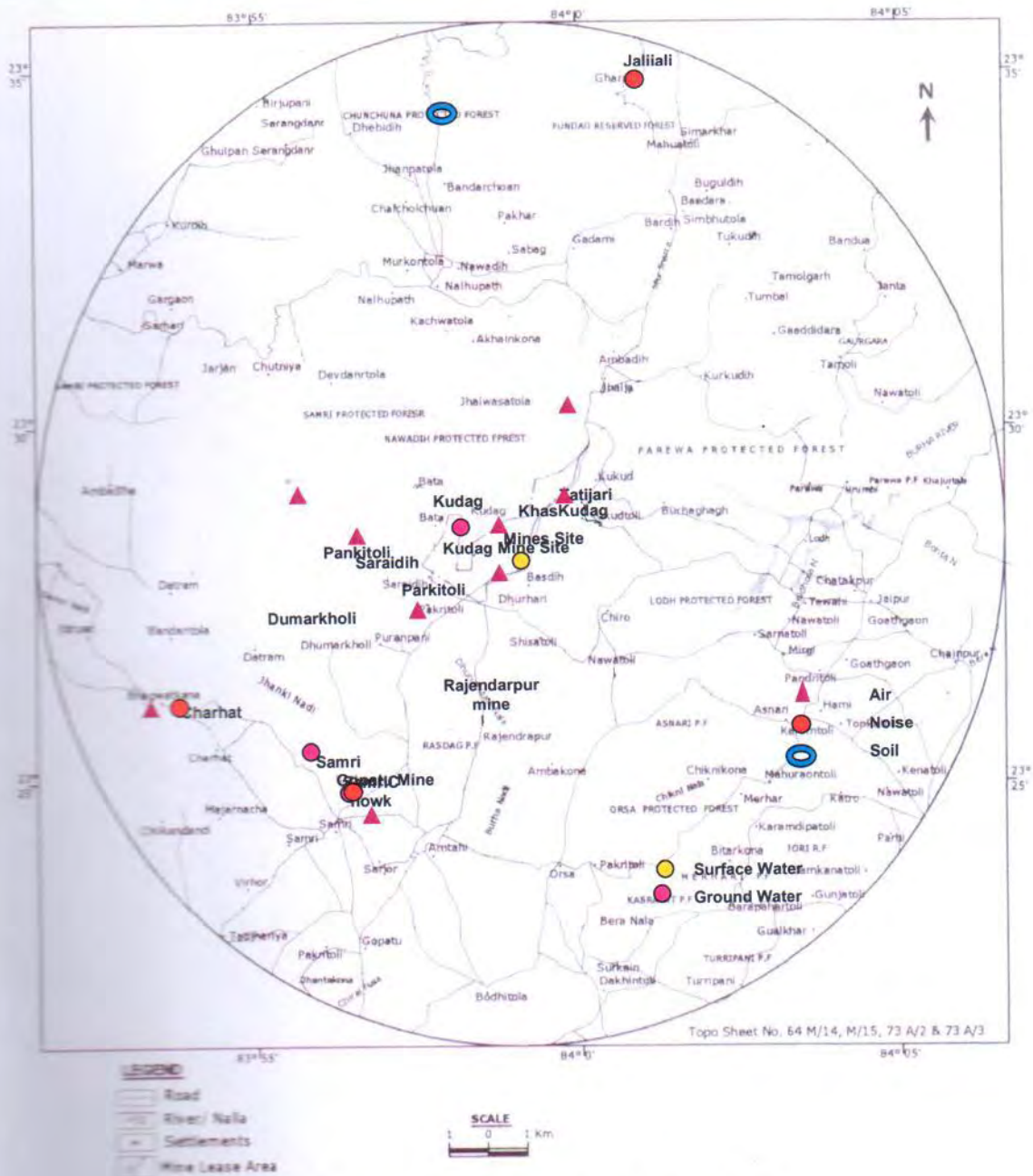


Fig 5: Sampling Locations for Water



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

No. 6422-TS/CECB/2015
 To,

Raipur, dated: 3/1/2015

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

Recd.
15.1.15.

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

Ref: - 1. Consent of the Board issued under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 vide letter no. 6882/TS/CECB/2007 Raipur, dated: 24/12/2007.

2. Last renewal of consent of the Board issued under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 vide letter no. 5701/TS/CECB/2014 Raipur, dated: 10/03/2014.

3. Your application letter no.HIL/SAM/CECB/123/2015/K, Dated: 23/07/2014 and subsequent correspondence ending dated: 23/09/2014

--: 00 :--

With reference to your above application, consent is hereby renewed for a period of two years i.e. from 01/12/2014 to 30/11/2016, subject to the fulfillment of the terms and conditions incorporated in the consent letter no. 6884/TS/CECB/2007 Raipur, dated: 24/12/2007, subsequent renewal of consent issue by Board and additional conditions mentioned below.

This renewal of consent is valid for production capacity of:-

Name	Production Capacity
Mining of Bauxite Ore	0.6 Lakhas Tonnes Per Year [Zero Point Six Lakhs Tonnes Per Year]


Additional Conditions

1. Industry shall operate and maintain the air pollution control system effectively and regularly. Effective steps shall be taken to control fugitive dust emission. Fixed type automatic water sprinkling system shall be installed at haul road / other roads, ore stock yard etc. Dust suppression system (water sprinkling arrangement) shall be made more effective to ensure ambient air quality within prescribed limit. Industry shall maintain the ambient air quality within prescribed limit in and around the mine area all the time. Chhattisgarh Environment Conservation Board may further

- stipulate stringent particulate matter emission limit depending upon environmental conditions.
2. Regular monitoring for the measurement of air pollutants level in ambient shall be carried out. Industry shall submit ambient air quality monitoring reports to the Board regularly every month.
 3. Industry shall ensure safe and scientific arrangement for disposal of all solid wastes.
 4. All internal roads shall be maintained properly. Dust muck and sludge generated due to transportation on the roads shall be cleaned and disposed off properly. Industry shall improve housekeeping within mine lease area. Industry shall ensure the transportation of ore in duly covered vehicles.
 5. Industry shall use fly ash brick, fly ash blocks or fly ash based products in their construction/repairing activities.
 6. Wide green belt of broad leaf local species shall be developed along the mine lease area. As far as possible maximum area of open spaces shall be utilized for plantation purposes. Extensive tree plantation shall be carried out in this year including plantation in over burden area.
 7. Industry shall submit Environment Statement to this Board as per provision of Environment (Protection) amendment Rule, 1993 for the previous year ending 31st March on or before 30th September every year.

Please acknowledge the receipt of this letter.

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



Member Secretary

Chhattisgarh Environment Conservation Board
Raipur (C.G.)

Raipur, dated: ___ / ___ / 2015

Endt. No. /TS/CECB/2015
Copy to: -

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


Member Secretary

Chhattisgarh Environment Conservation Board
Raipur (C.G.)



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

No. 6420 /TS/CECB/2015

Raipur, dated: 31/1/2015

To,

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

Recd.
[Signature]
15.1.15

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

- Ref: - 1. Consent of the Board issued under section 25/26 of the Water (Prevention and Control of Pollution) Act, 1974 vide letter no. 6880/TS/CECB/2007 Raipur, dated: 24/12/2007.
2. Last renewal of consent of the Board issued under section 25/26 of the Water (Prevention and Control of Pollution) Act, 1974 vide letter no. 5699/TS/CECB/2014 Raipur, dated: 10/03/2014.
3. Your application letter no. HIL/SAM/CECB/123/2015/K, Dated: 23/07/2014 and subsequent correspondence ending dated: 23/09/2014.

--: 00 :--

With reference to your above application, consent is hereby renewed for a period of two years from 01/12/2014 to 30/11/2016, subject to the fulfillment of the terms and conditions incorporated in the consent letter no. 6880/TS/CECB/2007 Raipur, dated: 24/12/2007, subsequent renewal of consent issue by Board and additional conditions mentioned below.

This renewal of consent is valid for production capacity of:-

Name	Production Capacity
Mining of Bauxite Ore	0.6 Lakhs Tonnes Per Year [Zero Point Six Lakhs Tonnes Per Year]


Additional Conditions

1. Industry shall operate and maintain the effluent treatment system effectively and regularly. Industry shall ensure treated effluent quality within the standards prescribed by Board published in Gazette Notification dated: 25/03/1988. Treated effluent shall be used for dust suppression, domestic use, irrigation, other useful purposes etc. Industry shall not discharge any treated / untreated effluent in to the river or any surface water bodies. No effluent shall be discharged outside of the mine premises in any circumstances; hence zero discharge condition shall be maintained all the time; failing which, this renewal of consent may be cancelled.
2. Industry shall ensure safe and scientific arrangement for disposal of all solid wastes.

3. All internal roads shall be maintained properly. Dust muck and sludge generated due to transportation on the roads shall be cleaned and disposed off properly. Industry shall improve housekeeping within mine lease area. Industry shall ensure the transportation of ore in duly covered vehicles.
4. Industry shall use fly ash brick, fly ash blocks or fly ash based products in their construction/repairing activities.
5. Industry shall adopt rainwater-harvesting technique in the project area and residential area (if any) for recharge of ground water.
6. Garland drains with appropriate check dams shall be provided all along the raw ore storage areas, over burden storage area etc. to avoid any possibility of erosion during rain.
7. Industry shall submit monitoring report of effluent regularly.
8. Wide green belt of broad leaf local species shall be developed along the mine lease area. As far as possible maximum area of open spaces shall be utilized for plantation purposes. Extensive tree plantation shall be carried out in this year including plantation in over burden area.
9. Industry shall submit Environment Statement to this Board as per provision of Environment (Protection) amendment Rule, 1993 for the previous year ending 31st March on or before 30th September every year.

Please acknowledge the receipt of this letter.

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



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

Endt. No. /TS/CECB/2015

Raipur, dated: ___ / ___ /2015

Copy to: -

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


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

Hindalco Industries Ltd.
Mines Division, Samri

Lease wise Production 2015-16

Lease	Production (MT)
Samri	411399.000
Kudag	49372.000
Tatijharia	365945.000
Total	826716.000


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

Hindalco Industries Ltd.
Mines Division, Samri

Lease wise Details 2015-16

Lease	Mined Out Area (Hact.)	Reclaimed Area (Hact.)	Nos. of Sapling	Area of Sapling (Hact.)
Samri	10.999	15.453	10139	4.050
Kudag	4.452	4.084	4000	1.600
Tatijharia	9.302	7.844	7500	3.000
Total	24.753	27.381	21639	8.650


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.

Year wise /Lease wise Details of Afforestation

Year	Kudag Bauxite Mines		Samri Bauxite Mines		Tatijharia 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
Total	113180	47.18	158101	64.454	72975	29.660	344256	141.294

Actual Expenditure incurred in Environment Management Plan:-

Total cost for protection of environment in Samri, Tatijharia & Kudag Bauxite Mine of Hindalco Industries Ltd. of Chhattisgarh state during the second half period of F.Y. 2015-16 (October15-March16).

Sl No-	Environment Protection Measures	Actual Cost (Lac) (F.Y. 2015-16) (Oct15-Mar16))
1	Pollution Control	9.75
2	Environment Monitoring	1.51
3	Occupational Health	7.5
4	Green Belt	7.80
5	Reclamation/Rehabilitation of mined out area (Samri -2.944 Ha. Tatijharia-1.202 Ha. Kudag- 0.364 Ha. Total – 4.510 Ha.)	22.55
6	Total	49.11

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


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