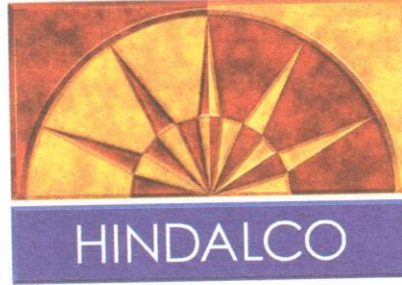


ADITYA BIRLA



HIL/SAM/MoEF/27/K/2016

09.11.2016.

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

Sub:- Status of compliance of EC condition (Half yearly status of compliance report) of Kudag Bauxite Mine (Lease area- 377.116 Ha.) of Hindalco Industries Limited of Chhattisgarh state from April-2016 to September-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- Ramanujganj, district, Chhattisgarh state, PIN-497224 from April-2016 to September-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 July-2016 to September-2016 enclosed as annexure -III
4. Renewal copy of Consent to Operate from CECB enclosed as annexure -IV
5. Yearly Production report enclosed as annex-V.
6. Status report of mined out, reclaimed and afforested land as annexure-VI.
7. Actual expenditure incurred in protection of environment from April-2016 to September-2016 as annex-VII.

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

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

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

26.10.2016.

Status of Compliance from April-2016 to September-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.

- (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 area is being maintained below the limit prescribed and will be maintained. The operators of HEMM are being provided earplag/muffs. The proper maintenance of HEMM is being carried out to control noise emission.
- (viii) No waste water is generated from the mine however as suggested measures will be taken if required.
- (ix) All workers are provided personal protective equipment and training are also being imparted to them for safety & health in our Group vocational training centre – Samri and will be continued as per guidelines.
- (x) Periodical and Initial medical examination of all workers are being carried out as per provision of Mines Act.
- (xi) Environment cell is already in place at Samri Mines Division headed by GM (Mines) and comprises of suitable qualified persons.
- (xii) In case of final closure of mine the information will be submitted to Regional Office, Ministry of Environment & Forests, Bhopal.
- (xiii) Adequate fund provision is already earmarked for environmental protection measures and will not be diverted to other purpose. The year wise expenditure will be submitted to concern authorities as per guidelines.

- (xiv) The same information also intimated to Regional Office, Ministry of Environment & Forests, Bhopal.
- (xv) All cooperation is being extended to regulatory authorities and will be extended as earlier.
- (xvi) Although no suggestion/representation has been received by any Panchayat/Local NGO while processing the proposal. However we have forwarded the copy of clearance letter to Panchayat in our area. The copy of same has been already submitted to your good office.
- (xvii) The copy has been displayed by CECB in Balrampur Collectorate.

- (xviii) The information regarding environment clearance has been published in two local new papers namely Hari Bhumi & Ambika Vani. The copy of same has been already submitted to your good office.

Hope the above compliance will be found in order.

Yours truly,
(For Hindalco Industries Limited)



(M K Nayak)
Agent of Mines.

Encl. : As Above

Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.

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

अरण्य भवन, मेडिकल कॉलेज रोड, रायपुर

ईमेल pccwbsa@safty.com

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

संक्रमांक/व.प्रा./प्रबंध-12/13/2967

रायपुर दिनांक 07/10/2013

प्रति,

संचालक,

इन्वायरनमेंट क्लीयरेंस सेल

भारत सरकार, वन एवं पर्यावरण मंत्रालय,

पर्यावरण भवन, सी.जी.ओ. काम्प्लेक्स,

लोधी रोड, नई दिल्ली-111003

विषय :-

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

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

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कृपया आपके उपरोक्त संदर्भित पत्रों का अवलोकन करने का कष्ट करें। जिसके द्वारा बलरामपुर जिले (पुराने सरगुजा जिले) के सामरी बॉक्ससाईट खुली खदान (1 LTPA) की क्षमता बढ़ाकर (SLTPA) करने, कुदाग बॉक्ससाईट खदान (0.4 LTPA) की क्षमता बढ़ाकर (0.6 LTPA) करने तथा टाटीझरिया बॉक्ससाईट 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 संकेत किया है।

1. विषयवर्तित 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 बॉक्ससाईट खनन की स्वीकृति प्राप्त कर संस्था द्वारा खनन का कार्य किया जा रहा है।

- उपरोक्त प्रस्ताव में उपरोक्त स्वीकृत खादानों की क्षमता सामरी के लिये 1.0 LPTA से बढ़ाकर 5.0 LPTA किया जाना, कदाम के लिये 0.4 LPTA से बढ़ाकर 0.6 LPTA किया जाना एवं टाटीझरिया के लिये 50,000 TPA से बढ़ाकर 4,00,000 TPA किया जाना प्रस्तावित है। भारत सरकार पर्यावरण व वन विभाग के द्वारा उपरोक्त वृद्धि हेतु प्रथम धरण की स्वीकृति क्रमशः आदेश क्रमांक J-11015/353/2007-IA.II/M दिनांक 27 जुलाई 2007, J-11015/354/2007-IA.II/M दिनांक 27 जुलाई 2007 एवं J-11015/337/2007-IA.II/M दिनांक 9 अगस्त 2007 द्वारा कुछ शर्तों के साथ दी गई है जिसमें एक महत्वपूर्ण शर्त यह भी उल्लेखित है कि संबंधित क्षेत्र में वन्य प्राणी (संरक्षण) अधिनियम 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), हिन्डालको इन्डस्ट्रीज के पत्र क्रमांक HIL/SAM/300/2013 दिनांक 2.03.2013 द्वारा प्रस्तुत किया गया है जिसका समग्र रूप से परीक्षण किया गया। प्रस्तावित परियोजनाओं के कोर क्षेत्र से 10 कि.मी. की परिधि में आने वाले आंतरलैपिंग बफर क्षेत्र में वन्य प्राणियों एवं उपलब्ध वनस्पतियों का सर्वे किया जाकर पाये गये स्पेसिज को परियोजना प्रस्ताव में अक्सर-4 के में उल्लेखित किया गया है।
4. उल्लेखित सूची में वन्य प्राणी (संरक्षण) अधिनियम के शेड्यूल 1 के वन्य प्राणी नहीं पाये गये हैं। परंतु इस कार्यालय द्वारा वन संरक्षक (वन्य प्राणी), सरगुजा से विगत दस वर्षों में वन्य प्राणियों द्वारा की गई क्षति की जानकारी चाही गयी। वन संरक्षक ने अपने पत्र क्रमांक 749 दिनांक 24.05.2012 से यह जानकारी उपलब्ध कराया है कि उक्त क्षेत्र में हाथियों का वर्ष 2005 में दो बार, वर्ष 2006 में आठ बार, 2007 में एक बार, 2008 में दो बार, 2009 में सात बार आना जाना हुआ है। इसी प्रकार भालुओं के द्वारा वर्ष 2007-08 में आठ, वर्ष 2008-09 में पाँच, वर्ष 2009-10 में छः एवं 2010-11 में 4 जनहानि व जनघायल के प्रकरण तथा वर्ष 2007-08 तथा 2008-09 में तेंदुआ द्वारा पशु हानि के दो प्रकरण तथा लकड़बग्घे के कारण एक प्रकरण दर्ज किये गये हैं। इस प्रकार वन्य प्राणी (संरक्षण) अधिनियम के शेड्यूल 1 के उपरोक्त उल्लेखित वन्य प्राणियों के परियोजना क्षेत्र में आने जाने के प्रमाण पाये गये हैं। प्रस्तावित क्षेत्र से 6 से 7 कि.मी.की दूरी पर झारखंड राज्य में भेड़िया अभ्यारण्य भी स्थापित है। अतः संस्था द्वारा दस वर्षों के लिये वन्य प्राणी संरक्षण व प्रबंध योजना श्री पी. के. सेन पूर्व वन्य प्राणी अभिरक्षक, झारखंड से तैयार कराया जाकर प्रस्तुत किया गया है। जिसका समग्र व विस्तृत अध्ययन किया गया। प्रबंधन योजना में प्रस्तावित प्रबंधन संबंधित मुख्य गतिविधियों का विवरण निम्नानुसार है।
5. योजना में वन्य प्राणियों के लिये जलग्रहण क्षेत्र विकास, रहवास-विकास, पेयजल व्यवस्था, विभाग के क्षेत्रीय अमले के सहयोग से क्षेत्र में पेट्रोलिंग व गॉनिटरिंग, अग्नि सुरक्षा, ईको विकास की गतिविधियों, स्थानीय प्रान्तीयों के लिये आजीविका सृजन, टीकाकरण, जनजागृति कार्यक्रम जैसी गतिविधियों का

III

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

Sr No	Works to be done	Cost for Four years (Rs. in lakhs)					Remarks
		1 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 moyement 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 sataff.	2.00	2.00	2.00	2.00	8.00	
9	Awareness Programme including Signages, distribution of Pamphlets related to wild life conservation etc.	2.50	2.50	2.50	2.50	10.00	
10	Provision for conservation of Biodiversity among flora and fauna of the area & Preparation of Biodiversity register	20.00	0.00	0.00	0.00	20.00	The amount is to be deposited in the account of Biodiversity Board as this work is to be done by Bio-diversity management committees (BMC's)
Total		55.00	35.00	35.00	35.00	160.00	

16. वन्यप्राणी संरक्षण योजना का बजट-रु. 160.00 लाख वर्तमान दरों पर है, परियोजना में देरी होने से यह लागत बढ़ेगी, जिससे पर्याप्त धन प्राप्त होना संभव नहीं रहेगा। परियोजना के क्रियान्वयन के समय जो भी लागत आयेगी उसे पर्याप्त धन प्रस्तावकों को वन विभाग में एकमुश्त जमा करानी होगी। जिससे मूल्य वृद्धि के प्रभाव को समाप्त किया जा सके। वन विभाग एकमुश्त जमा की गई राशि से वन्यप्राणी संरक्षण योजना क्रियान्वित करेगा।

17. अनुवीक्षित वन्यप्राणी संरक्षण योजना की एक प्रति संलग्न प्रेषित है। कृपया वन्यप्राणी संरक्षण योजना में प्रावधानित राशि रु. 160.00 लाख एकमुश्त जमा कराने हेतु परियोजना प्रस्तावकों को आदेशित करने का कष्ट करें।

संलग्न:- उपरोक्तानुसार।

Ramprakash
(रामप्रकाश) 01/12/13

प्रधान मुख्य वन संरक्षक (वन्यप्राणी)

छत्तीसगढ़, रायपुर

रायपुर दिनांक 02/10/2013

पृष्ठा 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, सादरी बॉक्सवर्ड माइन्स, पोस्ट-कुसुनी, जिला-सरगुजा, छत्तीसगढ़ की ओर मय योजना की प्रति सहित सूचनार्थ प्रेषित।

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

KUDAG


Agent of Mines
Samri Mines Division
Hindaico Industries Ltd.

Annexure-6
Details of Flora and Fauna

ANNEXURE-6
DETAILS OF FLORA & FAUNA

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

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

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

Sr. No.	Technical Name	Family	Life Form
I. Agricultural Crops			
1	<i>Hordium vulgare</i>	Poaceae	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>	Rutaceae	Therophyte
15	<i>Colocasia esculenta</i>	Areaceae	Geophyte
16	<i>Coreandrum sativum</i>	Umbelliferae	Hemicryptophyte
17	<i>Daucus carota</i>	Umbelliferae	Geophyte
18	<i>Lycopersicum esculentus</i>	Solanaceae	Therophyte
19	<i>Mangifera indica</i>	Anacardiaceae	Phanerophyte
20	<i>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>	Alangiceae	Phanerophyte
57	<i>Albizia odoratissima</i>	Caesalpinaceae	Phanerophyte
58	<i>Albizia procera</i>	Caesalpinaceae	Phanerophyte
59	<i>Alstonia scholaris</i>	Apocyanaceae	Phanerophyte
60	<i>Alternanthera sessilis</i>	Amaranthaceae	Therophyte
61	<i>Alysicarpus hamosus</i>	Fabaceae	Therophyte
62	<i>Anogeissus latifolia</i>	Combretaceae	Phanerophyte
63	<i>Anogeissus sericea</i>	Combretaceae	Phanerophyte
64	<i>Argemone mexicana</i>	Papaveraceae	Phanerophyte
65	<i>Azadirachta indica</i>	Meliaceae	Phanerophyte
66	<i>Barleria prionoites</i>	Acanthaceae	Therophyte
67	<i>Bidens biternata</i>	Compositae	Therophyte
68	<i>Blepharis asperima</i>	Acanthaceae	Phanerophyte
69	<i>Blepharis madaraspatens</i>	Acanthaceae	Therophyte
70	<i>Blumea lacera</i>	Compositae	Therophyte
71	<i>Boerheavia chinensis</i>	Nyctaginaceae	Therophyte
72	<i>Boerheavia diffusa</i>	Nyctaginaceae	Therophyte
73	<i>Bombax ceiba</i>	Bombacaceae	Phanerophyte
74	<i>Borreria hispida</i>	Rubiaceae	Therophyte
75	<i>Borreria stricta</i>	Rubiaceae	Therophyte
76	<i>Boswellia serrata</i>	Burseraceae	Phanerophyte
77	<i>Brassica campestris</i>	Cruciferae	Therophyte
78	<i>Bridelia retusa</i>	Euphorbiaceae	Phanerophyte
79	<i>Bridelia superba</i>	Euphorbiaceae	Phanerophyte
80	<i>Caesalpinia pulcherima</i>	Caesalpinaceae	Phanerophyte
81	<i>Calotropis procera</i>	Asclpiadaceae	Phanerophyte
82	<i>Canthium diddymum</i>	Rubiaceae	Phanerophyte
83	<i>Capparis aphylla</i>	Capparidaceae	Therophyte
84	<i>Capparis deciduas</i>	Capparidaceae	Phanerophyte
85	<i>Carissa carandus</i>	Apocyanaceae	Phanerophyte
86	<i>Carissa spinarium</i>	Apocyanaceae	Phanerophyte
87	<i>Casearia graveolens</i>	Samydiaceae	Phanerophyte
88	<i>Cassia absus</i>	Caesalpinaceae	Phanerophyte
89	<i>Cassia absus</i>	Caesalpinaceae	Therophyte
90	<i>Cassia auriculata</i>	Caesalpinaceae	Therophyte
91	<i>Cassia occidentalis</i>	Caesalpinaceae	Therophyte
92	<i>Cassia tora</i>	Caesalpinaceae	Phanerophyte
93	<i>Cestrum diurnum</i>	Rubiaceae	Therophyte
94	<i>Cestrum noctrunum</i>	Rubiaceae	Therophyte

Sr. No.	Technical Name	Family	Life Form
95	<i>Chloris variegata</i>	Poaceae	Therophyte
96	<i>Cissus quadrangularis</i>	Vitaceae	Therophyte
97	<i>Citrus limon</i>	Rutaceae	Phanerophyte
98	<i>Cleome gynandra</i>	Capparidaceae	Therophyte
99	<i>Combretum ovalifolium</i>	Rubiaceae	Phanerophyte
100	<i>Cordia myxa</i>	Rubiaceae	Phanerophyte
101	<i>Crotalaria medicagenia</i>	Fabaceae	Therophyte
102	<i>Croton bonplandinum</i>	Amaryllidaceae	Therophyte
103	<i>Cuscuta reflexa</i>	Cuscutaceae	Epiphyte
104	<i>Datura fastulosa</i>	Solanaceae	Therophyte
105	<i>Datura metal</i>	Solanaceae	Therophyte
106	<i>Desmodium triflorum</i>	Asclepiadaceae	Therophyte
107	<i>Diospyros melanoxylon</i>	Lythraceae	Phanerophyte
108	<i>Diospyros Montana</i>	Lythraceae	Phanerophyte
109	<i>Echinops echinatus</i>	Compositae	Therophyte
110	<i>Eclipta prostrate</i>	Compositae	Hemicryptophyte
111	<i>Embllica officinale</i>	Euphorbiaceae	Phanerophyte
112	<i>Emilla 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 religiosa</i>	Moraceae	Phanerophyte
130	<i>Ficus gibbosa</i>	Moraceae	Phanerophyte
131	<i>Gardenia latifolia</i>	Rubiaceae	Phanerophyte
132	<i>Gardenia lucida</i>	Rubiaceae	Phanerophyte
133	<i>Garuga pinnata</i>	Burseraceae	Phanerophyte
134	<i>Glossocardia boswellia</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 abatifolia</i>	Tiliaceae	Phanerophyte
139	<i>Grewia salivifolia</i>	Tiliaceae	Phanerophyte
140	<i>Grewia subinaqualis</i>	Tiliaceae	Phanerophyte
141	<i>Gynandropis gynandra</i>	Capparidaceae	Hemicryptophyte
142	<i>Helictis isora</i>	Rubiaceae	Phanerophyte
143	<i>Hellotropium indicum</i>	Rubiaceae	Hemicryptophyte
144	<i>Hellotropium 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 suavealens</i>	Labiatae	Therophyte
151	<i>Imnocarpus frutens</i>	Poaceae	Hemicryptophyte
152	<i>Impatiens balsamania</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>Isora arborea</i>	Rubiaceae	Phanerophyte
160	<i>Isora parviflora</i>	Rubiaceae	Phanerophyte

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

Sr. No.	Technical Name	Family	Life Form
227	<i>Phyllanthes nirurii</i>	Euphorbiaceae	Therophyte
228	<i>Phyllanthes reticulatus</i>	Euphorbiaceae	Therophyte
229	<i>Physalis minima</i>	Solanaceae	Therophyte
230	<i>Pithecolobium dulce</i>	Mimosaceae	Phanerophyte
231	<i>Polyalthia longifolia</i>	Annonaceae	Phanerophyte
232	<i>Polygala ererptera</i>	Polygalaceae	Therophyte
233	<i>Pongamia pinnata</i>	Fabaceae	Phanerophyte
234	<i>Portulaca oleracea</i>	Portulaccaceae	Therophyte
235	<i>Psidium guava</i>	Myrtaceae	Phanerophyte
236	<i>Punica granatum</i>	Puniaceae	Therophyte
237	<i>Randia dumatorum</i>	Rubiaceae	Phanerophyte
238	<i>Rosa indica</i>	Rosaceae	Therophyte
239	<i>Rosa machata</i>	Rosaceae	Therophyte
240	<i>Saccharum munja</i>	Poaceae	Hemicryptophyte
241	<i>Saccharum officinarum</i>	Poaceae	Therophyte
242	<i>Salmalia malabarica</i>	Salmaliaceae	Phanerophyte
243	<i>Sapindus emerginatus</i>	Sapindaceae	Phanerophyte
244	<i>Schleichera trijuga</i>	Combretaceae	Phanerophyte
245	<i>Scherebera switenoides</i>	Sapindaceae	Phanerophyte
246	<i>Schleichera cleosa</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 negungo</i>	Verbinaceae	Therophyte
272	<i>Vitis vermifera</i>	Vitaceae	Therophyte
273	<i>Vivevera zizanoides</i>	Poaceae	Therophyte
274	<i>Wrightia tomentosa</i>	Apocyanaceae	Phanerophyte
275	<i>Xanthium strumariumk</i>	Compositae	Therophyte
276	<i>Yucca gloriosa</i>	Agavaceae	Therophyte
277	<i>Zizyphus jujube</i>	Rhamnaceae	Phanerophyte
278	<i>Zizyphus mauritiana</i>	Rhamanaceae	Phanerophyte
V. Grasslands			
279	<i>Apluda mutica</i>	Poaceae	Hemicryptophyte
280	<i>Chloris dolichosta</i>	Poaceae	Hemicryptophyte
281	<i>Cyanodactylon sp</i>	Poaceae	Geophyte
282	<i>Dichanthium annulatum</i>	Poaceae	Hemicryptophyte
283	<i>Inpura cylendrica</i>	Poaceae	Hemicryptophyte
284	<i>Sachharum spontanseum</i>	Poaceae	Hemicryptophyte
285	<i>Themeda quadrivalvis</i>	Poaceae	Hemicryptophyte
286	<i>Aristida adscensionis</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 triiceps</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 qovinda</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>Nectarinia zeylonica sola</i>	Indian purple rumped sunbird	Sch-IV
<i>Arachnothera longirostris longirostris</i>	Little spinder hunter	Sch-IV
<i>Passer domesticus indicus</i>	Indian house sparrow	Sch-IV
<i>Copsychus saularis ceyonensis</i>	Southern magpie-robin	Sch-IV
<i>Orthotomus sutorius</i>	Tailor bird guzurata	Sch-IV
<i>Pavocristatus</i>	Peacock	Part-III of Sch-I
Amphibians		
<i>Rana tigrana</i>	Common frog	Sch-IV
<i>Bufo melanosticus</i>	Toad	Sch-IV
Reptiles		
<i>Calotes versicolor</i>	Lizard	Sch-IV
<i>Calotes versicolor</i>	Common garden lizard	Sch-IV
<i>Chamaeleon zeylanicus</i>	Indian chamaeleon	Sch-II
<i>Lycodon spp.</i>	Wolf snake	Sch-III
<i>Bolija spp.</i>	Cat snake	Sch-III
<i>Bungarus spp.</i>	Krait	Sch-II
<i>Naja naja</i>	Indian cobra	Sch-III
<i>Vipera spp.</i>	Russels viper	Sch-III
<i>Python sp</i>	Python sp	Sch-I
Butterflies		
<i>Pachlopta hector Lin.</i>	Crimson rose	-
<i>Papilio demoleus Lin.</i>	Lime butterfly	-
<i>Graphium agamemnon Lin.</i>	Tailed jay	-
<i>Junonia almana Lin.</i>	Peacock pansy	-
<i>Hypolimnaris bolina Lin.</i>	Great eggfly	-
<i>Euploea core Cramer</i>	Common crow	-
<i>Neptis hylas Moore</i>	Common sailor	-
<i>Lucena hecabe Lin.</i>	Common grass yellow	-
<i>Caloptilia sp.</i>	Emigrant	-
Mammals		
<i>Rattus sp.</i>	Rat	Sch-IV
<i>Lepus nigricollis</i>	Hare	Sch-IV
<i>Canis aureus</i>	Jackal	Sch-III
<i>Presbytis entellus</i>	Langur	Sch-II
<i>Presbytis phayrei</i>	Monkey	Sch-I
<i>Lunambulus spp.</i>	Squirrel	Sch-IV
<i>Lunambulus palmarum</i>	Squirrel	Sch-IV
<i>Sus scrofa</i>	Wild pig	Sch-III
<i>Rattus norvegicus</i>	Field mouse	Sch-V
<i>Rattus rattus</i>	House rat	Sch-V
<i>Rhinolopus spp.</i>	Bat	Sch-V
<i>Hippociderus 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>Vulpes benghalensis</i>	Wild fox	Sch-III
<i>Melocercus usinus</i>	Bear	Sch-III
<i>Hystrix indica</i>	Porcupine	Sch-IV
<i>Axis axis</i>	Spotted deer	Sch-III
<i>Canis lupus pallipes</i>	Indian wolf	Part-I of Sch-I
<i>Mellivora capensis</i>	Indian Ratel	Part-I of Sch-I
<i>Elephas maximus</i>	Indian Elephant	Part-I of Sch-I
<i>Felis chaus</i>	Jungle cat	Part-II of sch-II
<i>Paradoxurus hermaphroditus</i>	Indian Small civet	Part-I of sch-I
<i>Muntiacus muntiacus</i>	Barking deer	Sch-III
<i>Macaca mulata</i>	Monkey	Part-I of Sch-I

ANNEXURE - ~~8~~ D

✓ Annexure D

(8)

KUDAG

तार

Telegram : PARYAVARAN,
NEW DELHI

दूरभाष :

Telephone :

टेलिग्राफ (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, सी. जी. ओ. कॉम्प्लेक्स

PARYAVARAN BHAWAN, C.G.O. COMPLEX

लोदी रोड, नई दिल्ली - 110003

LODHI ROAD, NEW DELHI - 110003

Dated: 18th March, 1996.

No.8-24/95-FC

To

The Secretary (Forests)
Government of Madhya Pradesh
Bhopal.

Sub: Diversion of 124.109 ha. of revenue forest land in
favour of M/s HINDALCO Industries Ltd. for Bauxite
mining in District Sarguja.

Sir,

I am directed to refer to your letter no.F.5/17/95/10/3
dated 9.3.95 on the above mentioned subject seeking prior
approval of the Central Government in accordance with Section-2
of the Forest (Conservation) Act, 1980 and to say that the
proposal has been examined by the Advisory Committee constituted
by the Central Government under Section-3 of the aforesaid
Act.

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

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

- iii) Reclamation of the mining area will be done in consultation with the State Forest Deptt. at the project cost as per plan prepared in this regard.
- iv) Demarcation of the mining area will be done on the ground at the project cost.
- v) Forest land will not be used for construction of buildings etc. and any purpose other than those mentioned in the proposal.
- vi) Lease period shall remain coterminus with lease under MMARD 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: July-August-September-2016

Name of Industry




Agent of Mines
Samri Mines Division
Hindalco Industries Ltd.

M/s. Hindalco Industries Limited.,

Name of Laboratory:-



Recognised by MoEF (GOI) Notifn. No. D.L.33004/99 Dt.24.10.2007

NABL T-1550 (Chemical), T-1826 (Biological), T-2344 (Mechanical) dt.04/10/2016 valid up to
03.10.2018

Accredited under the QCI-NABET Scheme for EIA Consultant

BIS vide No.CL/CQAPD/OSL (7124116) dt.16.12.2011

Certified by ISO 9001:2008, ISO 14001:2004, ISO 18001:2007

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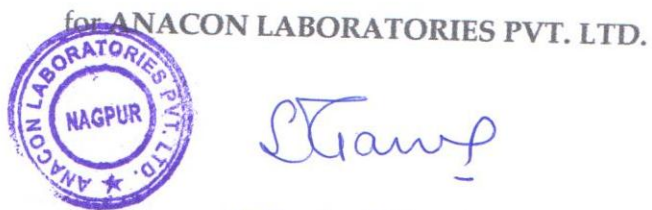
Foreword

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

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

This report presents the Environmental Status for the period **July-2016** to **September-2016** as compliance to the statutory requirements.

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



Stamp

Authorized Signatory

Place : Nagpur

Date : September, 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 (*Jul-Aug-Sep-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 ^o 26' 02"N to 23 ^o 29' 00"N
3.	Longitude	83 ^o 51' 00"E to 83 ^o 59' 00"E
4.	Elevation	1145-m above Mean Sea Level
5.	Climatic Conditions (as per IMD, Ambikapur)	Annual maximum temperature : 30.3 ^o C Annual minimum temperature : 17.7 ^o C Average annual rainfall : 1401.1 mm
6.	Mining lease area	377.116 Hec.
7.	Method of mining	Open cast (Semi-Mechanized)
8.	Mode of transportation	Trucks
9.	Landuse	Agricultural and Barren land
10.	Nearest Road	Samri to Kusmi (17 km)
11.	Nearest Airport	Ranchi Airport (151.09 Km)
12.	Nearest Town	Ambikapur (127 km, SW)

1.4 Environmental Monitoring

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during mining operation. With the knowledge of baseline conditions the monitoring program will serve as an indicator for any deterioration in environmental conditions due to mining operation of the project. Suitable mitigation steps will be taken in time to safeguard the environment based on monitoring reports. Monitoring is important for the control of pollution since the efficiency of control measures can only be determined through monitoring.

In order to find out 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 July-Aug-Sept-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 July-Aug-Sept-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 (SO_2), Oxides of Nitrogen (NO_x), Pb, Hg, As and Cr were monitored for establishing the baseline status. SPM and RPM was collected with the help of Respirable Particulate Sampler operating 24 hours by drawing air which passes through the cyclone at the rate of 1-1.3 m^3/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 cm of water is always retained. The measurement techniques used for various pollutants and other details are given in **(Table 4)**.

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

Earmarked samples were collected for Particulate Matter- PM_{10} , Particulate Matter- $\text{PM}_{2.5}$, SO_2 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 (PM_{10}), Particulate Matter ($\text{PM}_{2.5}$), Sulphur Dioxide (SO_2), 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 (µg/ m ³)
1.	Suspended Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part - 23)	5
2.	Respirable Particulate Matter	Respirable Dust Sampler (Gravimetric Method)	IS-5182 (Part-23)	5
3.	Particulate Matter 2.5	Respirable Dust Sampler (Gravimetric Method)	Gravimetric Method	5
4.	Sulphur Dioxide	Modified West and Gaeke	IS-5182 (Part - II)	4
5.	Oxide of Nitrogen	Jacob & Hochheiser Method	IS-5182 (Part - VI)	4
6.	Pb, As,Hg, Cr	Acid Digestion Method	EPA Method	0.1
7.	Mercury (Hg)	By Cold Vapor atomic Absorption	IS-5182 (Part-I)	0.001
8.	Dust Full	Gravimetric	IS-5182 (Part-I)	-

1.6 Fugitive Emission Monitoring (Core Zone)

The summary of Fugitive Emission monitoring results for the month of July-Aug-Sept 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.

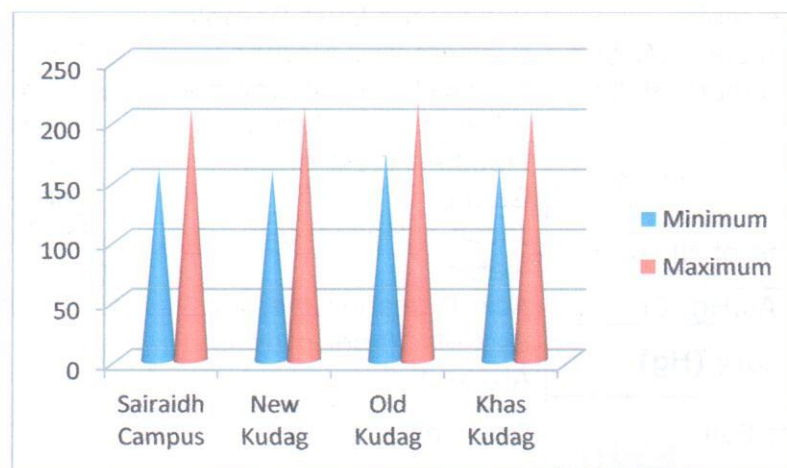
Suspended Particulate Matter-SPM

The minimum and maximum concentrations for Suspended Particulate Matter-SPM were recorded as 141 $\mu\text{g}/\text{m}^3$ and 215 $\mu\text{g}/\text{m}^3$ respectively. The average concentrations were ranged between 154 to 205 $\mu\text{g}/\text{m}^3$. and 98th percentile value ranged between 167 to 215 $\mu\text{g}/\text{m}^3$ in the study area

(Table 6).

Graphical Presentation Of Fugitive Emission Monitoring

SPM

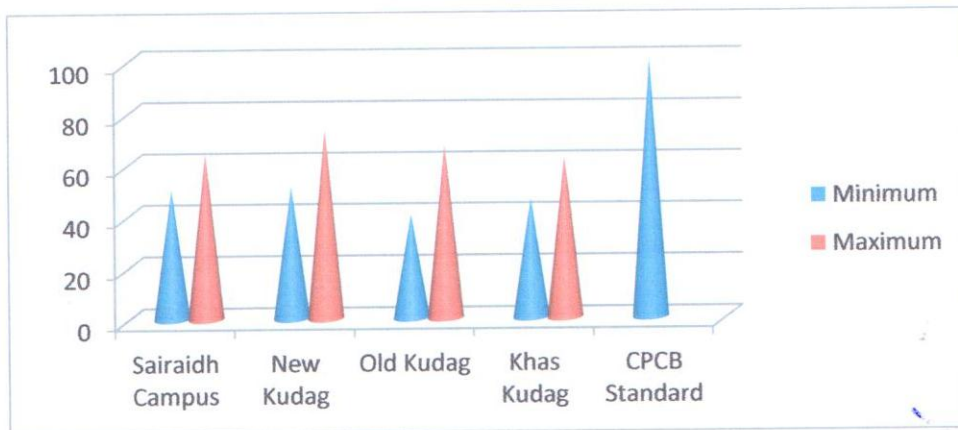


Respirable Suspended Particulate Matter –RSPM

The minimum and maximum concentrations for RSPM were recorded as 40 $\mu\text{g}/\text{m}^3$ and 73 $\mu\text{g}/\text{m}^3$ respectively. The average values were observed to be in the range of 46 to 69 $\mu\text{g}/\text{m}^3$ and 98th percentile values ranged between 49 to 73 $\mu\text{g}/\text{m}^3$ in the study area (**Table 7**).

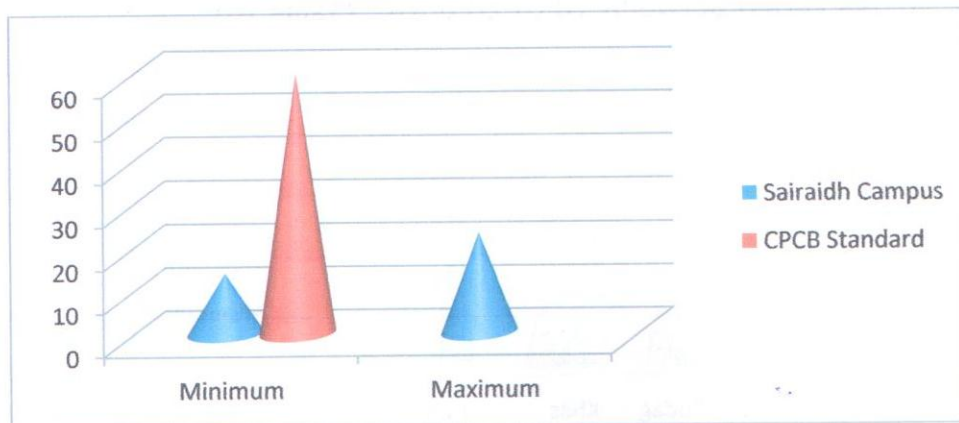
Graphical Presentation Of Fugitive Emission Monitoring

RSPM



Particulate Matter -PM_{2.5}

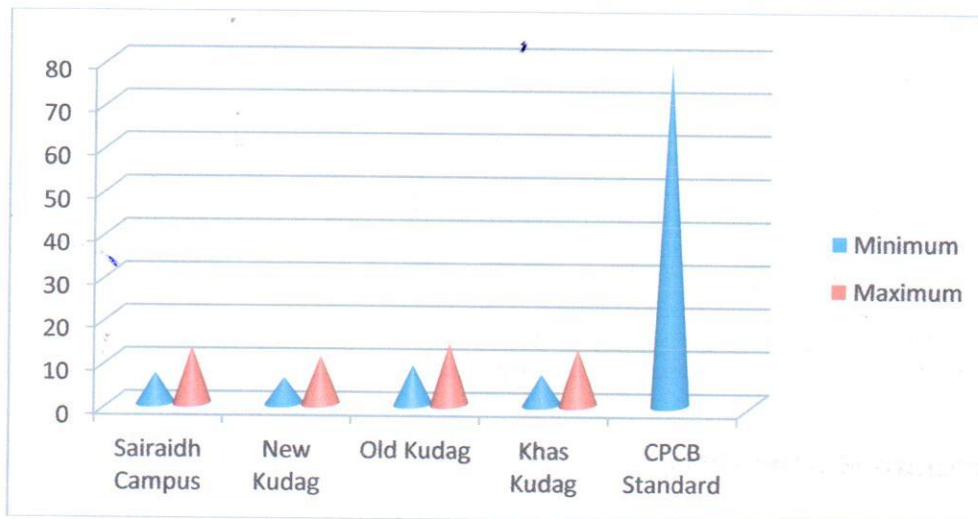
The minimum and maximum values of PM_{2.5} concentrations varied between 14 to 23 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 17 to 21 $\mu\text{g}/\text{m}^3$ and 98th percentile values varied between 20 to 23 $\mu\text{g}/\text{m}^3$ (**Table 8**).



Sulphur Dioxide (SO₂)

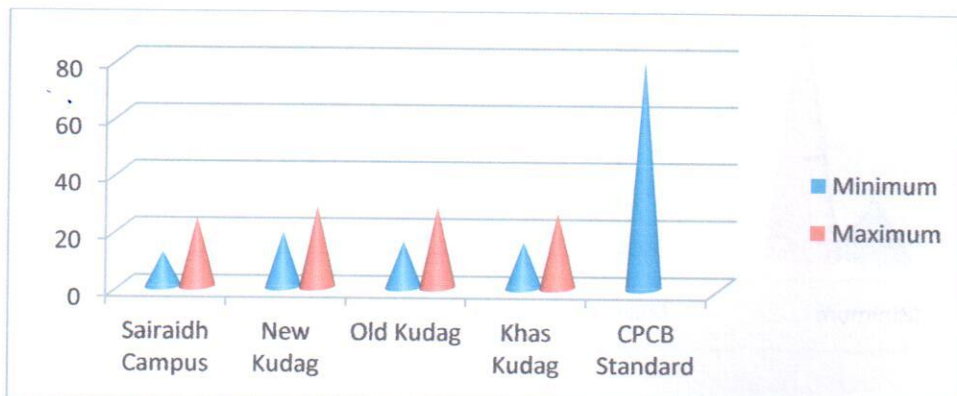
The minimum and maximum SO₂ concentrations were recorded as 6 µg/m³ and 14 µg/m³ respectively. The average values were observed to be in the range of 8 to 12 µg/m³ and 98th percentile values varied between 9 to 14 µg/m³ (**Table 9**).

Graphical Presentation Of Fugitive Emission Monitoring
SO₂



Nitrogen Oxide (NO_x)

The minimum and maximum NO_x concentrations were recorded as 12 µg/m³ and 28 µg/m³. The average concentrations were ranged between 15 to 24 µg/m³ and 98th percentile values varied between 18 to 28 µg/m³ (**Table 10**).





Lead (Pb)

The minimum and maximum Lead detected between 0.015 to 0.032 $\mu\text{g}/\text{m}^3$ respectively. The average Lead detected between 0.017 to 0.028 $\mu\text{g}/\text{m}^3$ & 98th percentile values varied between 0.018 to 0.032 $\mu\text{g}/\text{m}^3$ in the study region. **(Table 11).**

Mercury (Hg)

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

(Table 12).

Arsenic (As)

Arsenic was not detected at any of the locations in SPM samples as well as RSPM Samples **(Table 13).**

Chromium (Cr)

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

1.7 Ambient Air Quality (Buffer Zone)

The background levels of SPM, RSPM(PM₁₀), PM_{2.5}, SO₂, NO_x, Pb, Hg, As, Cr and Dust fall are required to compute Buffer Zone. The sampling locations are selected at the above mentioned locations in downwind and upwind directions of the mine. The Minimum Maximum concentration, Arithmetic mean (AM), Geometric mean (GM), and 98 Percentile are presented in tabular form (**Table 6**).

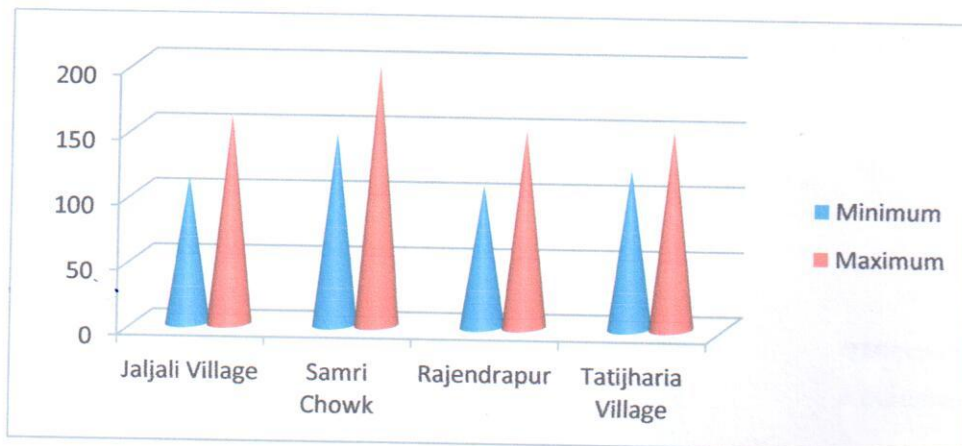
1.7.1 Presentation of Results.

The summary of Ambient Air Quality monitoring results for the month of July-Aug-Sept-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 AA 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 109 to 199 µg/m³ respectively during study period at all the 4 locations. The average values ranged between 121 to 186 µg/m³ and 98th percentile values ranged between 126 to 199 µg/m³ in the study area.

Graphical Presentation Of Ambient Air Quality (Buffer Zone)

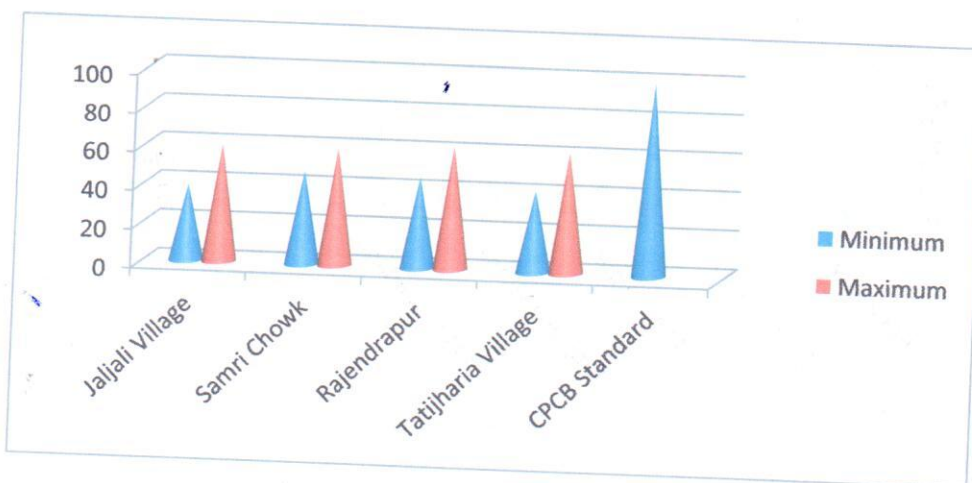




Particulate Matter-RSPM

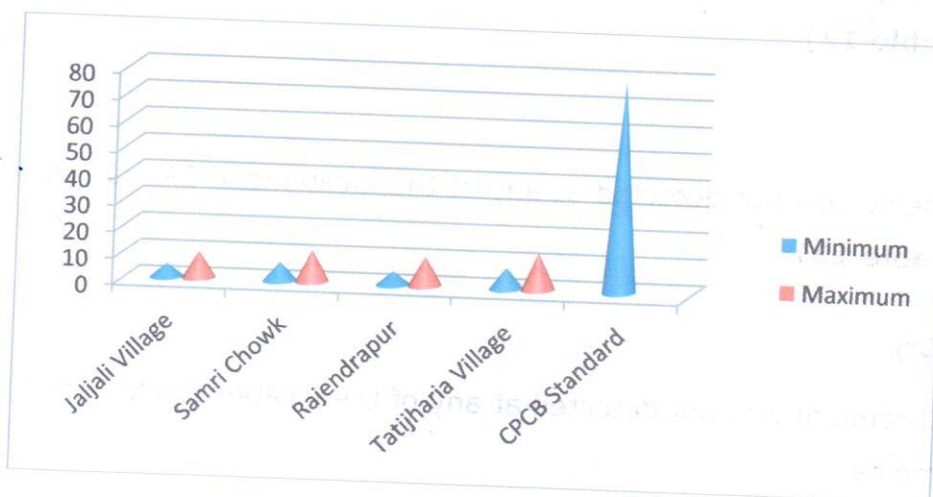
The minimum and maximum values of RSPM varied between 39 to 63 $\mu\text{g}/\text{m}^3$ respectively (**Table 7**). The average values varied between 44 to 58 $\mu\text{g}/\text{m}^3$ percentile values varied between 49 to 63 $\mu\text{g}/\text{m}^3$ in the mining area. The overall of SPM and RSPM were well within the CPCB limits prescribe for industrial and area in the study area during the study period.

Graphical Presentation Of Ambient Air Quality (Buffer Zone) RSPM



Sulphur Dioxide (SO_2)

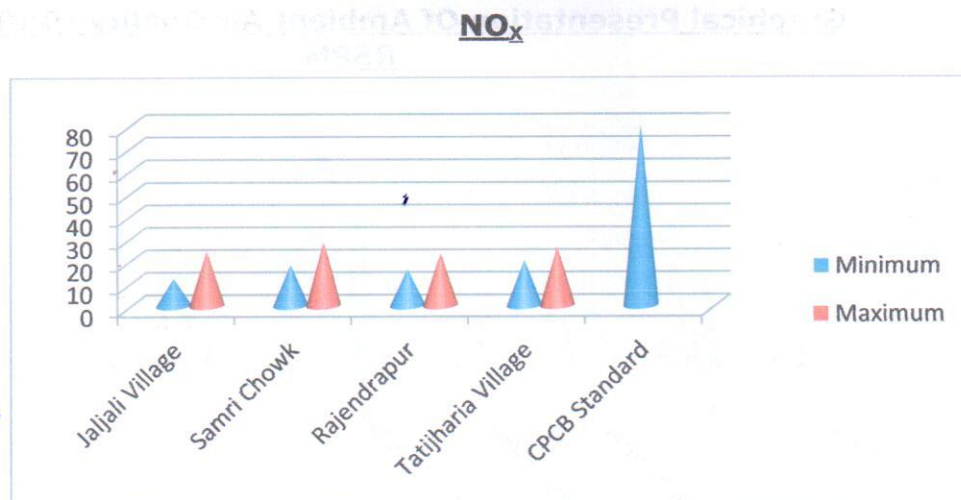
The minimum and maximum values of SO_2 concentrations varied between 7 to 14 $\mu\text{g}/\text{m}^3$ respectively. The average values range between 7 to 12 $\mu\text{g}/\text{m}^3$ and percentile values varied between 8 to 14 $\mu\text{g}/\text{m}^3$ (**Table 9**).



Nitrogen Oxide (NO_x)

The minimum and maximum values of NO_x concentrations varied between 1 to 28 µg/m³ respectively. The average values range between 15 to 24 µg/m³ and 98th percentile values varied between 17 to 28 µg/m³ (**Table 10**).

Graphical Presentation Of Ambient Air Quality (Buffer Zone)



Lead (Pb)

Lead was not detected at any of the locations in SPM samples as well as 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 July-Aug-Sept-2016 in Old Kudag/Mining Area and Khas Kudag village. The dust fall rate was observed to be 24.1 and 20.7 MT/km²/month respectively as given in **(Table 14)**.

Overall the ambient air concentrations of SPM, RSPM, SO₂, NO_x, Pb, As, Cr and Hg were well within the limits of concentrations promulgated by CPCB, New Delhi in the study area.



1.8 Meteorology: Wind Pattern

The data of wind pattern collected during the study period (**Jul-Aug-Sep-2016**) indicates that the wind was blowing predominantly from (SE and SSE) directions, during study period, for 3.08% wind was found to be calm. The details of wind pattern in the form of wind frequency distribution are presented in **table 1**. The wind rose diagram and graphical illustration is presented in **Figures 1 & 2** respectively.

Table.1
Wind Frequency Distribution Data

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

SUMMARY OF WIND PATTERN

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

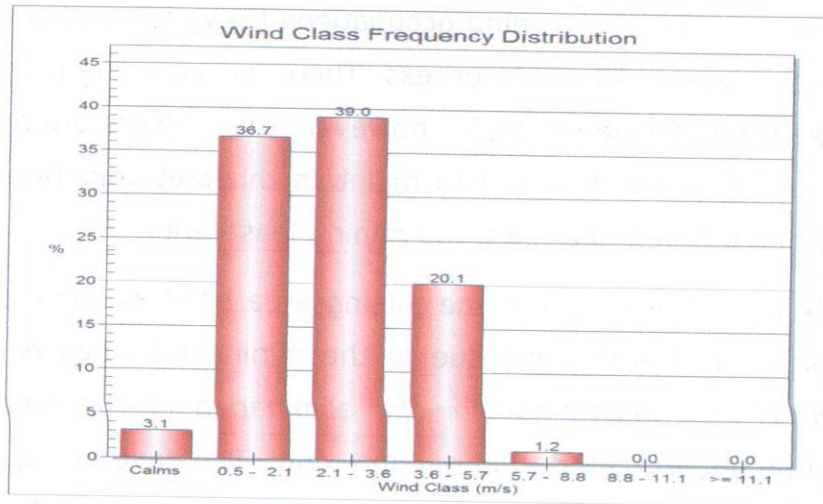
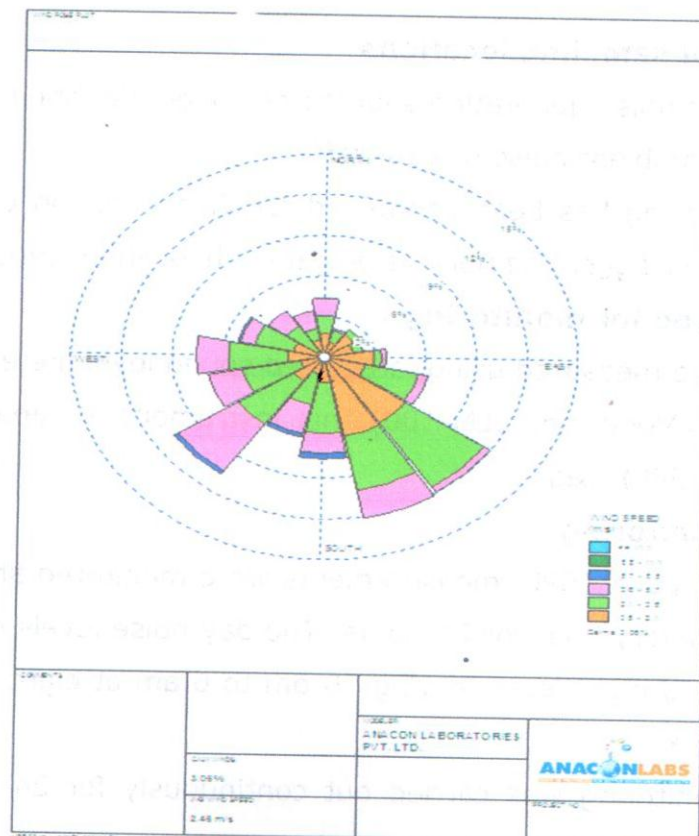


Figure.01: Wind Class Frequency Distribution



1.9 Noise Environment

The Director General of Mines Safety in its circular No. DG (Tech)/18 of 1975, prescribed the noise level in mining occupations (TLV) for workers, in an 8 hour shift per 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 village area and ambient noise due to traffic.

The noise monitoring has been conducted for determination of ambient noise levels in 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 Enviro made in India (Model no. SLM-100). This instrument is capable of measuring the Sound Pressure Level (SPL), Leq.

Method of Monitoring

Sound Pressure Level (SPL) measurements were monitored at eight locations. The readings were taken for every hour for 24 hours. The day noise levels have been monitored during 10 am to 10 pm and night levels during 10 pm to 6 am at eight locations within 10-km radius of the study area.

Noise level monitoring was carried out continuously for 24 hours with one hour interval starting at 06.00 hrs to 06.00 hrs next day.

Noise levels monitored during day and night at eight locations are found to be below 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 Aug 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 Aug 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	July-2016	175	209	192	192	209
	Aug-2016	184	210	197	197	210
	Sept-2016	160	177	169	169	177
New Kudag/Nr. Weigh Bridge	July-2016	158	195	177	177	195
	Aug-2016	198	211	205	205	211
	Sept-2016	187	201	194	194	201
Old Kudag/Mining Area	July-2016	149	180	165	165	180
	Aug-2016	172	215	194	194	215
	Sept-2016	141	167	154	154	167
Khas Kudag	July-2016	158	189	174	174	189
	Aug-2016	162	208	185	185	208
	Sept-2016	144	172	158	158	172
CPCB Standard				---		

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Buffer Zone :-						
Jaljali Village	July-2016	112	126	119	119	126
	Aug-2016	134	160	147	147	160
	Sept-2016	120	136	128	128	136
Samri Chowk/ Nr.Old Weigh Bridge	July-2016	148	177	163	163	177
	Aug-2016	174	199	187	187	199
	Sept-2016	147	172	160	160	172
Rajendrapur	July-2016	133	144	139	139	144
	Aug-2016	125	151	138	138	151
	Sept-2016	109	134	122	122	134
Tatijharia Village	July-2016	122	149	136	136	149
	Aug-2016	138	152	145	145	152
	Sept-2016	134	144	139	139	144
CPCB Standard				---		

Conclusion-A:-

- 1) **Sairaidh Campus Lease Area Core Zone :-** For the Months of July-Aug-Sept-2016 Average of SPM is $186 \mu\text{g}/\text{m}^3$
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-**For the Months of July-Aug-Sept-2016 Average of SPM is $192 \mu\text{g}/\text{m}^3$
- 3) **Old Kudag/Mining Lease Area Core Zone:-** For the Months of July-Aug-Sept-2016 Average of SPM is $171 \mu\text{g}/\text{m}^3$.
- 4) **Khas Kudag Lease Area Core Zone:-** For the Months of July-Aug-Sept-2016 Average of SPM is $172 \mu\text{g}/\text{m}^3$.

- The Average Concentration of SPM within the core zone of Kudag Lease is $180 \mu\text{g}/\text{m}^3$.

Conclusion-B:-

- 1) **Jaljali Village Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2016 Average of SPM is $131 \mu\text{g}/\text{m}^3$
- 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2016 Average of SPM is $170 \mu\text{g}/\text{m}^3$
- 3) **Rajendrapur Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2016 Average of SPM is $133 \mu\text{g}/\text{m}^3$
- 4) **Tatijharia Village Lease Area Buffer Zone :-** For the Months of July-Aug-Sept-2016 Average of SPM is $140 \mu\text{g}/\text{m}^3$.

- The Average Concentration of SPM within the Buffer Zone of Kudag Lease is $143 \mu\text{g}/\text{m}^3$

Monthwise Summary of Statistical Analysis of SPM

2.1 Fugitive Emission (Core Zone):-

2.1.1 Presentation of Results.

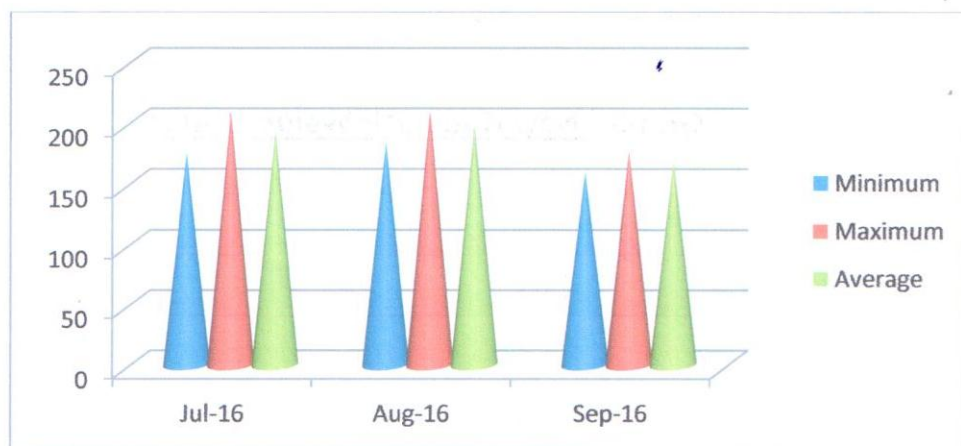
The summary of Statistical Analysis of SPM results for the month of July-2016 to Sept-2016 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2016 the minimum and maximum concentrations for SPM were recorded as 175 $\mu\text{g}/\text{m}^3$ and 209 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 192 $\mu\text{g}/\text{m}^3$.

For the month of Aug-2016 the minimum and maximum concentrations for SPM were recorded as 184 $\mu\text{g}/\text{m}^3$ and 210 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 197 $\mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for SPM were recorded as 160 $\mu\text{g}/\text{m}^3$ and 177 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 169 $\mu\text{g}/\text{m}^3$.



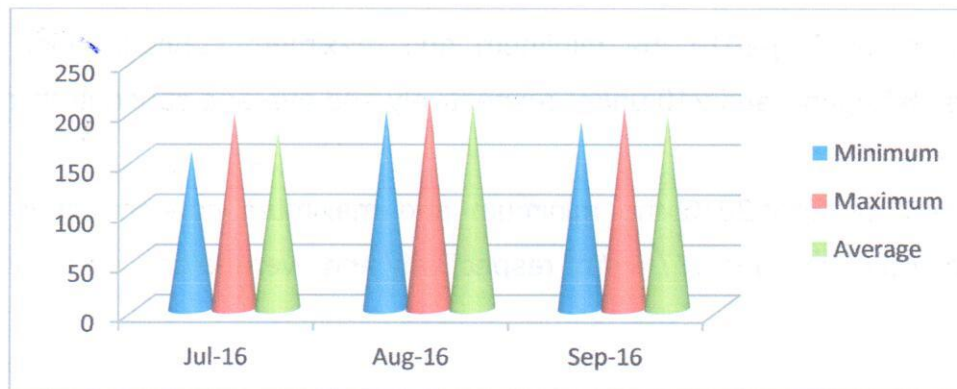
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of July-2016 the minimum and maximum concentrations for SPM were recorded as 158 $\mu\text{g}/\text{m}^3$ and 195 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 177 $\mu\text{g}/\text{m}^3$.

For the month of Aug-2016 the minimum and maximum concentrations for SPM were recorded as 198 $\mu\text{g}/\text{m}^3$ and 211 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 205 $\mu\text{g}/\text{m}^3$.

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



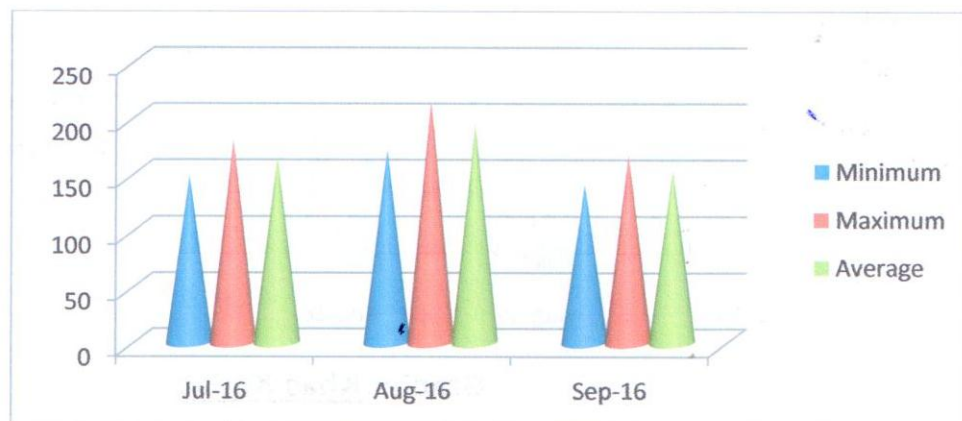
Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

For the month of July-2016 the minimum and maximum concentrations for SPM were recorded as $149 \mu\text{g}/\text{m}^3$ and $180 \mu\text{g}/\text{m}^3$ respectively and average concentration of $165 \mu\text{g}/\text{m}^3$.

For the month of Aug-2016 the minimum and maximum concentrations for SPM were recorded as $172 \mu\text{g}/\text{m}^3$ and $215 \mu\text{g}/\text{m}^3$ respectively and average concentration of $194 \mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for SPM were recorded as $141 \mu\text{g}/\text{m}^3$ and $167 \mu\text{g}/\text{m}^3$ respectively and average concentration of $154 \mu\text{g}/\text{m}^3$.



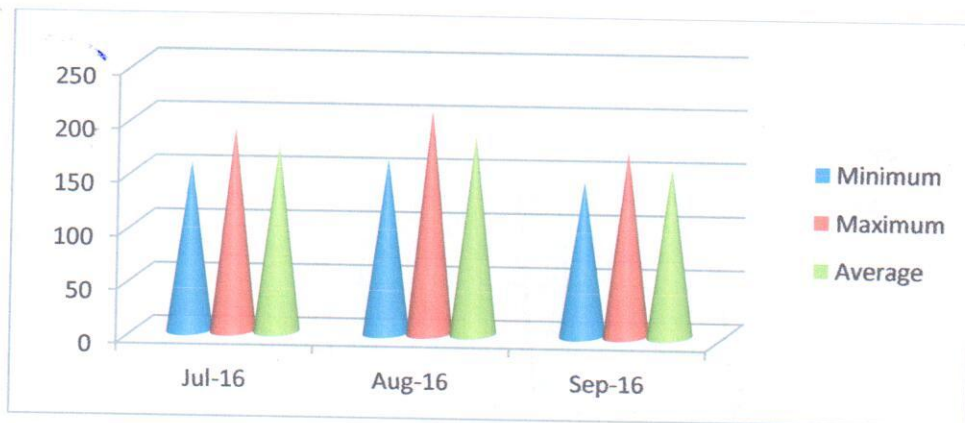
Graph:- Old Kudag/Mining Area

Khas Kudag

For the month of July-2016 the minimum and maximum concentrations for SPM recorded as $158 \mu\text{g}/\text{m}^3$ and $189 \mu\text{g}/\text{m}^3$ respectively and average concentration of $174 \mu\text{g}/\text{m}^3$

For the month of Aug-2016 the minimum and maximum concentrations for SPM recorded as $162 \mu\text{g}/\text{m}^3$ and $208 \mu\text{g}/\text{m}^3$ respectively and average concentration of $185 \mu\text{g}/\text{m}^3$

For the month of Sept-2016 the minimum and maximum concentrations for SPM recorded as $144 \mu\text{g}/\text{m}^3$ and $172 \mu\text{g}/\text{m}^3$ respectively and average concentration of $158 \mu\text{g}/\text{m}^3$



Graph:- Khas Kudag

2.2 Fugitive Emission (Buffer Zone):-

2.2.1 Presentation of Results.

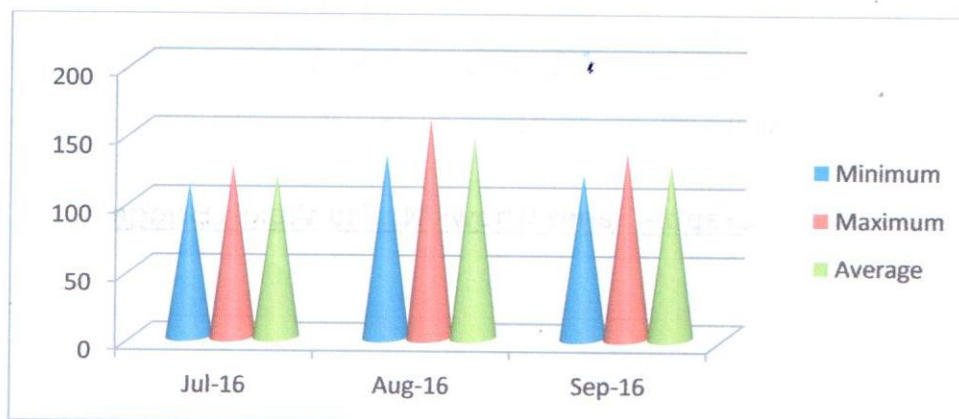
The summary of Statistical Analysis of SPM results for the month of July-2016 to Sept-2016 are presented in detail in **Table 6**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of July-2016 the minimum and maximum concentrations for SPM were recorded as 112 $\mu\text{g}/\text{m}^3$ and 126 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 119 $\mu\text{g}/\text{m}^3$.

For the month of Aug-2016 the minimum and maximum concentrations for SPM were recorded as 134 $\mu\text{g}/\text{m}^3$ and 160 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 147 $\mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for SPM were recorded as 120 $\mu\text{g}/\text{m}^3$ and 136 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 128 $\mu\text{g}/\text{m}^3$.



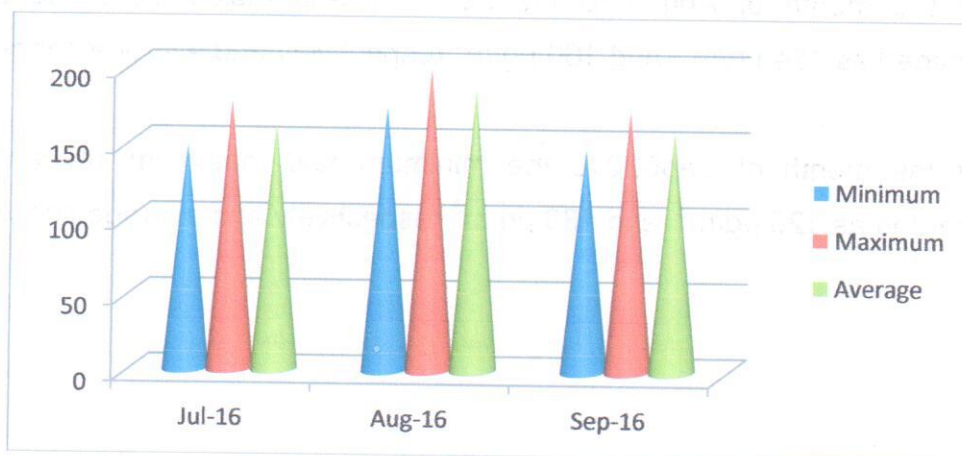
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of July-2016 the minimum and maximum concentrations for SPM were recorded as $148 \mu\text{g}/\text{m}^3$ and $177 \mu\text{g}/\text{m}^3$ respectively and average concentration of $162 \mu\text{g}/\text{m}^3$

For the month of Aug-2016 the minimum and maximum concentrations for SPM were recorded as $174 \mu\text{g}/\text{m}^3$ and $199 \mu\text{g}/\text{m}^3$ respectively and average concentration of $186 \mu\text{g}/\text{m}^3$

For the month of Sept-2016 the minimum and maximum concentrations for SPM were recorded as $147 \mu\text{g}/\text{m}^3$ and $172 \mu\text{g}/\text{m}^3$ respectively and average concentration of $159 \mu\text{g}/\text{m}^3$



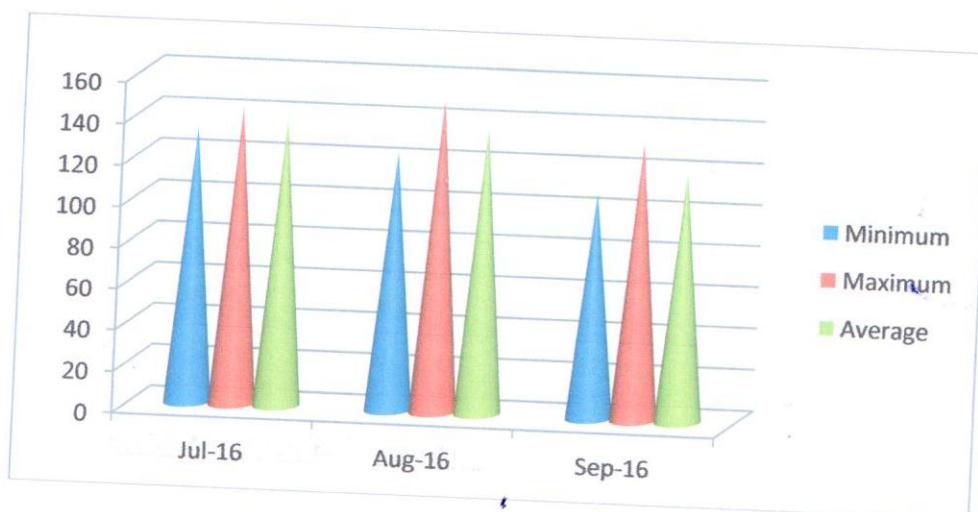
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of July-2016 the minimum and maximum concentrations for SPM were recorded as $133 \mu\text{g}/\text{m}^3$ and $144 \mu\text{g}/\text{m}^3$ respectively and average concentration of $138 \mu\text{g}/\text{m}^3$.

For the month of Aug-2016 the minimum and maximum concentrations for SPM were recorded as $125 \mu\text{g}/\text{m}^3$ and $151 \mu\text{g}/\text{m}^3$ respectively and average concentration of $138 \mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for SPM were recorded as $109 \mu\text{g}/\text{m}^3$ and $134 \mu\text{g}/\text{m}^3$ respectively and average concentration of $121 \mu\text{g}/\text{m}^3$.



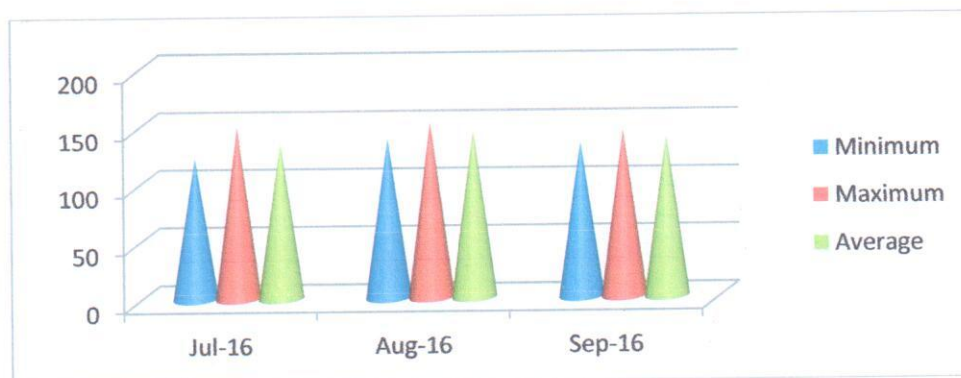
Graph:- Rajendrapur

Tatijharia Village

For the month of July-2016 the minimum and maximum concentrations for SPM recorded as $122 \mu\text{g}/\text{m}^3$ and $149 \mu\text{g}/\text{m}^3$ respectively and average concentration of $135 \mu\text{g}/\text{m}^3$

For the month of Aug-2016 the minimum and maximum concentrations for SPM recorded as $138 \mu\text{g}/\text{m}^3$ and $152 \mu\text{g}/\text{m}^3$ respectively and average concentration of $145 \mu\text{g}/\text{m}^3$

For the month of Sept-2016 the minimum and maximum concentrations for SPM recorded as $134 \mu\text{g}/\text{m}^3$ and $144 \mu\text{g}/\text{m}^3$ respectively and average concentration of $139 \mu\text{g}/\text{m}^3$



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	July-2016	48	64	56	56	64
	Aug-2016	50	59	55	55	59
	Sept-2016	44	54	49	49	54
New Kudag/Nr. Weigh Bridge	July-2016	64	73	69	69	73
	Aug-2016	51	65	58	58	65
	Sept-2016	55	66	61	61	66
Old Kudag/Mining Area	July-2016	40	52	46	46	52
	Aug-2016	59	67	63	63	67
	Sept-2016	52	64	58	58	64
Khas Kudag	July-2016	49	58	54	54	58
	Aug-2016	48	62	55	55	62
	Sept-2016	46	49	48	48	49
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	July-2016	44	58	51	51	58
	Aug-2016	50	60	55	55	60
	Sept-2016	39	49	44	44	49
Samri Chowk/ Nr.Old Weigh Bridge	July-2016	48	57	53	53	57
	Aug-2016	52	60	56	56	60
	Sept-2016	49	59	54	54	59
Rajendrapur	July-2016	47	55	51	51	55
	Aug-2016	50	61	56	56	61
	Sept-2016	53	63	58	58	63
Tatijharia Village	July-2016	46	54	50	50	54
	Aug-2016	44	58	51	51	58
	Sept-2016	42	62	52	52	62
CPCB Standard				100 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Conclusion: A)

- Sairaidh Campus Lease Area Core Zone :-** For the Months of July-Aug-Sept- 2016 Average of RSPM is $53 \mu\text{g}/\text{m}^3$.
- New Kudag/Nr. Weigh Bridge Lease Area Core Zone :-**For the Months of July-Aug-Sept -2016 Average of RSPM is $62 \mu\text{g}/\text{m}^3$.
- Old Kudag/Mining Area Lease Area Core Zone :-** For the Months of July-Aug-Sept -2016 Average of RSPM is $56 \mu\text{g}/\text{m}^3$.
- Khas Kudag Lease Area Core Zone :-** For the Months of July-Aug-Sept -2016 Average of RSPM is $52 \mu\text{g}/\text{m}^3$.

• The Average Concentration of RSPM within the Core Zone of Kudag Lease is $56 \mu\text{g}/\text{m}^3$ and it is within permissible limits as per CPCB Standard.

Conclusion: B)

- Jaljali Village Lease Area Buffer Zone :-** For the Months of July-Aug-Sept -2016 Average of RSPM is $50 \mu\text{g}/\text{m}^3$.
- Samri Chowk Lease Area Buffer Zone :-** For the Months of July-Aug-Sept -2016 Average of RSPM is $54 \mu\text{g}/\text{m}^3$.
- Rajendrapur Lease Area Buffer Zone :-** For the Months of July-Aug-Sept -2016 Average of RSPM is $55 \mu\text{g}/\text{m}^3$.
- Tatijharia Village Lease Area Buffer Zone :-** For the Months of July-Aug-Sept -2016 Average of RSPM is $51 \mu\text{g}/\text{m}^3$.

• The Average Concentration of RSPM within the Buffer Zone of Kudag Lease is $53 \mu\text{g}/\text{m}^3$ 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.

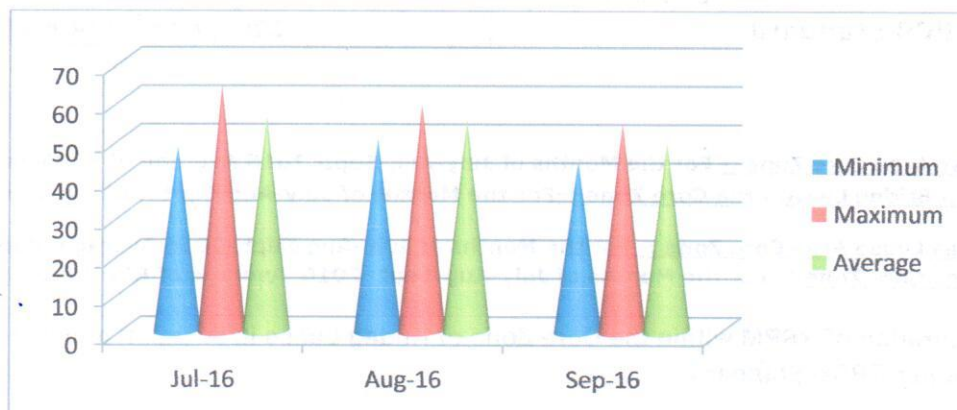
The summary of Statistical Analysis of RSPM results for the month of July-2016 to Sep-2016 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2016 the minimum and maximum concentrations for RSPM were recorded as 48 $\mu\text{g}/\text{m}^3$ and 64 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 56 $\mu\text{g}/\text{m}^3$.

For the month of Aug-2016 the minimum and maximum concentrations for RSPM were recorded as 50 $\mu\text{g}/\text{m}^3$ and 59 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 55 $\mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for RSPM were recorded as 44 $\mu\text{g}/\text{m}^3$ and 54 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 49 $\mu\text{g}/\text{m}^3$.



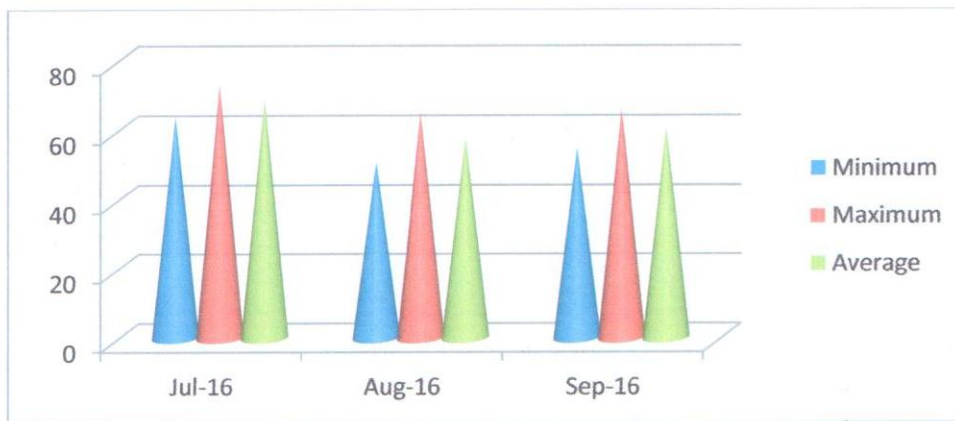
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of July-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 Aug-2016 the minimum and maximum concentrations for RSPM were recorded as 51 $\mu\text{g}/\text{m}^3$ and 65 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 58 $\mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for RSPM were recorded as 55 $\mu\text{g}/\text{m}^3$ and 66 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 61 $\mu\text{g}/\text{m}^3$.



Graph:- New Kudag/Nr.Weigh Bridge

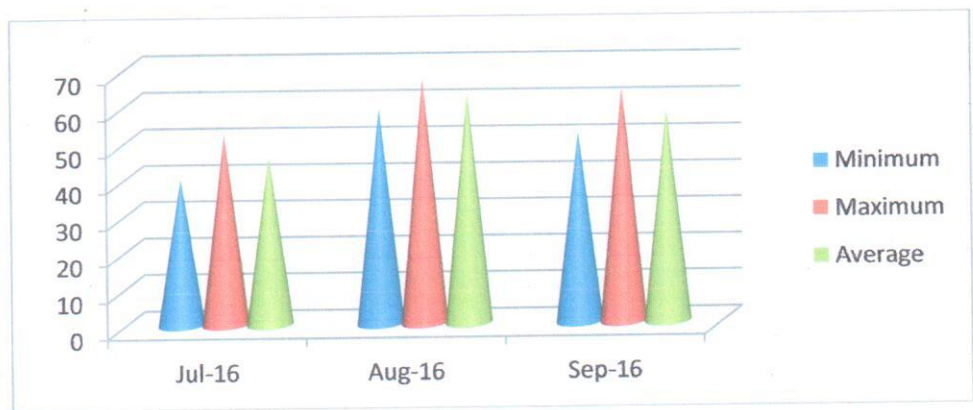


Old Kudag/Mining Area

For the month of July-2016 the minimum and maximum concentrations for RSPM were recorded as $40 \mu\text{g}/\text{m}^3$ and $52 \mu\text{g}/\text{m}^3$ respectively and average concentration of $46 \mu\text{g}/\text{m}^3$

For the month of Aug-2016 the minimum and maximum concentrations for RSPM were recorded as $59 \mu\text{g}/\text{m}^3$ and $67 \mu\text{g}/\text{m}^3$ respectively and average concentration of $63 \mu\text{g}/\text{m}^3$

For the month of Sept-2016 the minimum and maximum concentrations for RSPM were recorded as $52 \mu\text{g}/\text{m}^3$ and $64 \mu\text{g}/\text{m}^3$ respectively and average concentration of $58 \mu\text{g}/\text{m}^3$



Graph:- Old Kudag/Mining Area

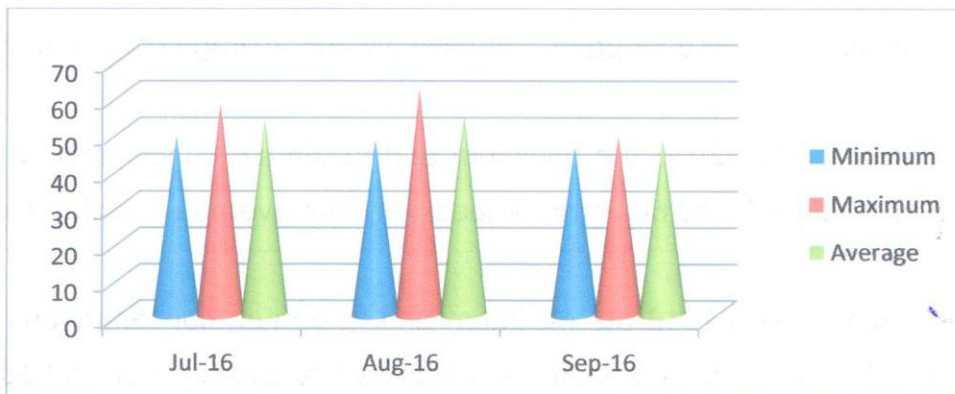


Khas Kudag

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

For the month of Aug-2016 the minimum and maximum concentrations for RSPM were recorded as $48 \mu\text{g}/\text{m}^3$ and $62 \mu\text{g}/\text{m}^3$ respectively and average concentration of $55 \mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for RSPM were recorded as $46 \mu\text{g}/\text{m}^3$ and $49 \mu\text{g}/\text{m}^3$ respectively and average concentration of $48 \mu\text{g}/\text{m}^3$.



Graph:- Khas Kudag

2.4 Fugitive Emission (Buffer Zone):-

2.4.1 Presentation of Results.

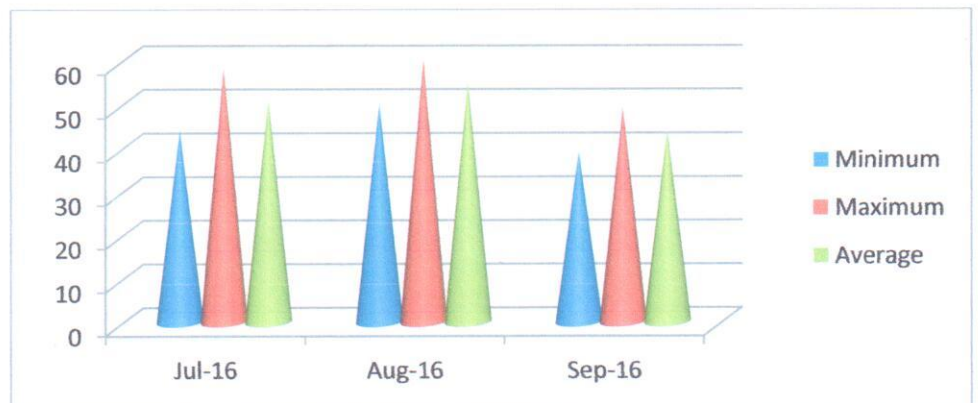
The summary of Statistical Analysis of RSPM results for the month of July-2016 to 2016 are presented in detail in **Table 7**. 98th percentile; maximum, minimum and values etc have been computed from the collected raw data for all the Fugitive monitoring station.

Jaljali Village

For the month of July-2016 the minimum and maximum concentrations for RS recorded as 44 $\mu\text{g}/\text{m}^3$ and 58 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 5

For the month of Aug-2016 the minimum and maximum concentrations for RS recorded as 50 $\mu\text{g}/\text{m}^3$ and 60 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 5

For the month of Sept-2016 the minimum and maximum concentrations for RS recorded as 39 $\mu\text{g}/\text{m}^3$ and 49 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 4



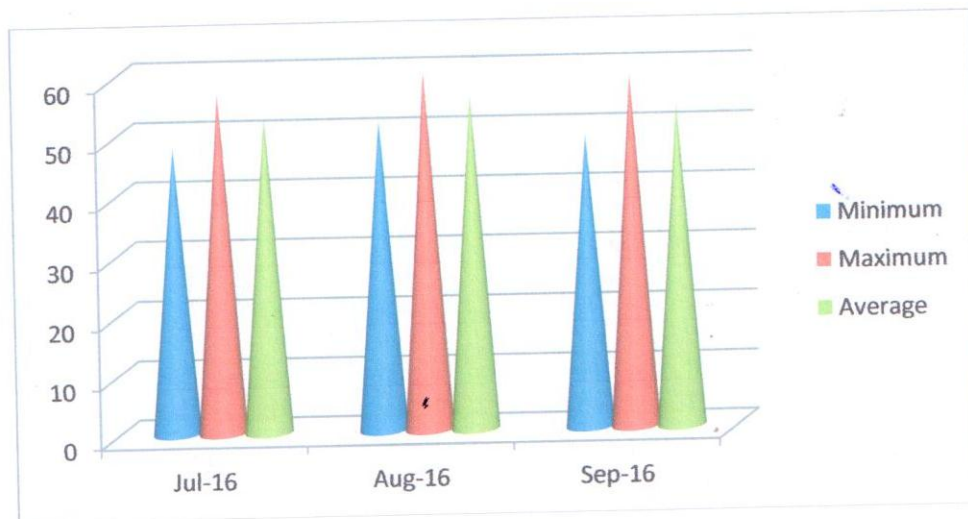
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of July-2016 the minimum and maximum concentrations for RSPM were recorded as $48 \mu\text{g}/\text{m}^3$ and $57 \mu\text{g}/\text{m}^3$ respectively and average concentration of $53 \mu\text{g}/\text{m}^3$.

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

For the month of Sept-2016 the minimum and maximum concentrations for RSPM were recorded as $49 \mu\text{g}/\text{m}^3$ and $59 \mu\text{g}/\text{m}^3$ respectively and average concentration of $54 \mu\text{g}/\text{m}^3$.



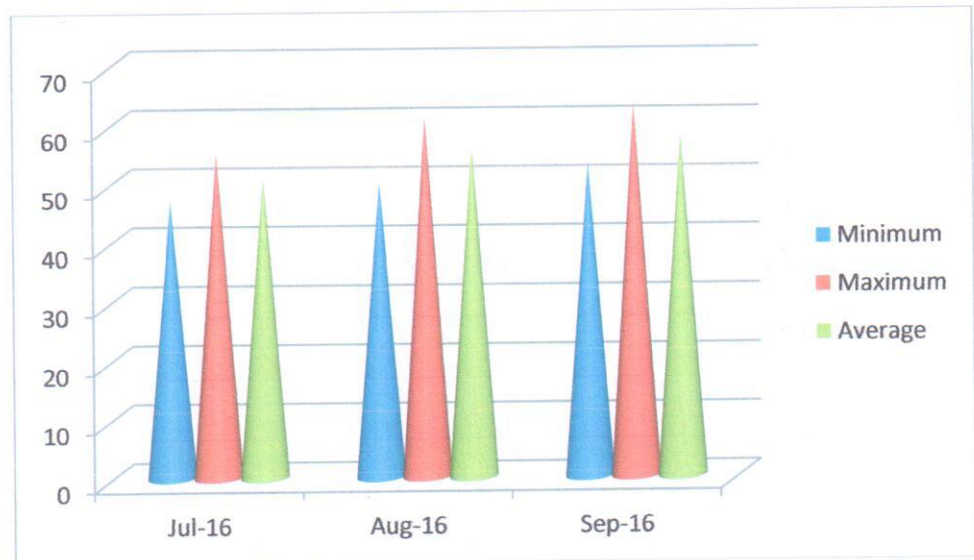
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of July-2016 the minimum and maximum concentrations for RSPM were recorded as $47 \mu\text{g}/\text{m}^3$ and $55 \mu\text{g}/\text{m}^3$ respectively and average concentration of $51 \mu\text{g}/\text{m}^3$.

For the month of Aug-2016 the minimum and maximum concentrations for RSPM were recorded as $50 \mu\text{g}/\text{m}^3$ and $61 \mu\text{g}/\text{m}^3$ respectively and average concentration of $56 \mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for RSPM were recorded as $53 \mu\text{g}/\text{m}^3$ and $63 \mu\text{g}/\text{m}^3$ respectively and average concentration of $58 \mu\text{g}/\text{m}^3$.



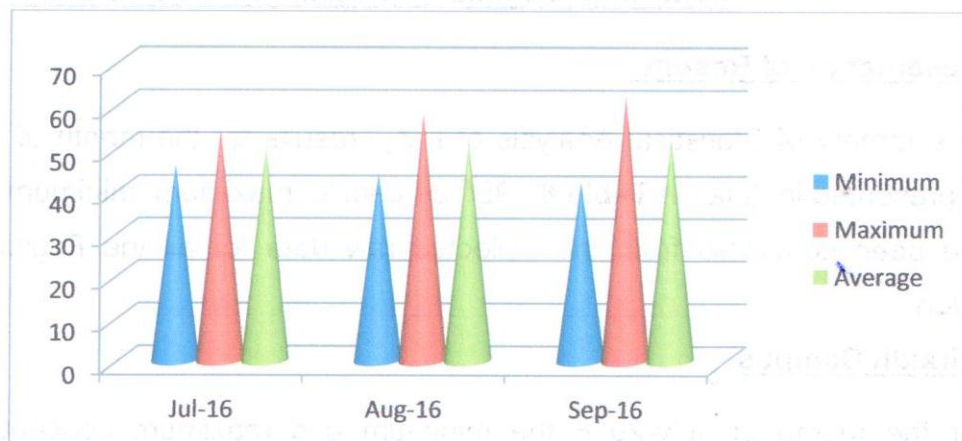
Graph:- Rajendrapur

Tatijharia Village

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

For the month of Aug-2016 the minimum and maximum concentrations for RSPM were recorded as $44 \mu\text{g}/\text{m}^3$ and $58 \mu\text{g}/\text{m}^3$ respectively and average concentration of $51 \mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for RSPM were recorded as $42 \mu\text{g}/\text{m}^3$ and $62 \mu\text{g}/\text{m}^3$ respectively and average concentration of $52 \mu\text{g}/\text{m}^3$.



Graph:- Tatijharia Village



Table 8
Statistical Analysis of PM_{2.5}

Location	Month & Year	Min.	Max.	Unit: $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98 th
Sairaidh Campus	July-2016	14	20	17	17	20
	Aug-2016	19	22	21	21	22
	Sept-2016	16	23	20	20	23
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 (July to Sept-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 July-2016 to Sept-2016 are presented in detail in Table 8. 98th percentile; maximum, minimum and average values have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2016 the minimum and maximum concentrations for PM_{2.5} were recorded as 14 $\mu\text{g}/\text{m}^3$ and 20 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 17 $\mu\text{g}/\text{m}^3$.

For the month of Aug-2016 the minimum and maximum concentrations for PM_{2.5} were recorded as 19 $\mu\text{g}/\text{m}^3$ and 22 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 21 $\mu\text{g}/\text{m}^3$.

For the month of Sept-2016 the minimum and maximum concentrations for PM_{2.5} were recorded as 16 $\mu\text{g}/\text{m}^3$ and 23 $\mu\text{g}/\text{m}^3$ respectively and average concentration of 20 $\mu\text{g}/\text{m}^3$.

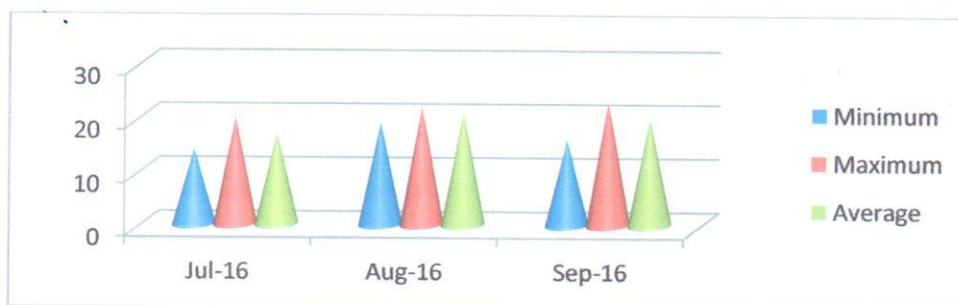




Table 9
Statistical analysis of SO₂

Location	Month & Year	Min.	Max.	Unit: $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	July-2016	8	11	10	10	11
	Aug-2016	9	13	11	11	13
	Sept-2016	7	9	8	8	9
New Kudag/Nr. Weigh Bridge	July-2016	6	10	8	8	10
	Aug-2016	8	11	10	10	11
	Sept-2016	8	11	10	10	11
Old Kudag/Mining Area	July-2016	9	14	12	12	14
	Aug-2016	10	12	11	11	12
	Sept-2016	9	12	11	11	12
Khas Kudag	July-2016	8	10	9	9	10
	Aug-2016	7	11	9	9	11
	Sept-2016	7	13	10	10	13
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Location	Month & Year	Min.	Max.	Unit: $\mu\text{g}/\text{m}^3$		
				A.M.	G.M.	98%
Buffer Zone :-						
Jaljali Village	July-2016	5	8	7	7	8
	Aug-2016	7	10	9	9	10
	Sept-2016	6	9	8	8	9
Samri Chowk/ Nr.Old Weigh Bridge	July-2016	8	11	10	10	11
	Aug-2016	9	12	11	11	12
	Sept-2016	7	11	9	9	11
Rajendrapur	July-2016	5	8	7	7	8
	Aug-2016	7	11	9	9	11
	Sept-2016	8	10	9	9	10
Tatijharia Village	July-2016	8	12	10	10	12
	Aug-2016	9	14	12	12	14
	Sept-2016	9	11	10	10	11
CPCB Standard				80 $\mu\text{g}/\text{m}^3$ (24 hrs)		

Conclusion:- A)

Sairaidh Campus Lease Area Core Zone:- For the Months of July-Aug-Sept-2016 Average of SO₂ is 8 $\mu\text{g}/\text{m}^3$.
New Kudag/Nr. Weigh Bridge Lease Area Core Zone:- For the Months of July-Aug-Sept-2016 Average of SO₂ is 9 $\mu\text{g}/\text{m}^3$.
Old Kudag/Mining Lease Area Core Zone:- For the Months of July-Aug-Sept-2016 Average of SO₂ is 11 $\mu\text{g}/\text{m}^3$.
Khas Kudag Lease Area Core Zone:- For the Months of July-Aug-Sept-2016 Average of SO₂ is 9 $\mu\text{g}/\text{m}^3$.
 Average Concentration of SO₂ within the Core Zone of Kudag Lease during this period (July-Aug-Sept-2016) is 10 $\mu\text{g}/\text{m}^3$ and it is within permissible limit as per CPCB Standard.

Conclusion:- B)

Jaljali Village Lease Area Buffer Zone :- For the Months of July-Aug-Sept -2016 Average of SO₂ is 8 $\mu\text{g}/\text{m}^3$.
Samri Chowk Lease Area Buffer Zone :- For the Months of July-Aug-Sept -2016 Average of SO₂ is 10 $\mu\text{g}/\text{m}^3$.
Rajendrapur Lease Area Buffer Zone :- For the Months of July-Aug-Sept -2016 Average of SO₂ is 8 $\mu\text{g}/\text{m}^3$.
Tatijharia Village Lease Area Buffer Zone :- For the Months of July-Aug-Sept-2016 Average of SO₂ is 11 $\mu\text{g}/\text{m}^3$.
 Average Concentration of SO₂ within the Buffer Zone of Kudag Lease during this period (Jul-Sep-2016) is 9 $\mu\text{g}/\text{m}^3$ and it is within permissible limit as per CPCB Standard.



2.6 Fugitive Emission (Core Zone):-

2.6.1 Presentation of Results.

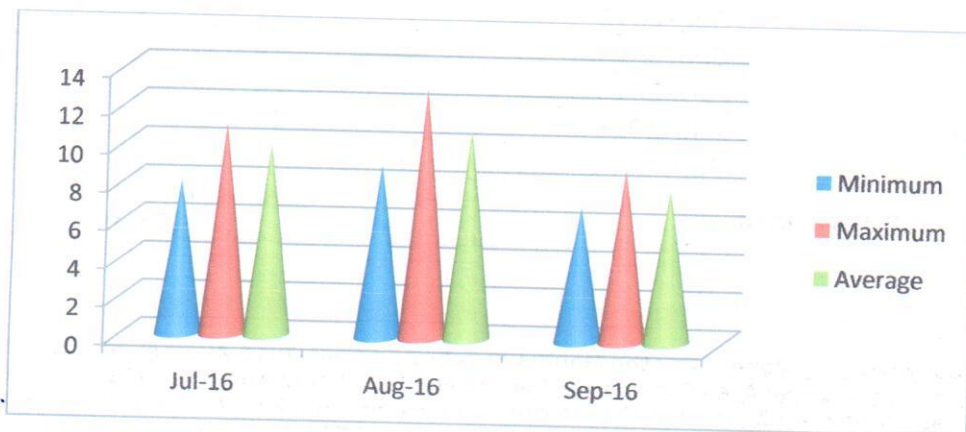
The summary of Statistical Analysis of SO₂ results for the month of July-2016 to 2016 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

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

For the month of Aug-2016 the minimum and maximum concentrations for SO₂ recorded as 9 µg/m³ and 13 µg/m³ respectively and average concentration of 11 µg/m³

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



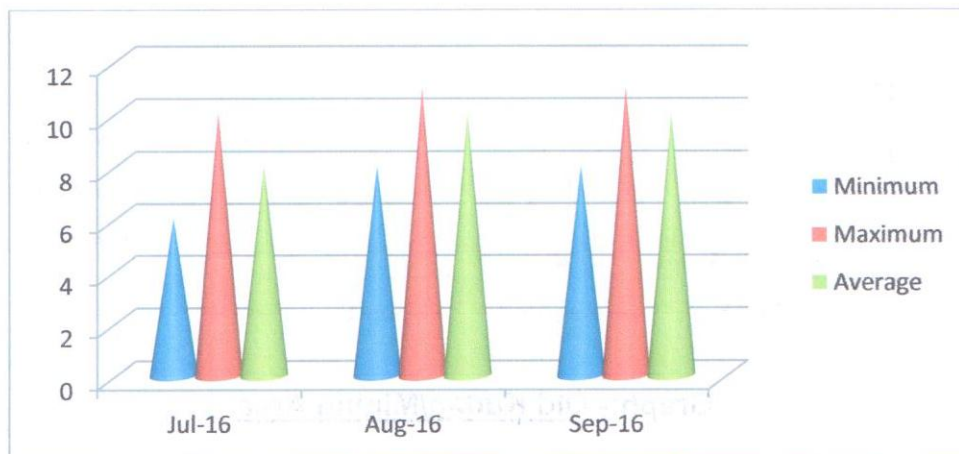
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of July-2016 the minimum and maximum concentrations for SO₂ were recorded as 6 µg/m³ and 10 µg/m³ respectively and average concentration of 8 µg/m³.

For the month of Aug-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 Sept-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.



Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

For the month of July-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.

For the month of Aug-2016 the minimum and maximum concentrations for SO₂ were recorded as 10 µg/m³ and 12 µg/m³ respectively and average concentration of 11 µg/m³.

For the month of Sept-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

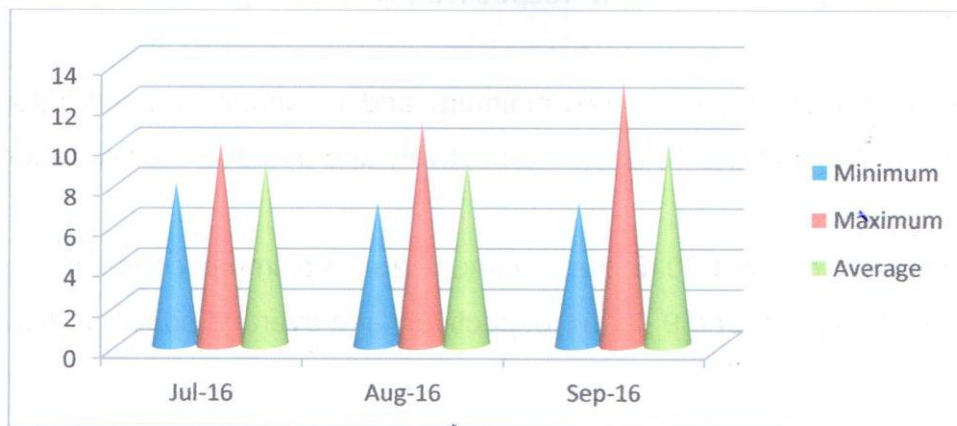


Khas Kudag

For the month of July-2016 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 10 µg/m³ respectively and average concentration of 9 µg/m³.

For the month of Aug-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 Sept-2016 the minimum and maximum concentrations for SO₂ were recorded as 7 µg/m³ and 13 µg/m³ respectively and average concentration of 10 µg/m³.



Graph:- Khas Kudag



2.7 Fugitive Emission (Buffer Zone):-

2.7.1 Presentation of Results.

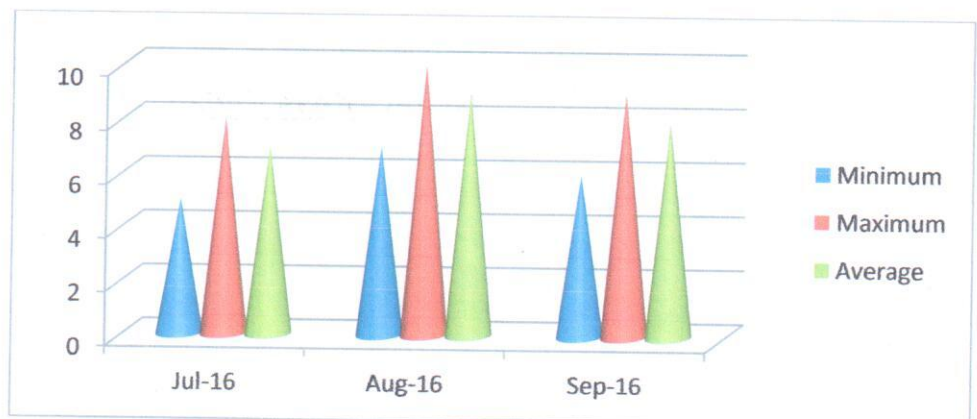
The summary of Statistical Analysis of SO₂ results for the month of July-2016 2016 are presented in detail in **Table 9**. 98th percentile; maximum, minimum and values etc have been computed from the collected raw data for all the Fugitive monitoring station.

Jaljali Village

For the month of July-2016 the minimum and maximum concentrations for S recorded as 5 µg/m³ and 8 µg/m³ respectively and average concentration of 7 µg/m³

For the month of Aug-2016 the minimum and maximum concentrations for S recorded as 7 µg/m³ and 10 µg/m³ respectively and average concentration of 9 µg/m³

For the month of Sept-2016 the minimum and maximum concentrations for S recorded as 6 µg/m³ and 9 µg/m³ respectively and average concentration of 8 µg/m³



Graph:- Jaljali Village

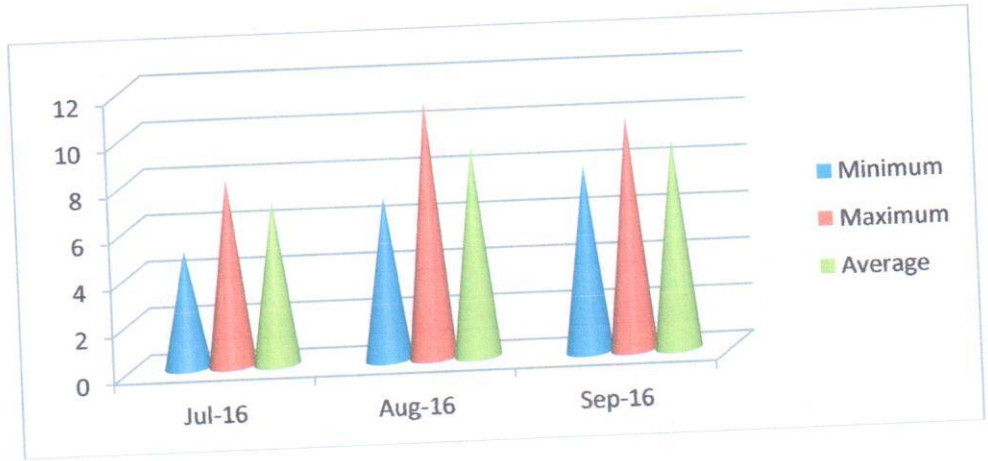


Rajendrapur

For the month of July-2016 the minimum and maximum concentrations for recorded as $5 \mu\text{g}/\text{m}^3$ and $8 \mu\text{g}/\text{m}^3$ respectively and average concentration of $7 \mu\text{g}/\text{m}^3$

For the month of Aug-2016 the minimum and maximum concentrations for recorded as $7 \mu\text{g}/\text{m}^3$ and $11 \mu\text{g}/\text{m}^3$ respectively and average concentration of $9 \mu\text{g}/\text{m}^3$

For the month of Sept-2016 the minimum and maximum concentrations for recorded as $8 \mu\text{g}/\text{m}^3$ and $10 \mu\text{g}/\text{m}^3$ respectively and average concentration of $9 \mu\text{g}/\text{m}^3$



Graph:- Rajendrapur

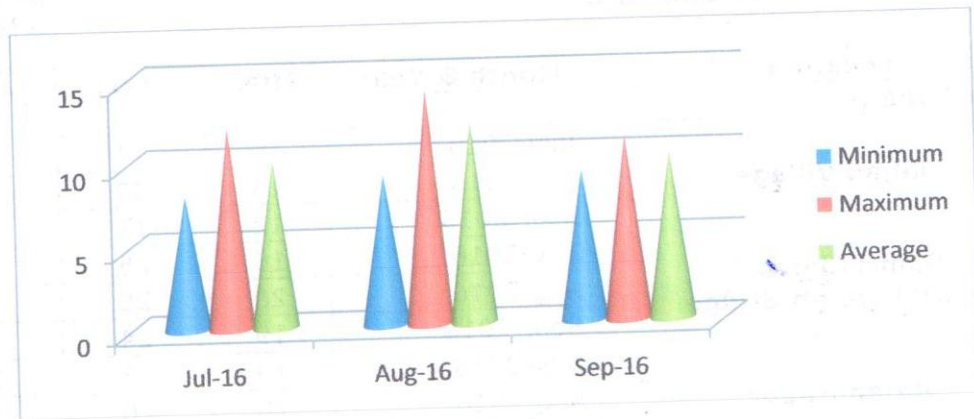


Tatijharia Village

For the month of July-2016 the minimum and maximum concentrations for SO₂ were recorded as 8 µg/m³ and 12 µg/m³ respectively and average concentration of 10 µg/m³.

For the month of Aug-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.

For the month of Sept-2016 the minimum and maximum concentrations for SO₂ were recorded as 9 µg/m³ and 11 µg/m³ respectively and average concentration of 10 µg/m³.



Graph:- Tatijharia Village


 <p>HINDALCO ADITYA BIRLA GROUP</p>	<p>Hindalco Industries Limited Kudag Mining Environmental Status Report for July-2016 To September-2016</p>	<p>Details of Sal Features</p>
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Table 10
Statistical Analysis of NOx

Location	Month & Year	Min.	Max.	A.M.	G.M.
Fugitive Emission (Core Zone):-					
Sairaidh Campus	July-2016	12	18	15	15
	Aug-2016	18	23	21	21
	Sept-2016	22	24	23	23
New Kudag/Nr. Weigh Bridge	July-2016	19	22	21	21
	Aug-2016	20	28	24	24
	Sept-2016	22	25	24	24
Old Kudag/Mining Area	July-2016	16	22	19	19
	Aug-2016	20	28	24	24
	Sept-2016	19	24	22	22
Khas Kudag	July-2016	18	23	21	21
	Aug-2016	19	26	23	23
	Sept-2016	16	23	20	20
CPCB Standard				80 µg/m³ (24 hrs)	

Location	Month & Year	Min.	Max.	A.M.	G.M.
Buffer Zone :-					
Jaljali Village	July-2016	19	24	22	22
	Aug-2016	18	20	19	19
	Sept-2016	12	17	15	15
Samri Chowk/ Nr.Old Weigh Bridge	July-2016	18	25	22	22
	Aug-2016	20	28	24	24
	Sept-2016	19	24	22	22
Rajendrapur	July-2016	19	23	21	21
	Aug-2016	16	20	18	18
	Sept-2016	17	20	19	19
Tatijharia Village	July-2016	20	24	22	22
	Aug-2016	21	25	23	23
	Sept-2016	20	26	23	23
CPCB Standard				80 µg/m³ (24 hrs)	

Conclusion: A)

- 1) **Sairaidh Campus Lease Area Core Zone:-** For the Months of July-Aug-Sept-2016 Average of NOx is 20 µg/m³
- 2) **New Kudag/Nr.Weigh Bridge Lease Area Core Zone:-** For the Months of July-Aug-Sept-2016 Average of NOx is 22 µg/m³
- 3) **Old Kudag/Mining Lease Area Core Zone:-** For the Months of July-Aug-Sept-2016 Average of NOx is 22 µg/m³
- 4) **Khas Kudag Lease Area Core Zone:-** For the Months of July-Aug-Sept-2016 Average of NOx is 21 µg/m³.

- The Average Concentration of NO_x within the Core Zone of Kudag Lease during this period (July-Aug-2016) is 21 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 July-Aug-Sept -2016 Average of NOx is 19 µg/m³
 - 2) **Samri Chowk Lease Area Buffer Zone :-** For the Months of July-Aug-Sept -2016 Average of NOx is 23 µg/m³
 - 3) **Rajendrapur Lease Area Buffer Zone:-** For the Months of July-Aug-Sept -2016 Average of NOx is 19 µg/m³
 - 4) **Tatijharia Village Lease Area Buffer Zone:-** For the Months of July-Aug-Sept -2016 Average of NOx is 23 µg/m³
- The Average Concentration of NO_x within the Buffer Zone of Kudag Lease during this period (July-Aug-2016) is 21 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.

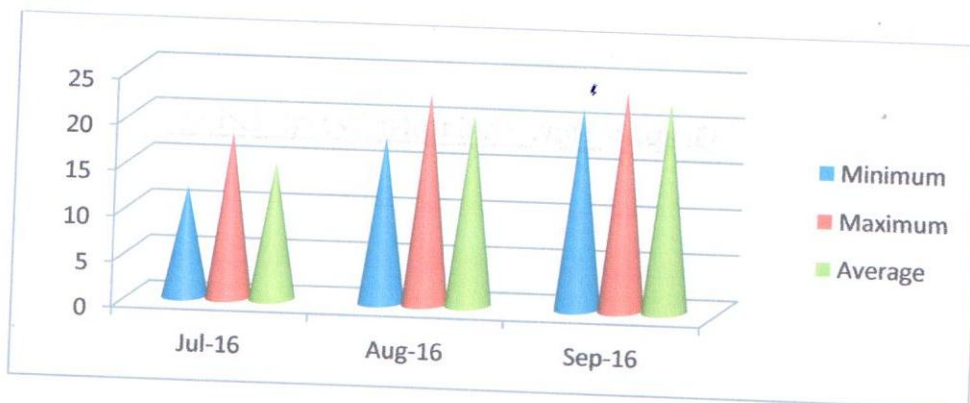
The summary of Statistical Analysis of NO_x results for the month of July-2016 to Sept-2016 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Sairaidh Campus

For the month of July-2016 the minimum and maximum concentrations for NO_x were recorded as 12 µg/m³ and 18 µg/m³ respectively and average concentration of 15 µg/m³.

For the month of Aug-2016 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 23 µg/m³ respectively and average concentration of 21 µg/m³.

For the month of Sept-2016 the minimum and maximum concentrations for NO_x were recorded as 22 µg/m³ and 24 µg/m³ respectively and average concentration of 23 µg/m³.



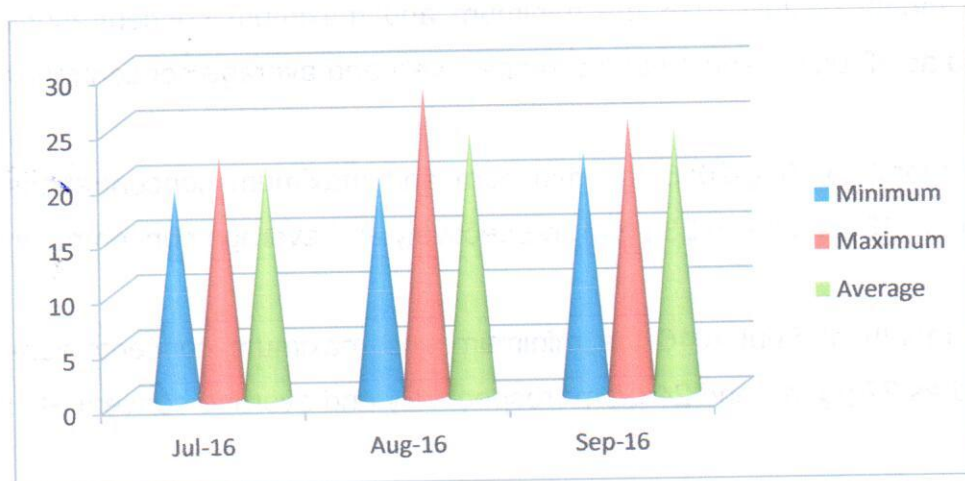
Graph :- Sairaidh Campus

New Kudag/Nr.Weigh Bridge

For the month of July-2016 the minimum and maximum concentrations for NO_x were recorded as 19 µg/m³ and 22 µg/m³ respectively and average concentration of 21 µg/m³

For the month of Aug-2016 the minimum and maximum concentrations for NO_x were recorded as 20 µg/m³ and 28 µg/m³ respectively and average concentration of 24 µg/m³

For the month of Sept-2016 the minimum and maximum concentrations for NO_x were recorded as 22 µg/m³ and 25 µg/m³ respectively and average concentration of 24 µg/m³



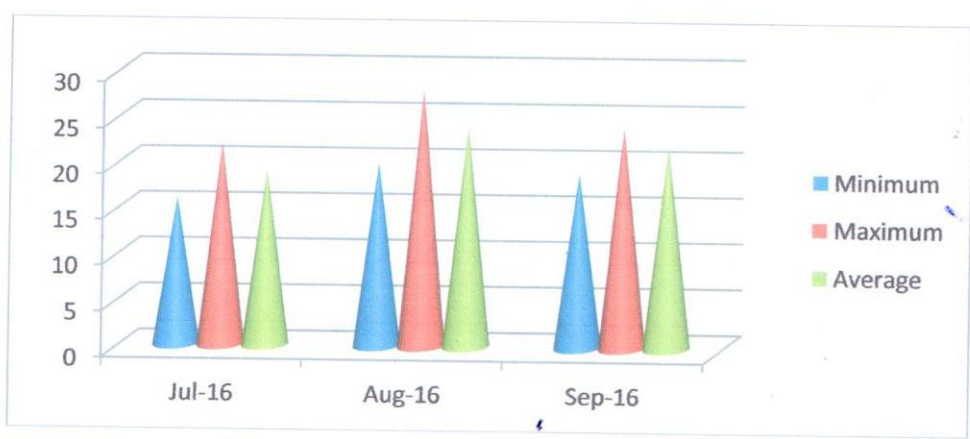
Graph:- New Kudag/Nr.Weigh Bridge

Old Kudag/Mining Area

For the month of July-2016 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 22 µg/m³ respectively and average concentration of 19 µg/m³.

For the month of Aug-2016 the minimum and maximum concentrations for NO_x were recorded as 20 µg/m³ and 28 µg/m³ respectively and average concentration of 24 µg/m³.

For the month of Sept-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.



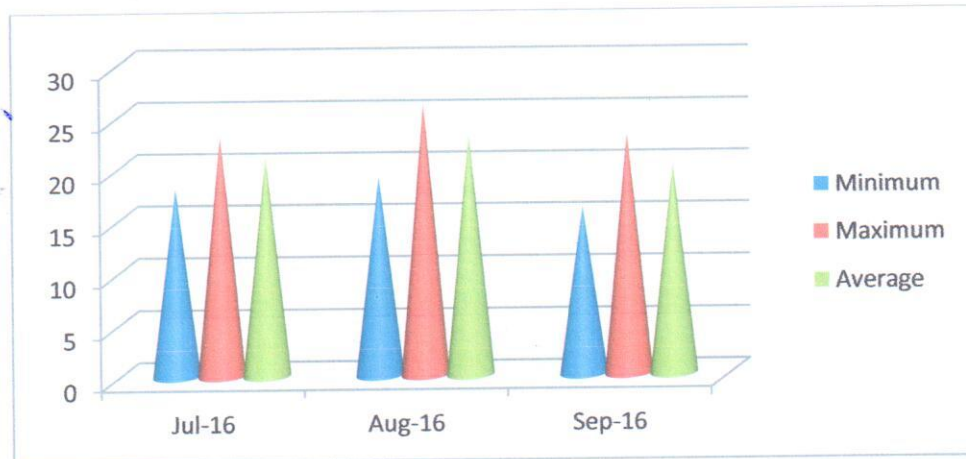
Graph:- Old Kudag/Mining Area

Khas Kudag

For the month of July-2016 the minimum and maximum concentrations for NO_x recorded as 18 µg/m³ and 23 µg/m³ respectively and average concentration of 21 µg/m³

For the month of Aug-2016 the minimum and maximum concentrations for NO_x recorded as 19 µg/m³ and 26 µg/m³ respectively and average concentration of 23 µg/m³

For the month of Sept-2016 the minimum and maximum concentrations for NO_x recorded as 16 µg/m³ and 23 µg/m³ respectively and average concentration of 20 µg/m³



Graph:- Khas Kudag

2.9 Fugitive Emission (Buffer Zone):-

2.9.1 Presentation of Results.

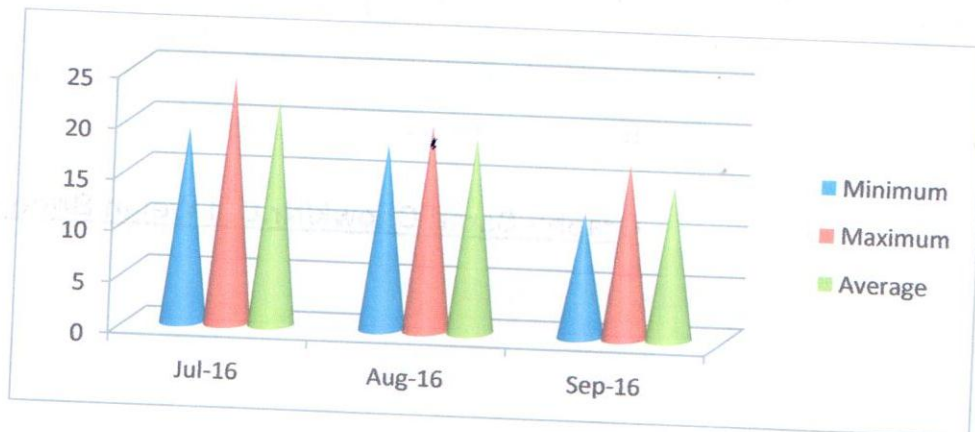
The summary of Statistical Analysis of NO_x results for the month of July-2016 to Sept-2016 are presented in detail in **Table 10**. 98th percentile; maximum, minimum and average values etc have been computed from the collected raw data for all the Fugitive emission monitoring station.

Jaljali Village

For the month of July-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 Aug-2016 the minimum and maximum concentrations for NO_x were recorded as 18 µg/m³ and 20 µg/m³ respectively and average concentration of 19 µg/m³.

For the month of Sept-2016 the minimum and maximum concentrations for NO_x were recorded as 12 µg/m³ and 17 µg/m³ respectively and average concentration of 15 µg/m³.



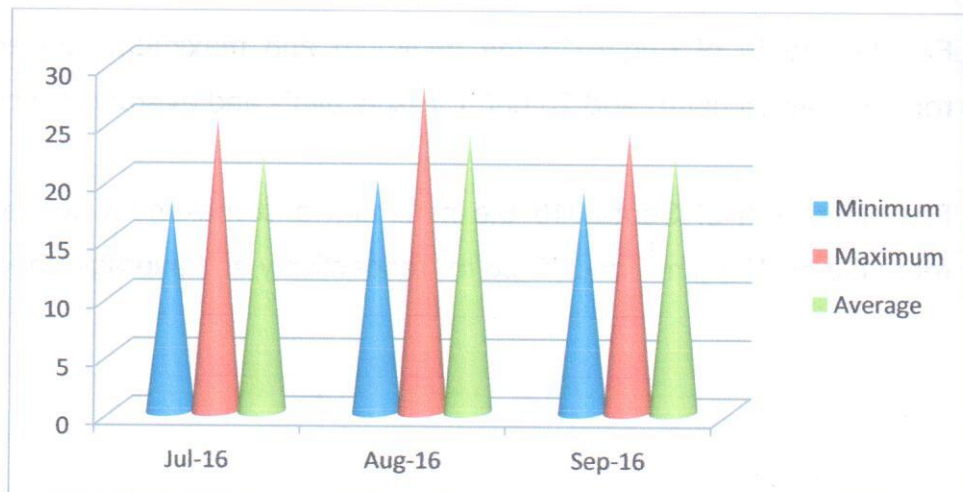
Graph:- Jaljali Village

Samri Chowk/Nr.Old Weigh Bridge

For the month of July-2016 the minimum and maximum concentrations recorded as $18 \mu\text{g}/\text{m}^3$ and $25 \mu\text{g}/\text{m}^3$ respectively and average concentration

For the month of Aug-2016 the minimum and maximum concentrations recorded as $20 \mu\text{g}/\text{m}^3$ and $28 \mu\text{g}/\text{m}^3$ respectively and average concentration

For the month of Sept-2016 the minimum and maximum concentrations recorded as $19 \mu\text{g}/\text{m}^3$ and $24 \mu\text{g}/\text{m}^3$ respectively and average concentration



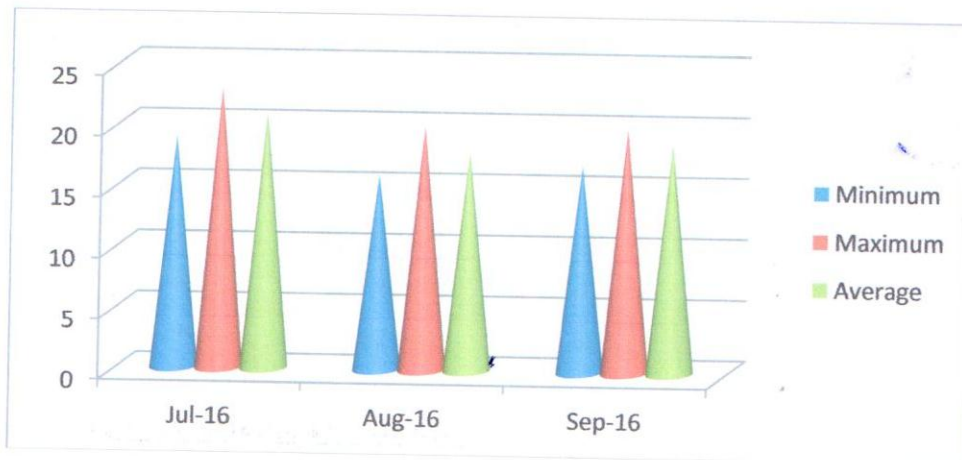
Graph:- Samri Chowk/Nr.Old Weigh Bridge

Rajendrapur

For the month of July-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 Aug-2016 the minimum and maximum concentrations for NO_x were recorded as 16 µg/m³ and 20 µg/m³ respectively and average concentration of 18 µg/m³.

For the month of Sept-2016 the minimum and maximum concentrations for NO_x were recorded as 17 µg/m³ and 20 µg/m³ respectively and average concentration of 19 µg/m³.



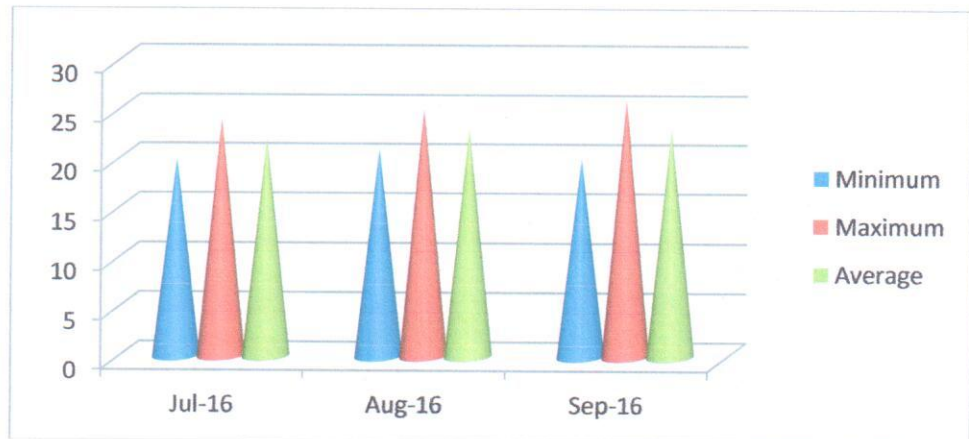
Graph:- Rajendrapur

Tatijharia Village

For the month of July-2016 the minimum and maximum concentrations for NO_x recorded as 20 µg/m³ and 24 µg/m³ respectively and average concentration of 22 µg/m³

For the month of Aug-2016 the minimum and maximum concentrations for NO_x recorded as 21 µg/m³ and 25 µg/m³ respectively and average concentration of 23 µg/m³

For the month of Sept-2016 the minimum and maximum concentrations for NO_x recorded as 20 µg/m³ and 26 µg/m³ respectively and average concentration of 23 µg/m³



Graph:- Tatijharia Village



Table 11
Statistical Analysis of Pb

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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98%ile
Fugitive Emission (Core Zone):-						
Sairaidh Campus	July-2016	0.019	0.023	0.021	0.021	0.023
	Aug-2016	0.016	0.020	0.018	0.018	0.020
	Sept-2016	0.015	0.018	0.017	0.017	0.018
New Kudag/Nr. Weigh Bridge	July-2016	0.019	0.024	0.022	0.022	0.024
	Aug-2016	0.022	0.026	0.024	0.024	0.026
	Sept-2016	0.018	0.023	0.021	0.021	0.023
Old Kudag/Mining Area	July-2016	0.024	0.028	0.026	0.026	0.028
	Aug-2016	0.023	0.032	0.028	0.028	0.032
	Sept-2016	0.020	0.030	0.025	0.025	0.030
Khas Kudag	July-2016	0.019	0.027	0.023	0.023	0.027
	Aug-2016	0.017	0.022	0.020	0.020	0.022
	Sept-2016	0.016	0.024	0.020	0.020	0.024
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	July-2016	ND	ND	ND	ND	ND
	Aug-2016	ND	ND	ND	ND	ND
	Sept-2016	ND	ND	ND	ND	ND
Samri Chowk/ Nr.Old Weigh Bridge	July-2016	ND	ND	ND	ND	ND
	Aug-2016	ND	ND	ND	ND	ND
	Sept-2016	ND	ND	ND	ND	ND
Rajendrapur	July-2016	ND	ND	ND	ND	ND
	Aug-2016	ND	ND	ND	ND	ND
	Sept-2016	ND	ND	ND	ND	ND
Tatijharia Village	July-2016	ND	ND	ND	ND	ND
	Aug-2016	ND	ND	ND	ND	ND
	Sept-2016	ND	ND	ND	ND	ND
CPCB Standard			1.0 $\mu\text{g}/\text{m}^3$ (24 hrs)			

Conclusion: A)

The Average Concentration of Pb within the Core Zone of Kudag Lease during this period (July to Sept-2016) is $0.022 \mu\text{g}/\text{m}^3$ 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 (July to Sept-2016) was not detected at any of the locations.



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

Location	Month & Year	Min.	Max.	A.M.	G.M.	98
Fugitive Emission (Core Zone):-						
Sairaidh Campus	July-2016	ND	ND	ND	ND	NI
	Aug-2016	ND	ND	ND	ND	NI
	Sept-2016	ND	ND	ND	ND	NI
New Kudag/Nr. Weigh Bridge	July-2016	ND	ND	ND	ND	NI
	Aug-2016	ND	ND	ND	ND	NI
	Sept-2016	ND	ND	ND	ND	NI
Old Kudag/Mining Area	July-2016	ND	ND	ND	ND	NI
	Aug-2016	ND	ND	ND	ND	NI
	Sept-2016	ND	ND	ND	ND	NI
Khas Kudag	July-2016	ND	ND	ND	ND	NI
	Aug-2016	ND	ND	ND	ND	NI
	Sept-2016	ND	ND	ND	ND	NI
Buffer Zone :-						
Jaljali Village	July-2016	ND	ND	ND	ND	NI
	Aug-2016	ND	ND	ND	ND	NI
	Sept-2016	ND	ND	ND	ND	NI
Samri Chowk/ Nr.Old Weigh Bridge	July-2016	ND	ND	ND	ND	NI
	Aug-2016	ND	ND	ND	ND	NI
	Sept-2016	ND	ND	ND	ND	NI
Rajendrapur	July-2016	ND	ND	ND	ND	NI
	Aug-2016	ND	ND	ND	ND	NI
	Sept-2016	ND	ND	ND	ND	NI
Tatijharia Village	July-2016	ND	ND	ND	ND	NI
	Aug-2016	ND	ND	ND	ND	NI
	Sept-2016	ND	ND	ND	ND	NI
CPCB Standard		---				

Conclusion: A)

The Average Concentration of Hg within the Core Zone of Kudag Lease during this period (July-2016 to Sept-2016) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.

Conclusion: B)

The Average Concentration of Hg within the Buffer Zone of Kudag Lease during this period (July-2016 to Sept-2016) was not detected at any of the locations and it is within permissible limits as per CPCB Standard.



Table 13
Statistical Analysis of As
Unit: ng/m³


Location	Month & Year	Min.	Max.	A.M.	G.M.	98%
Fugitive Emission (Core Zone):-						
Sairaidh Campus	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
New Kudag/Nr. Weigh Bridge	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
Old Kudag/Mining Area	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
Khas Kudag	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
Buffer Zone :-						
Jaljali Village	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
Samri Chowk/ Nr.Old Weigh Bridge	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
Rajendrapur	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
Tatijharia Village	July-2016	ND	ND	ND	ND	ND
	August-2016	ND	ND	ND	ND	ND
	September-2016	ND	ND	ND	ND	ND
CPCB Standard			06 ng/m³ (Annual)			

Conclusion: A)

The Average Concentration of As within the Core Zone of Kudag Lease during this period (July to September-2016) was not detected at any of the locations and it is within permissible limits as per CPCB Standard

Conclusion: B)

The Average Concentration of As within the Buffer Zone of Kudag Lease during this period (July to September-2016) was not detected at any of the locations and it is within permissible limits as per CPCB Standard

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Free Silica :-

Sr. No.	Location	Measurement Unit	July-2016		Aug-2016		Sept-2016	
			SPM	RSPM	SPM	RSPM	SPM	RSPM
1.	Old Kudag/Mining Area	g/100gm	0.19	0.11	0.26	0.18	0.24	0.15

Table 14
Dust fall rate

Sl.No.	Location	July-2016	Aug-2016	Sept-2016	Average
Rate (mt/km²/month)					
1	Old Kudag/Mining Area	19.6	24.7	28.1	24.1
2	Khas kudag	16.3	21.9	23.8	20.7

Table 15
Noise Level Monitoring

Sl. No.	Location	Unit: dB(A)					
		July-2016		Aug-2016		Sept-2016	
		Day	Night	Day	Night	Day	Night
Core Zone							
1	Sairaidh Campus	57.3	43.9	64.7	52.8	61.9	54.1
2	New Kudag/Near Weigh Bridge	61.7	56.3	59.3	48.2	63.8	52.1
3	Old Kudag/Mining Area	59.2	48.1	62.8	51.6	64.1	56.1
4	Khas Kudag	56.1	47.8	63.9	54.7	58.3	49.1
Buffer Zone							
1	Jaljali Village	51.7	42.6	46.3	38.1	52.9	41.1
2	Samri Chowk/Nr.Old Weigh Bridge	53.6	42.1	48.2	37.9	51.7	42.1
3	Rajendrapur	48.3	37.6	51.7	42.7	52.1	41.1
4	Tatijharia Village	52.1	41.7	49.3	37.6	51.4	38.1

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

Location	July-2016			Aug-2016			Sept-2016		
	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
New Kudag/Nr.Weigh Bridge	59.2	68.3	63.8	63.7	74.9	69.3	67.3	79.2	73.3



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

Table 16

Report on Chemical Examination of Ground Water

Location: GW1: 1) Old Kudag/Mining Area-September-2016

TEST RESULTS


Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)	
				Acceptable Limit	*Permissible Limit
1.	pH value		IS 3025 (Part 11)	6.5 to 8.5	No relaxation
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	0.3	No relaxation
7.	Free residual chlorine	mg/l	IS 3025 (Part 26)	Min. 0.2	Min. 1
8.	Total dissolved solids	mg/l	IS 3025 (Part 16)	500	2000
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5
10.	Cyanide (as CN)	mg/l	IS 3025 (Part 27)	0.05	No relaxation
11.	Chloride (as Cl)	mg/l	IS 3025 (Part 32)	250	1000
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3
20.	Mercury (as Hg)	mg/l	IS 3025 (Part 2)	0.001	No relaxation
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation
22.	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation
23.	Arsenic (as As)	mg/l	IS 3025 (Part 2)	0.01	0.05
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation
31.	Sulphide (as H ₂ S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation
32.	Chloramines (as Cl ₂)	mg/l	APHA 4500-Cl ₂ G	4.0	No relaxation

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.

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.

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
				Acceptable Limit	*Permissible Limit	
1.	Alpha-HCH	µg/l	USEPA 508	0.01	0.01	< 0.01
2.	Beta HCH	µg/l	USEPA 508	0.04	0.04	< 0.03
3.	Delta-HCH	µg/l	USEPA 508	0.04	0.04	< 0.03
4.	Alachlor	µg/l	USEPA 508	20	0.03	< 0.03
5.	Aldrin / Dieldrin	µg/l	USEPA 508	0.03	0.03	< 0.03
6.	Atrazine	µg/l	USEPA 1657	2	0.03	< 0.03
7.	Butachlor	µg/l	USEPA 508	125	0.03	< 0.03
8.	Chlorpyrifos	µg/l	USEPA 1657	30	0.03	< 0.03
9.	DDT and its isomers	µg/l	USEPA 508	1	0.03	< 0.03
10.	Gamma - HCH (Lindane)	µg/l	USEPA 508	2	0.03	< 0.03
11.	2,4-Dichlorophenoxyacetic acid	µg/l	USEPA 1657	30	0.03	< 0.03
12.	Endosulphan	µg/l	USEPA 508	0.4	0.03	< 0.03
13.	Ethion	µg/l	USEPA 1657	3	0.03	< 0.03
14.	Isoproturon	µg/l	USEPA 1657	9	0.03	< 0.03
15.	Malathion	µg/l	USEPA 1657	190	0.03	< 0.03
16.	Methyl Parathion	µg/l	USEPA 1657	0.3	0.03	< 0.03
17.	Monocrotophos	µg/l	USEPA 1657	1	0.03	< 0.03
18.	Phorate	µg/l	USEPA 1657	2	0.03	< 0.03
44. Pesticides residues						
Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
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	mg/l		0.1	No relaxation	Absent
	c. Bromodichloromethane	mg/l		0.06	No relaxation	Absent
	d. Chloroform	mg/l		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

(Cont.....)

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(Nalahs near Mining Area)
Sep-2016

Sr. No.	Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		7
				Acceptable Limit	*Permissible Limit	
1.	pH value	-	IS 3025 (Part 11)	6.5 to 8.5	No relaxation	8
2.	Turbidity	NTU	IS 3025 (Part 10)	1	5	
3.	Colour	Hazen units	IS 3025 (Part 4)	5	15	
4.	Odour	-	IS 3025 (Part 5)	Agreeable	Agreeable	
5.	Taste	-	IS 3025 (Part 8)	Agreeable	Agreeable	
6.	Iron (as Fe)	mg/l	IS 3025 (Part 2)	0.3	No relaxation	
7.	Free residual chlorine	mg/l	IS 3025 (Part 26)	Min. 0.2	Min. 1	
8.	Total dissolved solids	mg/l	IS 3025 (Part 16)	500	2000	
9.	Fluoride (as F)	mg/l	IS 3025 (Part 60)	1.0	1.5	
10.	Cyanide (as CN)	mg/l	IS 3025 (Part 27)	0.05	No relaxation	
11.	Chloride (as Cl)	mg/l	IS 3025 (Part 32)	250	1000	
12.	Total Alkalinity (as CaCO ₃)	mg/l	IS 3025 (Part 23)	200	600	
13.	Total hardness (as CaCO ₃)	mg/l	IS 3025 (Part 21)	200	600	
14.	Calcium (as Ca)	mg/l	IS 3025 (Part 40)	75	200	
15.	Magnesium (as Mg)	mg/l	IS 3025 (Part 46)	30	100	
16.	Sulphate (as SO ₄)	mg/l	IS 3025 (Part 24)	200	400	
17.	Nitrate (as NO ₃)	mg/l	APHA Method	45	No relaxation	
18.	Copper (as Cu)	mg/l	IS 3025 (Part 2)	0.05	1.5	
19.	Manganese (as Mn)	mg/l	IS 3025 (Part 2)	0.1	0.3	
20.	Mercury (as Hg)	mg/l	IS 3025 (Part 2)	0.001	No relaxation	
21.	Cadmium (as Cd)	mg/l	IS 3025 (Part 2)	0.003	No relaxation	
22.	Selenium (as Se)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	
23.	Arsenic (as As)	mg/l	IS 3025 (Part 2)	0.01	0.05	
24.	Aluminium (as Al)	mg/l	IS 3025 (Part 2)	0.03	0.2	
25.	Lead (as Pb)	mg/l	IS 3025 (Part 2)	0.01	No relaxation	
26.	Zinc (as Zn)	mg/l	IS 3025 (Part 2)	5	15	
27.	Nickel (as Ni)	mg/l	IS 3025 (Part 2)	0.02	No relaxation	
28.	Total Chromium (as Cr)	mg/l	IS 3025 (Part 2)	0.05	No relaxation	
29.	Barium (as Ba)	mg/l	Annexure F of IS 13428	0.7	No relaxation	
30.	Ammonia (as N)	mg/l	IS 3025 (Part 34)	0.5	No relaxation	
31.	Sulphide (as H ₂ S)	mg/l	IS 3025 (Part 29)	0.05	No relaxation	
32.	Chloramines (as Cl ₂)	mg/l	APHA 4500-Cl ₂ G	4.0	No relaxation	



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Details of Salient Features

(Contd.....)

Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
			Acceptable Limit	*Permissible Limit	
Molybdenum (as Mo)	mg/l	IS 3025 (Part 2)	0.07	No relaxation	< 0.001
Silver (as Ag)	mg/l	Annexure J of IS 13428	0.1	No relaxation	< 0.001
Polychlorinated Biphenyls (PCB)	µg/l	USEPA 508	0.5	No relaxation	< 0.03
Boron (as B)	mg/l	IS 3025 (Part 2)	0.5	1.0	< 0.1
Mineral Oil	mg/l	IS 3025 (Part 39)	0.5	No relaxation	< 0.001
Tri Halo Methane					
a. Bromoform					
b. Dibromochloromethane					
c. Bromodichloromethane					
f. Chloroform	mg/l	APHA 6232	0.1	No relaxation	Absent
Phenolic compounds as C ₆ H ₅ OH)	mg/l	IS 3025 (Part 43) :1001	0.1	No relaxation	Absent
anionic detergents as MBAS)	mg/l	IS 13428:2005 (Annex K)	0.06	No relaxation	Absent
Polynuclear aromatic hydrocarbon (PAH)	mg/l	USEPA : 550	0.2	No relaxation	Absent
Total coliform	µg/l	IS 1622	0.001	0.002	< 0.001
Escherichia coli	MPN/100 ml Per100 ml	IS 1622	0.2	1.0	< 0.001
		IS 1622	0.1	No relaxation	< 0.03
			---	---	1600 Present
			Absent	Absent	
Test Parameter	Measurement Unit	Test Method	As per IS 10500 : 2012 (Drinking Water - Specification)		Test Result
Pesticides residues					
alpha-HCH	µg/l	USEPA 508	0.01		< 0.01
gamma-HCH	µg/l	USEPA 508	0.04		< 0.03
delta-HCH	µg/l	USEPA 508	0.04		< 0.03
Endrin	µg/l	USEPA 508	20		< 0.03
DDT / Dieldrin	µg/l	USEPA 1657	0.03		< 0.03
Chlorobenzene	µg/l	USEPA 508	2		< 0.03
Chlorobenzene Isomers	µg/l	USEPA 1657	125		< 0.03
alpha-HCH (Lindane)	µg/l	USEPA 508	30		< 0.03
Chlorophenoxyacetic acid	µg/l	USEPA 508	1		< 0.03
Alphanaphthalene	µg/l	USEPA 1657	2		< 0.03
Benzenes	µg/l	USEPA 508	30		< 0.03
Chlorobenzene	µg/l	USEPA 1657	0.4		< 0.03
Parathion	µg/l	USEPA 1657	3		< 0.03
Malathion	µg/l	USEPA 1657	9		< 0.03
Phosphos	µg/l	USEPA 1657	190		< 0.03
	µg/l	USEPA 1657	0.3		< 0.03
	µg/l	USEPA 1657	1		< 0.03
	µg/l	USEPA 1657	2		< 0.03

1. Only the tested sample only. 2. Test report should not be reproduced partially. 3. *Permissible limit in the absence of '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. Results for test no. 7 are not applicable.

Upon request of the party, sample was tested for above mentioned parameters only.



Table 18

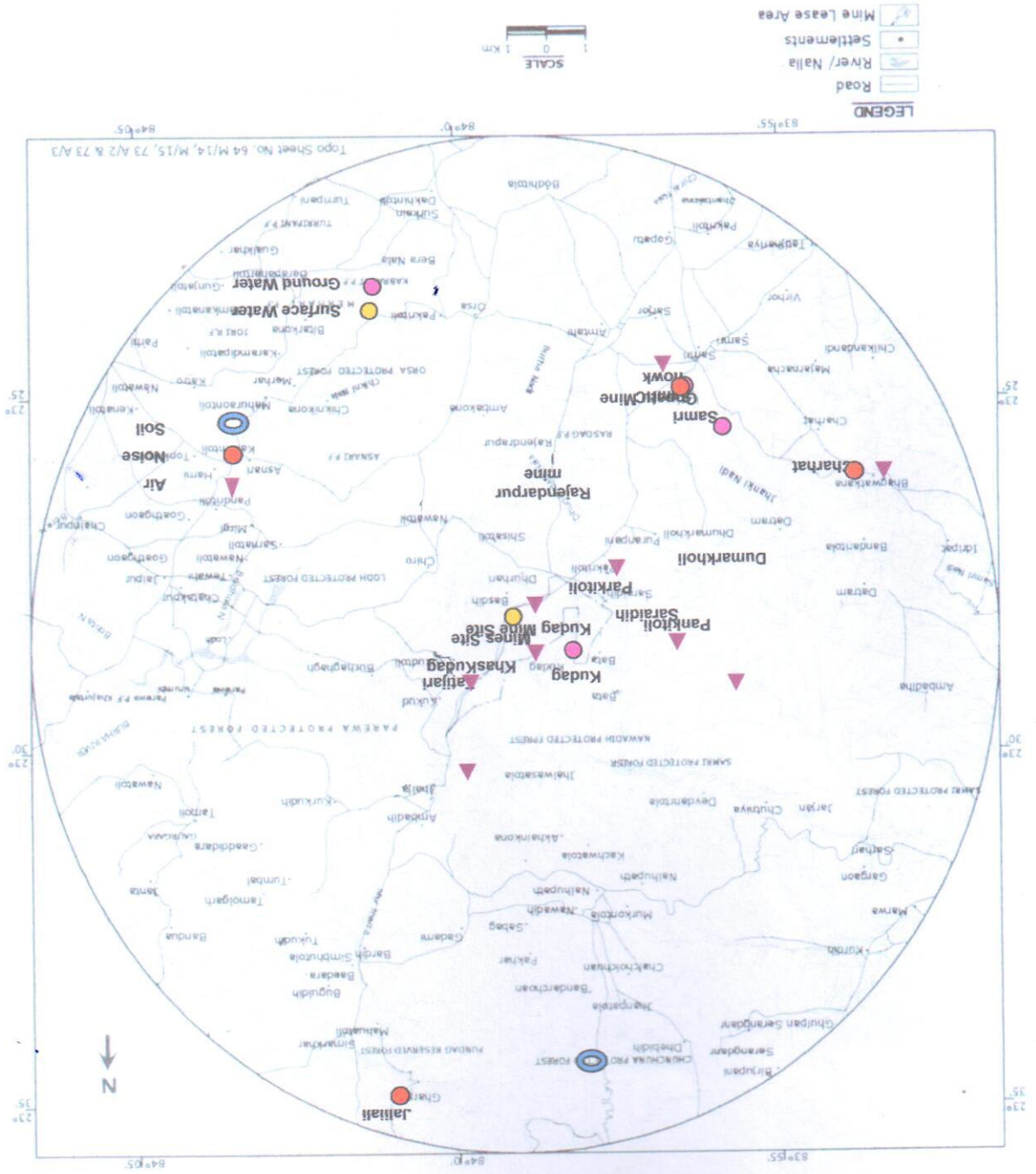
Report on Soil Analysis, Kudag
Date of collection: Sep-2016
Sample Location:(Old Kudag/Mining Area)

Sr. No.	Test Parameter	Measurement Unit	S1 Old Kudag/Mining Area
1.	PH (1:5 water extract)	-	6.73 at 26°C
2.	Electrical Conductivity at 25°C (1:5 water extract)	µs/cm	281
3.	Texture	-	Silty Clay
4.	Sand	%	31
5.	Slit	%	46
6.	Clay	%	23
7.	Water Holding Capacity	%	51.62
8.	Bulk Density	g/cc	1.21
9.	Porosity	%	18.74
10.	Exchangeable Calcium (as Ca)	mg/Kg	112.58
11.	Exchangeable Magnesium (as Mg)	mg/Kg	9.26
12.	Exchangeable Manganese (as Mn)	mg/Kg	5.18
13.	Exchangeable Zinc (as Zn)	mg/Kg	0.84
14.	Available Boron (as B)	mg/Kg	0.16
15.	Water Soluble Chloride (as Cl ⁺)	mg/Kg	218.72
16.	Water Soluble Sulphate (as SO ₄)	mg/Kg	121.64
17.	Available Potassium (as K)	mg/Kg	63.27
18.	Available Phosphorous (as P)	Kg/hect	1.94
19.	Available Nitrogen (as N)	Kg/hect	136
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	0.21
24.	Total Iron	mg/Kg	4.16
25.	Organic Matter	g/100g	1.49
26.	Organic Carbon	g/100g	0.93
27.	CEC	meq/100g	12.4

Note: 1. Results relate to tested sample only. 2. Test report should not be reproduced partially. 3. 'mg/Kg 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



Hindalco Industries Ltd.
Mines Division, Samri

Lease wise Details 2016-17 (Up to September 2016)

Lease	Mined Out Area (Hact.)	Reclaimed Area (Hact.)	Nos. of Sapling	Area of Sapling (Hact.)
Samri	6.861	4.215	9110	3.700
Kudag	1.593	0.500	4390	2.800
Tatijharia	5.541	2.880	5950	2.400
Total	13.995	7.595	19450	8.900


Agent of Mines
Samri Mines Division
Hindalco Industries Ltd