ACC Limited
P.O. Jamul Cement Works
Dist. Durg - 490 024
Chhattisgarh, India
Phone +91 788 2285581 to 84
Fax +91 788 2382585
www.acclimited.com

March 16, 2016
JL/ENV/ /16/19

The Director,
Ministry of Environment, Forest & Climate Change
Impact Assessment Division
3rd Floor, Vayu Wing,
Indira Paryavaran Bhawan,
Jorbag Road, Aliganj,
New Delhi – 110 003

Kind Attn : Dr. U. Sridharan (Scientist 'F')

Sub : Nandini Khundini Limestone Mines of M/s ACC Limited located at Village Nandini Khundini, Tehsil Dhamdha, Dist. Durg, Chhattisgarh (53.57 ha; 0.15 MTPA to 1.03 MTPA) – Additional Information regarding.

Dear Sir,

This has reference to the above mentioned subject and vide MoEF letter no. F.No. J-11015/338/2013-IA.II (M) dtd. 4th March 2016 based on the discussion of EAC meeting held on dtd. February 23-25, 2016 please find point wise additional information as requested. The information has been furnished by incorporating in the EIA report and uploaded on the MoEF&CC website. The details are as follows :

Sl no.	Additional Information requested by MoEF	ACC Submission
1	The complete EIA report along with mine plan shall be uploaded on the MoEFCC website.	EIA report incorporating questionnaire and mining plan is uploaded on the MoEF & CC Web site.
2	The Questionnaire needs to be submitted and uploaded on the website.	EIA report incorporating questionnaire is uploaded on the MoEF & CC Web site.
3	The Action Plan along with budgetary provision on the issues raised during the Public Hearing shall be submitted.	The Action Plan along with budgetary provision on the issues raised during the Public Hearing is incorporated in the EIA report. Revised EIA report is enclosed on the MoEF&CC web site.
4	Drainage and Canals passing through mine lease may get affected, Mine lease area land is being used for Grazing, Funeral and the repairing of Main Road from Nandini Khundini and a school will get affected by Blasting. A detailed report with measures to be adopted in this regard shall be submitted.	All the points are addressed in the EIA report, under "Reply to the public hearing points".
5	The list of species selected for plantation in green belt includes the invasive alien species.	

	A revised list of fruit bearing/medicinal native species beneficial to the locals shall be submitted. The list shall also clearly mention the benefits of each species to the locals.	A revised list of fruit bearing/medicinal native species beneficial to the locals along with its benefits of each species to the locals is updated in the EIA report.
6	The copy of approved mine plan/scheme shall be submitted	Soft copy of the approved mining plan is uploaded on the MoEF&CC web site. Hard copy mining plan is being submitted along with this letter.

Hope you may find the required information in order as requested.

Thanking you,

Yours Faithfully,
For ACC Limited

Sunil Gupta
Cluster Head
Jamul Cement Works

ACC LIMITED

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Capacity Enhancement of Nandini Khundini Limestone Mines

From 0.15 MTPA to 1.03 MTPA

Mining Lease Area: 53.57 ha
(No increase in ML Area)
at
Village: Nandini Khundini
Tehsil: Dhamda, District: Durg
(Chhattisgarh)

Prepared By

EMTRC Consultants Private Limited
(NABET Accredited, MoEF Recognized Laboratory, ISO 9001, OHSAS 18001)
P-501, Anupam Apartments, East Arjun Nagar, Delhi 32
Website- www.emtrc.com
email-emtrcjkm@gmail.com, moitra@emtrc.com

AUGUST 2015 (Revised March 2016)

ACC Limited
PO Jamul Cement Works
Dist. Durg - 490 024
Chhattisgarh, India

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UNDERTAKING

(as per OM No. J.11013/41/200/IA-II (I) dt. 5-10-2011
Ministry of Environment & Forests, Govt. of India)

The Final EIA Report has been prepared by EMTRC Consultants Private Limited, Delhi for the proposed Capacity Enhancement of Nandini Khundini Limestone Mines from 0.15 MTPA to 1.03 MTPA of ACC Limited at Village Nandini Khundini, Tehsil Dhamdha, District Durg, Chhattisgarh. The Terms of Reference for preparation of EIA was issued by the Expert Appraisal Committee vide Letter No.J.11015/338/2013-IA.II (M), 9th January 2014. Public Hearing was done on 19-3-2015. Views, suggestions and comments of the public are included in the Final EIA Report.

Information and data on Mine Plan,Project Technical Details, Ownership, Land, Water,Pollution Mitigation Measures, Project Cost and Sections & Plans/Maps used in this EIA Report has been given by ACC Limited. The Final EIA Report is approved by ACC Limited for submission to MoEF & CC for final appraisal and accord of Environmental Clearance. The Final EIA Report complies with all the points mentioned in the TOR prescribed by EAC-MoEF Delhi. EMTRC has generated the baseline environmental data for this project and conducted the impact assessment and prepared EMP based on information supplied by ACC Limited.

We hereby submit this undertaking on the 24th day of August 2015, as per MOEF's OM dated 5-10-2011 that the contents and information submitted in this EIA report is owned by ACC Limited. We also state that no litigation or court case is pending against this project in any court of law or tribunal. We also state that the data submitted in this EIA Report is true and factually correct.

Cluster Head
Jamul Cement Works
ACC Limited

Recognized by Ministry of Environment & Forests, Govt. of India
Vide Gazette Notification, SO 592 (E) 8/3/2013 to 7/3/2018
NABET Accredited EIA Firm
ISO 9001:2008
OHSAS 18001:2007

EMTRC CONSULTANTS PRIVATE LIMITED

16-03.2016

CERTIFICATE

The Final EIA Report has been prepared by EMTRC Consultants Private Limited, Delhi for Capacity Enhancement of Nandini Khundini Limestone Mines from 0.15 MTPA to 1.03 MTPA of ACC Limited at Village Nandini Khundini, tehsil Dhamdha, District Durg, Chhattisgarh. The Terms of Reference for preparation of EIA was issued by the Expert Appraisal Committee vide Letter No.J.11015/338/2013-IA.II (M), 9th January 2014. Public Hearing was done on 19-3-2015. This revised Final EIA report incorporates the points mentioned by MOEF in its letter dated 4-3-2016. Issues raised during the Public Hearing are included in the Final EIA Report and Action Plan with separate budget prepared by ACC Ltd is given in the Questionnaire.

Information and data given in Chapter 1 and 2 (Mine Plan, Project Technical Details, Ownership, Land, Water, Pollution Mitigation Measures, Project Cost and Sections & Plans/Maps) of EIA Report has been given by ACC Limited. The Final EIA Report complies with all the points mentioned in the TOR prescribed by MOEF. EMTRC has generated the baseline environmental data, done the impact assessment and prepared EMP. The baseline environmental data given in Chapter 3 of EIA Report is true and factually correct.

DR. J.K.MOITRA
MANAGING DIRECTOR

Issue and Revision Record

Ref.	Date	EMTRC Consultants Pvt. Ltd EIA Coordinator	ACC Limited Approved by	Remarks
10/ 2015	24/08/2015 16/03/2016	Dr. J. K. Moitra	Dr. Vinay Kapur	Final EIA Report (Revised)

Registered Office :P-501, Anupam Apartments, East Arjun Nagar, Delhi-110032 (For all Correspondence)
Laboratory :F-66, Road No 2, Phase–I UPSIDC Industrial Area, Masuri Gulawthi Road, Ghaziabad - 201009 (UP)
Director's Office :ANSAL PLAZA, UM –113A, Near Vaishali Metro Station, Ghaziabad - 201010 (UP)
Telefax :011- 22301172, Mobile: 09810032481
E - mail :emtrcjkm@rediffmail.com, moitra@emtrc.com Website: www.emtrc.com

National Accreditation Board
for Education and Training

NABET

NABET/EIA/RA007/002

April 28, 2014

The Chairman and MD
EMTRC Consultants Private Limited
P-501, Anupam Apartments
East Arjun Nagar, Delhi - 110032
(Kind Attention: **Dr. Jayanta Kumar Moitra**)

Dear Sir,

Sub: Re-Accreditation

This has reference to your application to QCI-NABET for re-accreditation (RA) as EIA Consultant Organization and the assessment carried for same in your organization from December 09-11, 2013.

We are pleased to inform you that based on the document and office assessments during RA, the Accreditation Committee has approved renewal of accreditation w.e.f. December 11, 2013 for a period of three years. The accreditation given to your organization is subject to coverage of balance Functional areas and specific response to NCs/Obs./Alerts issued (Refer Annexure III) with the following details:

1. Annexure I - Scope of accreditation
2. Annexure II - List of experts with approved sectors/ functional areas
3. Annexure III - Non-Conformances/ Observations/ Alerts (NCs/ Obs./ Alerts)
4. Annexure IV - Observations on Quality Management System (QMS)
5. Annexure V - Terms and conditions of accreditation
6. Annexure VI - Result of assessment
7. Annexure VII - Guidelines for addressing Major Non-Conformances/ Observations/ Alerts
8. Annexure VIII - Format to be followed for mentioning the names of the experts involved in EIA reports prepared by EMTRC Consultants Private Limited.

Result of RA including Non-Conformances/ Observations/ Alerts (NCs/ Obs./ Alerts) applicable to your organization as per RA are also posted on QCI website vide minutes of the Accreditation Committee meeting dated December 18, 2013. You are requested to take necessary actions to close the NCs/ Obs. as per guidelines and timeframe mentioned in Annexure VII of this letter.

You are required to make all payments to NABET as applicable, within one month from the date of invoice sent to you. Continuation of this accreditation of your organization is subject to the clearance of all dues by your organization, satisfactory compliance to Annexure III and V.

With best regards,

Yours sincerely,

(Vipin Sahni)
C.E.O.

Institution of Engineers Building, 2nd Floor, Bahadur Shah Zafar Marg, New Delhi - 110 002, India
Tel. : +91-11-2337 9321, 2337 8057 Fax : +91-11-2332 3415 e-mail : nabet@qcin.org Website : www.qcin.org

Scope of Accreditation **Annexure I**

NAME OF THE CONSULTANT ORGANIZATION: **EMTRC Consultants Private Limited**
P-501, Anupam Apartments
East Arjun Nagar, Delhi – 110032

Sl. No.	Sector number		Name of Sector	Category A/B
	As per MoEF Notification	As per NABET Scheme		
1.	1 (a) (i)	1	Mining of minerals including Opencast/ underground mining	A
2.	1 (d)	4	Thermal Power Plants	A
3.	2 (a)	6	Coal washeries	A
4.	3 (a)	8	Metallurgical industries (ferrous & non ferrous) – both primary and secondary	A
5.	3 (b)	9	Cement plants	A
Total = 05 Sectors *Individual EIA Coordinators approved for different sectors are mentioned in Annexure II*				

(Vipin Sahni)
C.E.O.

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 8th March, 2013

S.O. 592(E).— In exercise of the powers conferred by clause (b) of sub-section (1) of section 12 and section 13 of the Environment (Protection) Act, 1986 (29 of 1986) read with rule 10 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the notification of the Government of India in the Ministry of Environment and Forests, number S.O. 1174(E), dated the 18th July, 2007, namely :-

In the Table appended to the said notification,-

(a) for serial numbers 23 and 50 and the entries relating thereto, the following serial numbers and entries shall respectively be substituted, namely :-

(1)	(2)	(3)	(4)
"23	M/s VITRO LABS #2-2-647/A/3, 3rd Floor, Shivam Road,New Nallakunta Hyderabad - 500013. (Andhra Pradesh)	(1) Mr. CH. Narasimha Rao (2) Mr. K. Venkateshwar Reddy (3) Mr. k. Satish Kumar	8.03.2013 to 7.03. 2018
50	M/s Shiva Test House, 1st Floor, Rajhans Niketan Near Canal, Rukunpura Bailey Road, Patna-800 014 (Bihar)	(1) Dr. Shibeswar Prasad (2) Dr. (Mrs.) Shreyasee Prasad (3) Mr. Rajeev Kumar	8 .03.2013 to 7 .03. 2018"

(b) after serial number 105 and the entries relating thereto, the following serial numbers and entries shall be inserted, namely :-

(1)	(2)	(3)	(4)
"106	M/s Chandigarh Pollution Testing Laboratory, Plot No. E-126, Phase VII, Industrial Area, Mohali -160055. (Punjab)	(1) Mr. Sital Singh (2) Mrs. Rashmi Bansal (3) Mrs. Manju Bhatti	8.03.2013 to 7.03. 2018
107	M/s EMTRC Laboratory, EMTRC Consultants Pvt. Ltd., F-66, Road No.2, Phase-1, UPSIDC Industrial Area, Masuri Gulawthi Road, Ghaziabad – 201009 (Uttar Pradesh),	(1) Dr. Jayanta Kumar Moitra (2) Mr. Ratnesh Kotiyal (3) Mr. Mukesh Kumar	8.03.2013 to 7.03. 2018"

[F. No. Q. 15018/7/2003-CPW]

Dr. RASHID HASAN, Adviser

Note :— The principal notification was published in the Gazette of India, Extraordinary vide number S.O. 1174 (E), dated the 18th July, 2007 and subsequently amended vide notification numbers S.O. 1539 (E), dated the 13th September, 2007, S.O.1811(E), dated the 24th October, 2007, S.O.55(E), dated 9th January, 2008, S.O.428(E), dated the 4 th March, 2008, S.O.No.865(E) dated the 11th April, 2008, S.O.1894(E) dated the 31st July,2008, S.O.2728(E) dated the 25 th November, 2008, S.O.1356(E) dated the 27 th May, 2009, S.O.1802(E) dated the 22nd July, 2009 and S.O.2399(E), dated the 18th September, 2009, S.O.3122(E), dated the 7th December, 2009 and S.O.3123(E), dated the 7th December, 2009, S.O.No.142(E), dated the 21st January, 2010, S.O.619(E), 19th March, 2010, S.O.1662(E) dated the 13rd July,2010, S.O.2390(E), dated the 30th September, 2010, S.O.2904(E), dated the 8th December, 2010, S.O.181(E), dated the 28th January, 2011, S.O. 692(E), dated the 5th April, 2011, S.O.1537(E), dated the 6th July,2011 , S.O.1754(E), dated the 28th July,2011 S.O.2609 (E) dated the 22nd November, 2011, S.O.264 (E), dated the 13 February, 2012, S.O.1150(E), dated the 22nd May, 2012, S.O.2039(E), dated the 5th September,2012, S.O. 2802(E) dated the 27 th November, 2012 and S.O. 2850(E), dated the 7th December, 2012

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APPENDIX 1 : TOR ISSUED BY MOEF&CC AND POINT-WISE COMPLIANCE

By Speed Post

No. J-11015/338/2013-IA.II (M)
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110 003

Dated the 09th January, 2014

To

M/s. ACC Ltd.
Jamul Cement Works
P.O. Jamul Cement Work
District Durg,
Chhattisgarh-490024

Subject: Nandini Khudini Limestone Mines of M/s. ACC Ltd. Located at Village NandiniKhundini, Tehsil Dhamdha, distt. Durg, Chhattisgarh. (53.57ha)(0.15 to 1.03 MTPA) -TOR regarding.

The Proposal was received in the Ministry on 27.08.2013. The Proposal is to determine the Terms of Reference for which the proponent had submitted information in the prescribed format (Form-1) along with Pre-feasibility report.

2. The proposal is for enhancement of limestone production from 015 to 1.03 MTPA from the mine lease area of 53.57 ha. The Mine Lease area is located at Village Nandini Khundini, Tehsil Dhamdha, distt. Durg, Chhattisgarh. The Mine Lease area is between 21°22'48.2"- 21°23'20.6"N to 81°23'9.8"- 81°23'16"E. The entire lease area falls in non-forest area. The mining will be conventional opencast mechanized. Drilling will be done by deep hole track mounted drill machine. Blasting will be done by NONEL. Blasted material will be loaded with hydraulic shovel and front end loader into tippers. The loaded material will be transported by tippers to JCW. The water requirement would be about 20 KLD.

3. It was reported by the PP that there is no wildlife sanctuary/tiger reserve/national park, etc within the 10 km radius area around the mine lease. Shivnath and Amner river flows within 10 km area of the mines.

4. The proposal was placed before Expert Appraisal Committee in its 13th meeting held during, 12th November, 2013, the Committee prescribed the following TORs for undertaking detailed EIA study:

1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 came into force w.r.t. the highest production achieved prior to 1994.
2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.

3) All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of the lessee.

4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/toposheet should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).

5) Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large may also be detailed in the EIA report.

6) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.

7) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc should be for the life of the mine / lease period.

8) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.

9) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.

10) A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.

11) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.

12) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.

13) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.

14) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly detailed mitigative measures required, should be worked out with cost implications and submitted.

15) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Tiger/Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the State Wildlife Department/Chief Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished.

16) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.

17) Proximity to Areas declared as 'Critically Polluted' or the Project areas attracting court restrictions for mining operations should also be indicated and where so required, clearance/ certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.

18) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village located in the mine lease area will be shifted or not. The issues relating to shifting of Village including their R&R and socio-economic aspects should be discussed in the report.

19) One season (non-monsoon) primary baseline data on ambient air quality (PM10, SO2 and NOx), water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The

mineralogical composition of PM10, particularly for free silica, should be given.

20) Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.

21) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.

22) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.

23) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.

24) Impact of the project on the water quality, both surface and groundwater should be assessed and necessary safeguard measures, if any required, should be provided.

25) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.

26) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.

27) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.

28) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project.

29) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered.

30) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA report.

31) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.

32) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given.

33) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP.

34) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.

35) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.

36) Detailed environmental management plan to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.

37) Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.

38) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given.

39) The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.

5. Besides the above, the below mentioned general points are also to be followed:-

a) All documents to be properly referenced with index and continuous page numbering.

b) Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.

c) Where the documents provided are in a language other than English, an English translation should be provided.

d) The Questionnaire for environmental appraisal of industrial projects as devised earlier by the Ministry shall also be filled and submitted.

e) While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should also be followed.

f) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the F.R for securing the TOR) should be brought to the attention of MoEF with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft

EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.

g) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, you are requested to submit certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project by the Regional Office of Ministry of Environment & Forests, if applicable.

7. The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

8. After preparing the draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned issues, the proponent will get the public hearing conducted and take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.

(Dr. V.P. Upadhayay)
Director

Copy to:

(i) The Secretary, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi-110 001.
(ii) The Secretary, Department of Environment, Government of Chhattisgarh,
(iii) The Secretary, Department of Mines and Geology, Government of Chhattisgarh, Chhattisgarh.
(iv) The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cumoffice complex, East Arjun Nagar, Delhi-110032
(v) The Chairman, Chhattisgarh Environment Conservation Board, Nanak Niwas, Civil Lines, Raipur, Chhattisgarh
(vi) The Chief Conservator of Forests (Eastern), Regional Office (Western Zone), E-3/240, Arera Colony Bhopal-462016, Madhya Pradesh
(vii) The Controller General, Indian Bureau of Mines, Indira Bhavan, Civil Lines, Nagpur-440 001.
(viii) The Member Secretary, Central Ground Water Authority, A2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.
(ix) The Member Secretary, Central Ground Water Authority, A2, W3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.
(x) The District Collector, Durg District, Chhattisgarh.
(xi) Guard File

(Dr. V.P. Upadhayay)
Director

POINT WISE COMPLIANCE TO TOR Issued by MOEF vide Letter No. J-11015/338/2013-IA. II (M) dated 9th January 2014

S. No.	TOR Points	Compliance
1.	Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may, also be categorically informed whether there had been any increase in production after the EIA Notification, 1994 come into force w.r.t the highest production achieved prior to 1994.	Nandini Khundini mine is not in operation. Hence, Not applicable.
2	A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Grant of Mine Lease by CG Govt provided in Annexure-1
3	All documents including approved mine plan, EIA and public hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management and mining technology and should be in the name of the lessee.	Complied Approved Mining Plan provided in Annexure II
4	All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery / toposheet should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	Mine Lease coordinates superimposed on High Resolution Imagery & Toposheet provided in Figure 2.1 and 2.2, page 14, Chapter 2 of EIA report. Land use of core and buffer zone is clearly visible in Toposheet and Imagery (water filled pits and type of land is clearly visible in the Imagery. Land use of core and buffer zone prepared using High Resolution Satellite Imagery is provided in Figure 3.8 & Figure 3.9, page 68 - 69, Chapter 3 of EIA report. Other ecological features are also visible in the Figures 3.8 and 3.9.
5	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA report with description of the prescribed operating process/ procedures to bring into focus any	Details of Institutional Management Structure and Environmental Management System provided in Section 8.2, page 126 -128, Chapter 8 of EIA report. Environment Policy is

	infringement/deviation/violation of the environmental or forest norms/conditions? The hierarchical system or administrative order of the company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and/or shareholders or stakeholders at large may also be detailed in the EIA report.	given in page 127.
6	Issues relating to Mine safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.	This is open cast mining, hence subsidence study not applicable. Mine safety issues discussed in section 2.8.1 page 17 chapter 2 and section 6.1, page 107 of EIA report. Slope of pit and OB dump height and slope discussed in in section 2.8.2, page 19, Chapter 2 of EIA Report. The slope is maintained within the natural angle of repose. Blasting is disused in section 2.8.2 page 19-24, chapter 2 of EIA report. Mitigation measures are discussed in following sections: Mine safety: Provided in section 6.1 page 107-109 OB dump slope stability: provided in section 4.6 page 99-100 Blasting (noise and vibration): Provided in section 4.3 and 4.3.1 page 83 – 88, chapter 4
7	The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc should be for the life of the mine/ lease period.	Complied. Provided in section 3.1, page 33, chapter 3 of EIA report. Data in EIA is for entire life of mine is provided in chapter-2

8	Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass pre-operational, operational and post-operational phases and submitted. Impact, if any, of change of land use should be given.	Land use map of study area provided in Figure 3.8 and 3.9 page 68-69 section 3.9, page 67, Chapter 3 of EIA report. No wildlife sanctuary, Biosphere reserve, national park, migratory routes of fauna, Reserved and Protected Forest is present within10 km area of the mine site. Pre-operational land use plan of ML area is provided in Table 2.1 page 15 Chapter 2 of EIA report. Operational plan (first 5 years) is provided in Table 2.9 & 2.10 page 20-21 Chapter 2 of EIA report. Post-mining land use plan of ML area is provided in Table 2.2 page 15 Chapter 2 of EIA report. Impact on land use provided in Section 4.7, page 100, Chapter 4 of EIA report.
9	Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.	No external (outside the ML area) OB dump will be made.
10	A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, in any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests the site may be inspected by the State Forest Department along with the Regional Office of the ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.	Forest Land not involved in ML area. Certificate from Forest Department attached as Annexure 6 pg 233

11	Status of forestry clearance for the broken up area and virgin forestland involved in the project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	Not applicable
12	Implementation status of recognition of forest rights under the scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not applicable
13	The vegetation in the RF/PF areas in the study area, with necessary details, should be given.	No Reserved & Protected forest present in ML area as well as within 10 km area of the study area.
14	A study shall be got done to ascertain the impact of the mining project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly detailed mitigative measures required, should be worked out with cost implications and submitted.	No Reserved & Protected forest or National park and Wildlife Sanctuary is present in ML area as well as within 10 km area of the study area.
15	Location of National Parks, Sanctuaries Biosphere Reserves, Wildlife Corridors, Tiger/ Elephant Reserves/(existing as well as proposed), if any within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the state wildlife Department/Chief Wildlife Warden under the Wildlife (Protection) Act, 1972 and copy furnished.	No National parks, Sanctuaries Biosphere Reserves, Wildlife Corridors, Tiger/ Elephant Reserves is present within 10 km area of ML area. Map Showing Environmental Features within 10 km area is given in Figure 1.2, page 7, Chapter 1 of EIA Report. Certificate from Forest department regarding absence of Reserve & Protected forests in 10 km area along with list of animal species found in the 10 km area attached as Annexure 6 (page 233)

16	A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease) shall be carried out. Details of flora and fauna, duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.	Detailed biological study of core zone and buffer zone is provided in Section 3.8, page 51-67, Chapter 3 of EIA report. Certificate from Forest Department regarding absence of Reserve & Protected forests in 10 km area along with list of animal species found in the 10 km area attached as Annexure 6 (page 233)
17	Proximity to Areas declared as 'Critically Polluted' or the Project areas attracting Court restrictions for mining operations should also be indicated and where so required, clearance/certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. should be secured and furnished to the effect that the proposed mining activities could be considered.	No place in Durg district in CG is critically polluted area as per CEPI. This has been confirmed from CPCB website and MOEF website.
18	R&R Plan /compensation details for the Project Affected people (PAP) should be furnished. While preparing the R&R plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the state Governments. It may be clearly brought out whether the village located in the mine lease area will be shifted or not. The issues relating to shifting of village including their R&R and socio-economic aspects should be discussed in the report.	No R&R issues are involved in this project. No human habitation exists in the mine area. The ML area is under the possession of ACC. Social Impact Assessment of the area has been provided in Section 6.4, page 115-117, Chapter 6 of EIA report. The CSR plan has been prepared as per need based analysis. The detail of CSR activities and earmarked budget is given in Table 6.3 page 118, chapter 6 of EIA report.

<table>
<tr><td>19</td><td>One season (non-monsoon) primary baseline data on ambient air quality (PM_{10}, SO_2 and NOx), water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as 'to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM_{10}, particularly for free silica, should be given.</td><td>Base line Environment quality provided in following sections:<table><tr><td>Parameter</td><td>Section</td><td>Page</td></tr><tr><td>Meteorology</td><td>3.2</td><td>36-40</td></tr><tr><td>Ambient air quality</td><td>3.3</td><td>40-41</td></tr><tr><td>Noise quality</td><td>3.4</td><td>42-43</td></tr><tr><td>Water quality</td><td>3.5</td><td>43-45</td></tr><tr><td>Soil quality</td><td>3.7</td><td>50-51</td></tr><tr><td>Ecology</td><td>3.8</td><td>51-67</td></tr><tr><td>Land use</td><td>3.9</td><td>67-69</td></tr><tr><td>Demography and socio-economics</td><td>3.10</td><td>70-77</td></tr></table></td></tr>
<tr><td>20</td><td>Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.</td><td>Air Quality Modelling of mining activity is provided in Section 4.2, page 78 - 83, Chapter 4 of EIA report. Isopleths (contours) showing the incremental GLC on toposheet (showing site and other features) given in Figure 4.1 & 4.2 page 81 & 82, Chapter 4 of EIA. Wind rose also shown in Figure 4.1 and 4.2. Details of model used and input parameters used for modeling provided in Annexure IV.

Impact assessment of movement of vehicles for transportation of limestone given in section 4.4 page 88 – 96, chapter 4 of EIA report.</td></tr>
<tr><td>21</td><td>The water requirement for the project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the project should be indicated.</td><td>Water requirement, availability and source (including water balance) provided in section 2.5, page 15, Chapter 2 of EIA report.</td></tr>
<tr><td>22</td><td>Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided</td><td>No ground water shall be used, hence not required. Water accumulated in mined-out pits shall be used.</td></tr>
<tr><td>23</td><td>Description of water conservation measures</td><td>Water accumulated in mined-out pits</td></tr>
</table>

	proposed to be adopted in the project should be given. Details of rainwater harvesting proposed in the project, if any, should be provided.	shall be used. Water harvesting measures provided in Section 8.10, page 140, Chapter 8 of EIA report.
24	Impact of the project on the water quality, both surface and groundwater should be assessed and necessary safeguard measures, if any required, should be provided.	No groundwater or surface water will be used in the project. Impact of the project on water quality provided in Section 4.5, page 97-99, Chapter 4 of EIA report.
25	Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. Necessary permission from Central Ground water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	Mining will intersect the groundwater Table. Detailed Hydrogeology Report is attached as Annexure V page 185-232. During the first 5 years of mining, groundwater table will not be intersected. No groundwater will be extracted or pumped outside the mining area. ACC will apply for obtaining necessary permission, whenever necessary.
26	Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any and the impact of the same on the hydrology should be brought out.	No nala or stream is passing through the ML area.
27	Information on site elevation, working depth, groundwater table etc, should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.	Information on site elevation, working depth and groundwater table is shown in Figure 2.4 and Figure 2.5, page 30 and 31 Chapter 2 of EIA report. The details are also given in section 2.8.2 page 19-24 of report. Groundwater levels of the study area are given in Annexure V page 185-232.
28	A time bound progressive Greenbelt Development plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind; the same will have to be executed up front on commencement of the project.	Provided in Section 8.8, page 134-136, Chapter 8 of EIA report.

29	Impact on local transport infrastructure due to the project should be indicated. Projected increase in truck traffic as a result of the project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. `	Provided in Section 4.4, page 88-96, Chapter 4 of EIA report.
30	Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA report.	All infrastructure facilities shall be provided at nearby Pathariya-I site. However, rest shelter shall be provided to workers as mentioned in Section 2.10, page 26, Chapter 2 of EIA report.
31	Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.	Provided in Section 2.8.2, page 19-24, Chapter 2 of EIA report. Conceptual Plan provided in Figure 2.6, page 32, Chapter 2 of EIA Report.
32	A time bound Progressive Greenbelt Development plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given.	Provided in Section 8.8, page 134-136, Chapter 8 of EIA report.
33	Occupational Health impacts of the project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP.	Provided in Section 8.9, page 137-139, Chapter 8 of EIA report.
34	Public health implications of the project and related activities for the population in the impact	Provided in Section 4.9, page 102,

	zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.	Chapter 4 of EIA report.
35	Measures of socio economic significance and influence to the local community proposed to provided by the project proponent should be indicated. As far as possible, quantitative dimension may be given with time frames for implementation.	Social Impact Assessment of the area has been provided in Section 6.4, page 115-119, Chapter 6 of EIA report. The CSR plan has been prepared as per need based analysis. The detail of CSR activities and earmarked budget is given in Table 6.3 page 118, chapter 6 of EIA report.
36	Detailed environmental management plan to mitigate the environmental impacts which should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed project	EMP provided in Chapter 8
37	Public hearing points raised and commitment of the project proponent on the same along with time bound action plan to implement the same should be provided and also incorporated in the final EIA/EMP Report of the project.	Provided in section 6.5 page 120-122. Commitments of ACC and time bound action plan has been prepared by ACC Ltd and provided in Questionnaire attached as Annexure 8 Page 241 – 279 of EIA Report.
38	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the project should be given.	None as per the Undertaking given by ACC (page 2)
39	The cost of the project (capital cost and recurring cost) as well as the cost towards implementation of EMP should clearly be spelt out.	Provided in Section 8.11, Table 8.2 page 141, Chapter 8 of EIA report.

Note:

- *Point No. 5 (a to g) and Point No. 7 and 8 of MOEF Letter dated 9-1-2014 and 4-3-2016 has been complied.*
- *Questionnaire prepared & signed by ACC Ltd attached as Annexure 8 page 241-279 of EIA Report*
- *Issues raised during the Public Hearing, Response of ACC Ltd and time bound Action Plan with Budget allocation, wherever required has been prepared by ACC Ltd and provided in Questionnaire attached as Annexure 8 (Page 273-278 of EIA report).*
- *Certified Compliance Report attached as Annexure 7, page 234 – 240 of EIA report*
- *Surface Plan, Conceptual Plan, Geological Plan and Sections provided in Chapter 2 of EIA report.*

CHAPTER 1 : INTRODUCTION

1.1 Purpose of Report

ACC Limited is pioneer cement manufacturing company of India, which was established in 1936. Since then many iconic and mega structures in India has been built with ACC cement. The Jamul Cement Works (JCW) of ACC Limited had started its production in the year 1965 with an installed capacity of 0.25 million tons of cement per annum (MTPA). The existing Clinker production capacity at JCW is 0.76 MTPA. The present, capacity of the plant is 1.58 MTPA of Portland Slag Cement. Slag is a waste from steel industry used as raw material for manufacturing cement. JCW has obtained environmental clearance from MoEF vide letter no. J-11011/251/2008-IA-II (I) Dated 11 January, 2013 to produce 3 MTPA Clinker and 1.5 MTPA Cement (PSC & PPC).

Additional limestone required for producing 3.0 MTPA Clinker at Jamul Cement Works would be met from ACC's captive mines, namely Jamul Limestone Mine, Pathariya Limestone Mine Lease-I & Pathariya Limestone Mine Lease -II and Nandini Khundini limestone mine. ACC has four limestone mining leases in Durg district, namely Jamul Cement Works Limestone Mine (Lease area 269.95 Ha), Pathariya Limestone Mine Lease- I (36.01 Ha) and Pathariya Limestone Mine Lease-II (37.85 Ha) and Nandini Khundini Limestone Mine (53.57 Ha). Mining operation in Nandini Khundini is yet to commence. Other three mines are in operation.ACC applied for the grant of mining lease at Nandini Khundini for an area of 53.57 Ha. Lease of Nandini Khundini limestone mines was held by Bhilai Steel Plant from 1971 to 1991. The lease was denotified vide Gazette Notification dated 9th June, 1992. The mining lease was freshly granted to ACC by the Chhattisgarh Government vide their office letter no. F 3- 18/2004/12 on 5th February 2008. Environmental Clearance to produce 0.15 MTPA has already being granted for Nandini Khundini Limestone Mine from MOEF vide letter no J-11015/237/2009-IA.II (M) dated 10th March 2011. 0.15 MTPA limestone production is not adequate to meet the demand of JCW, and therefore ACC applied to enhance the production capacity from 0.15 to 1.03 MTPA.

The expansion proposal of Nandini Khundani mines was submitted to MOEF for obtaining environmental clearance in accordance as per provisions of EIA notification, dated September 14, 2006. ACC submitted Form-1 and TOR along with PFR to MOEF. ACC representatives made presentation on the salient feature and other details of the project before the Expert Appraisal Committee of MOEF on 12-11-2013. Terms of Reference (TOR) for EIA have been approved by MoEF vide letter No. J.11015/338/2013.IA.II (M), 9th January 2014. This final EIA report has been prepared for 1.03 MTPA limestone mining as per the Terms of Reference (TOR) issued by the MOEF after incorporating views, comments and suggestions obtained during the Public Hearing heald on 19-3-2015.

1.2 Identification of Project and Project Proponent

Project:

Nandini Khundini Limestone Mines having lease area of 53.57 ha is located at Village-Nandini Khundini, Tehsil Dhamdha in the district of Durg of Chhattisgarh State. The capacity enhancement of the mine is being carried out within the existing mine lease area of 53.57 ha and no extra land is being acquired. No R & R issues are involved with this project. The estimated cost of the project is Rs. 15 crores.

The mining will be carried out by open cast method of mining by Shovel Tipper combination and is mechanised. Drilling is done by deep hole track type drilling machine. Blasting is done by NONEL. Blasted material is loaded with hydraulic shovel and front end loaders into tippers and transported by 16 tons capacity tippers. General ground level in mining lease area, ultimate bottom level and ground water level is 280 m, 221 m and 254 m respectively (amsl). The scheme of mining along with PMCP is approved by IBM for production enhancement.Proposed capacity expansion would also generate opportunities for direct and indirect employment to the surrounding peoples and also improve local and regional economy of the area. The project will ensure the continuous limestone supply to the Jamul Cement Works, result in the industrial growth of the region and fulfill the cement demand of eastern states of country. The advantages of operating the Nandini Khundini mines are described below:

- It is an old partially worked out mine of Bhilai Steel Plant so there will be proper utilization of natural resource.
- There is no need of any displacement of people.
- There are no forests, wildlife sanctuary or any ecosensitive areas surrounding the mine.
- Mining land is barren with no trees and agriculture
- The existing mined out pits are full of water, which is sufficient for the mining operations.

Details of Lease hold Area:

Land of Mining Lease is partly Govt. Land and part of it belongs to Bhilai Steel Plant (BSP). This area was partially mined out by BSP during 21.7.1971 to 20.7.1991 period. After that mining was discontinued. Mining land is now barren with no other activity currently going on site. Existing mining pits are filled with water. As per previous records, mine contained 4.01 Million Tons proved limestone reserves and 15.91 MT indicated reserves. Expected life of Nandini Khundini mine was 27 years. BSP has issued No Objection Certificate to ACC Limited in 1990 for granting mining lease on this surrendered lease. State Government by their order no F3- 18/2004/12 dated 05.02.2008 has granted mining lease for a period of 30 years to ACC Limited, Jamul Cement Works (JCW). Execution of Mining lease was done on 02.12.2008. State Government by order no 239/MAN.CHI/KHANIJ/2011 dated 29.04.2011 has granted permission to start mining operations.

Project Proponent: ACC is India's foremost manufacturer of cement and concrete. ACC's operations are spread throughout the country with 17 modern cement plants, more than 40 Ready mix concrete plants, 20 sales offices, and several zonal offices. It has a workforce of about 9,000 persons and a countrywide distribution network of over 9,000 dealers. The manufacturing units are backed by a technical support services centre. Since its inception in 1936, the company has been a trendsetter and important benchmark for the cement industry in respect of its production, marketing and personnel management processes. Its commitment to environment-friendliness, its high ethical standards in business dealings and its on-going efforts in community welfare programmes have won it acclaim as a responsible corporate citizen.

ACC has made significant contributions to the nation building process by way of quality products, services and sharing its expertise.

ACC has rich experience in mining, being one of the largest user of limestone, and it is also one of the principal users of coal. The company's various businesses are supported by a powerful, in-house research and technical backup facility - the only one of its kind in the Indian cement industry. This ensures not just consistency in product quality but also continuous improvements in products, processes, and application areas.

ACC is among the first companies in India to include commitment to environmental protection as one of its corporate objectives, long before pollution control laws came into existence. The company installed pollution control equipment and high efficiency sophisticated electrostatic precipitators for cement kilns, raw mills, coal mills, power plants and coolers as far back as 1966. Every factory has state-of-the art pollution control equipment and devices.ACC demonstrates the practices of being a good corporate citizen undertaking a wide range of activities to improve the living conditions of the under-privileged classes living near its factories.

1.3 Nature, Size and Location of the Project

The project activities (Limestone mining) falls under Category 'A' of EIA notification dated 14-9-2006. Area of the mine lease is 53.57 Ha. Production capacity of limestone from the mine will be 1.03 MTPA. Total project cost is Rs. 15 crores. The mining will be carried out by open cast method of mining by Shovel Tipper. The height of bench will be 2.0 to 4.0 meters in OB and 7.0 meters in limestone. Width of bench will be kept more than the height. Average thickness of OB is 2 to 4 meters therefore one bench is made up of OB and 07 to 08 benches will be developed in limestone whose average thickness is approx 50 to 60 meters. Limestone will be extracted and sent to Jamul Mines for crushing.

Limestone of Nandini Khundini Mines belongs to lower Vindhyan age which is horizontally bedded & highly jointed. Limestone is chocolate brown in color, finely grained and displays stromatotic structure. Clean stone quality of limestone varies from 79.5% to 90.6% total carbonates. Mine contains 43.74 million tons of proven reserves of limestone.

Location

The Mining Lease area of 53.57 Ha falls in Nandini Khundini village of Dhamda Tehsil, District Durg of Chhattisgarh. Terrain of the area is more or less flat. JCW is at about 15 km in south direction of mine. The mine is well connected with road. Nandini Khundini mine is 21 km, NE of Durg railway station (situated on Nagpur-Howrah Broad Gauge of SE Railway) and well connected to National and State Highways. NH-6 from Mumbai to Kolkata passes through nearest Bhilai town which is approx 20 km away from the mining site. Nearest airport is at Raipur which is about 70 km from mine site.

The main surrounding villages, population, direction and approximate distance from mining lease boundary are as follows: Pathariya – 2.0 km northwest (population: 2695), Nandani Khundini 0.5 km north (population: 4369), Medesara 2.0 km southwest (population: 3396), Pitora – 2.0 km west (population: 1605), Deorjhal – 1.3 km southeast (population: 976) and Potiya 2.0 km south (population: 1696). Nearest town is Dhamda located about 9.5 km in northwest direction.

Sheonath River and Amner River are the main surface water bodies. Sheonath River is located about 3.5 km west of the mine site. Amner River is located about 6.5 km in south west direction. Tandula canal and its distributaries are the other sources of surface water. Tandula canal is located about 3.6 km southeast of the mine site.

There are no ecologically sensitive and archaeologically important places within 10 km radius of the mine site. No reserve and protected forests are present in the ML area and study area that is 10 km radius around the ML area (However 130 ha land has been proposed to be Notified in Nandini Khundini as Protected Forests).

The area is covered by Survey of India Topo sheet number 64G/7 on 1: 50,000 scale. Latitude and Longitude of four corners of Mine Lease area is given below:

21°23' 20.6" N	81°23' 16" E
21°23' 07.4" N	81°23' 29" E
21°22' 48.2" N	81°23' 09.8"E
21°23' 06.5" N	81°22' 52.3" E

Location map is provided in **Figure 1.1**. Map showing environmental features around 10 km area of the Nandini Khundini mines site is provided in **Figure 1.2**. Map showing all location of all the three limestone mines of ACC (Nandini Khundini mines, Pathariya Lease I mines and Pathariya Lease-II mines is provided in **Figure 1.3**. Certified Revenue map showing the boundary of Nandini Khundini mines is shown in **Figure 1.4.** Photographs showing mine site is provided in **Figure 1.5.**

1.4 Importance of the Project to Country & Region

The optimal utilization of limestone reserves of the state for cement manufacturing within the state will boost the economic development of the state as well as the country. Impact of transportation on the environment will be highly reduced as mine is in close proximity of plant. The Blast furnace slag which is a waste for steel making process found its utilization as raw material in Cement manufacture and ACC is pioneer in propagating the usage of Slag cement there by conserving mineral resource of the country. With the organizational conservation towards mineral conservation, sustainable development of mineral resources& environmental protection, the mining activities by ACC in this area have played a vital role in uplifting the standards of living.This project will further create the additional employment opportunities for many people. Project will lead to many rural and community welfare programmes like road repair, school run, free medical caps, etc. It will also look after for bus services, sanitation and drinking water, provision for repairs of bore wells, etc.

1.5 Scope of the Study

ACC limited proposed expansion of its following three captive limestone mines at Tehsil Dhamdha in Dist Durg, Chhattisgarh.

1. Pathariya-I Limestone Mines from 0.6 MTPA to 0.84 MTPA (ML area 36.001 ha,

Category B project) located at Pathariya village, Tehsil Dhamdha.

2. Pathariya-II Limestone Mines from 0.6 MTPA to 0.84 MTPA (ML area 37.85 ha, Category B project) located at Pathariya village, Tehsil Dhamdha.
3. Nandini Khundini Limestone Mines expansion from 0.15 MTPA to 1.03 MTPA (ML area 53.57 ha, Category A) located at Nandini Khundini village, Tehsil Dhamdha.

The above mines are located close to each other in nearby two villages, Patheirya and Nandini Khundini. Pathariya-II and Nandini-Khundini mines are within 500 m distance of each other and Pathariya- Lease I mine is located about 900 m away from Pathariya- Lease II mine. The Main Office, Stores, Magazine and Workshop for all the three mines are common and located at Pathariya-I mines. Environment Management System of the three mines is also common. The mines supply limestone to ACC's Jamul Cement Works and transportation will be done by road. Mining Plan of the three mines is separately approved by IBM. Environmental Clearance of existing Nandini Khundini mines is issued by MOEF and EC of Pathariya Limestone Mine Lease I and Lease II are issued by SEIAA-Chhattisgarh. Therefore MOEF and SEAC have given three separate TORs for conducting EIA Study of the three projects. The baseline environment status is similar and there are no forests, national park, wildlife sanctuary, critically polluted area, etc within the 10 km area of the three mines. The aspects and impacts of the three projects are more or less same. Therefore this EIA addresses the applicable cumulative traffic impact of the three mines with a common Baseline Data and Environmental Management Plan. As a matter of fact many sections of this EIA report will be similar to the EIA report of Pathariya-Lease I and Pathariya Lease-II Limestone mines.

MoEF prescribed the TOR for EIA study of Nandini Khundini Limestone Mines vide letter No. J.11015/338/2013.IA.II (M) dated 9 January 2014. This EIA Report is prepared for Limestone Mining of 1.03 MTPA capacity. Baseline data collection has been generated for summer season during the period 1st March 2014 to 31st May 2014. The EIA/EMP has been prepared as per approved TOR, given in page vii. Point-wise compliance with TOR points issued by MOEF is given in page xiii.

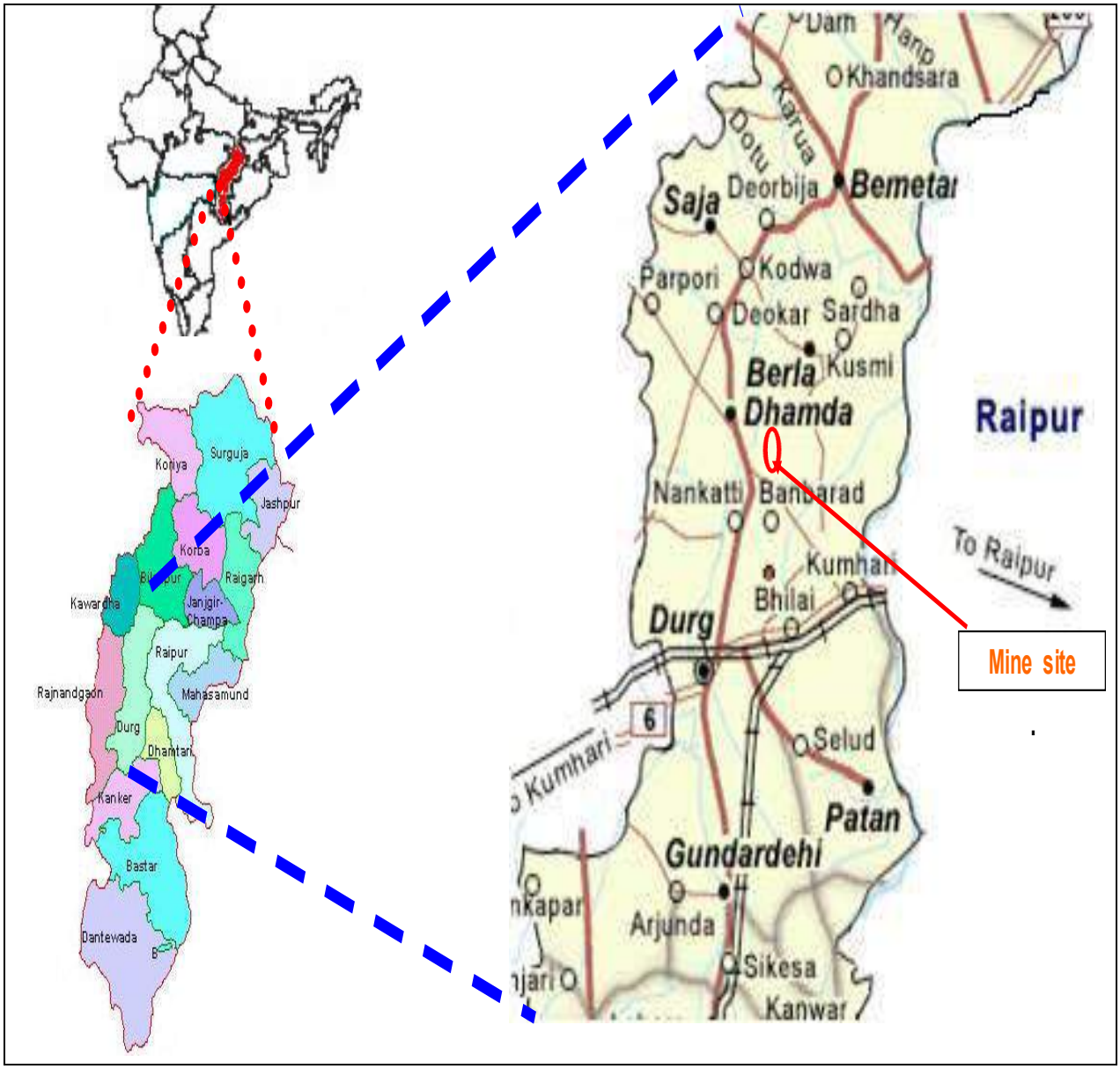


Figure 1.1 Location Map

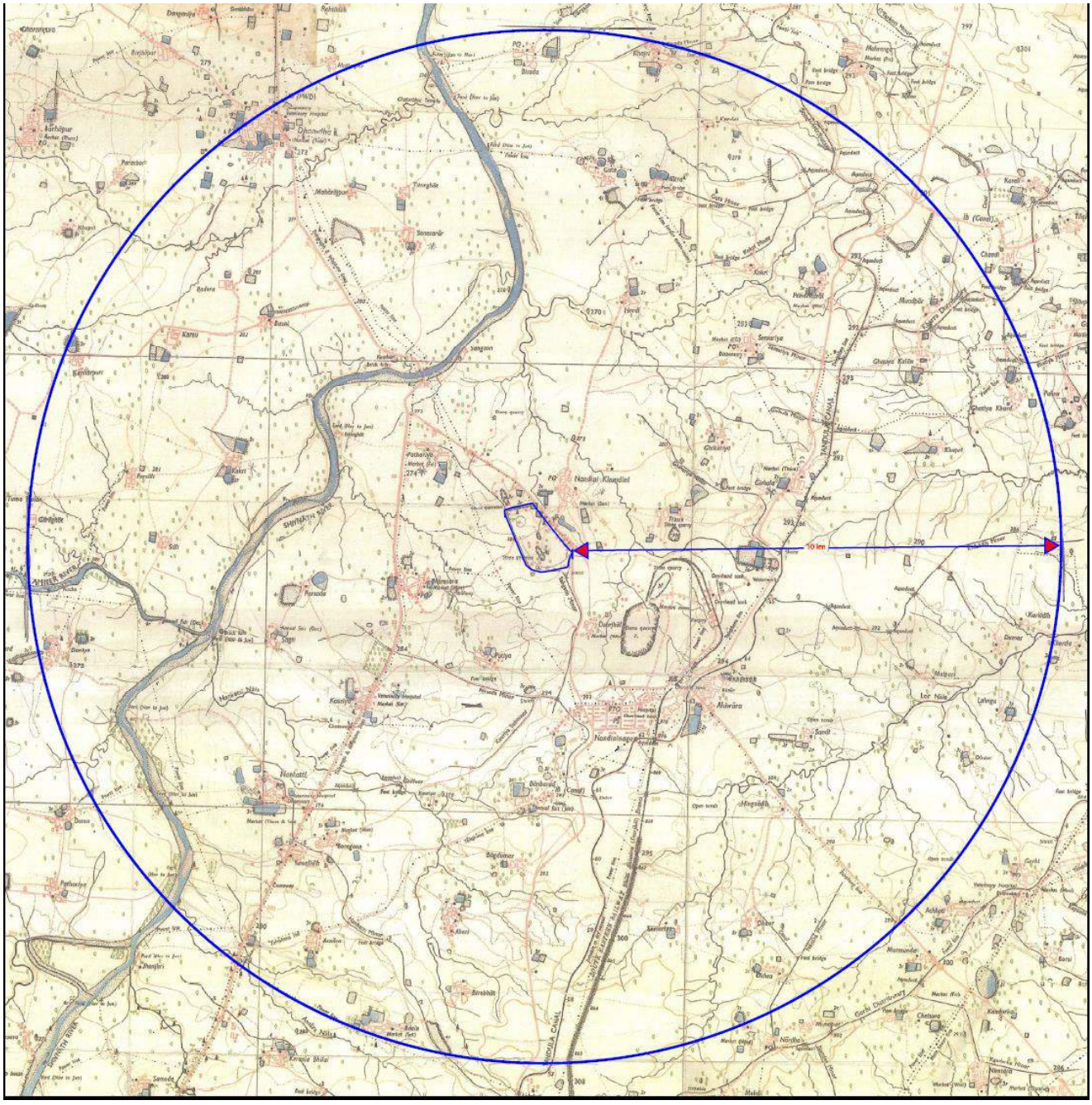


Figure 1.2 Map Showing Site & Surrounding Features within 10 km Area

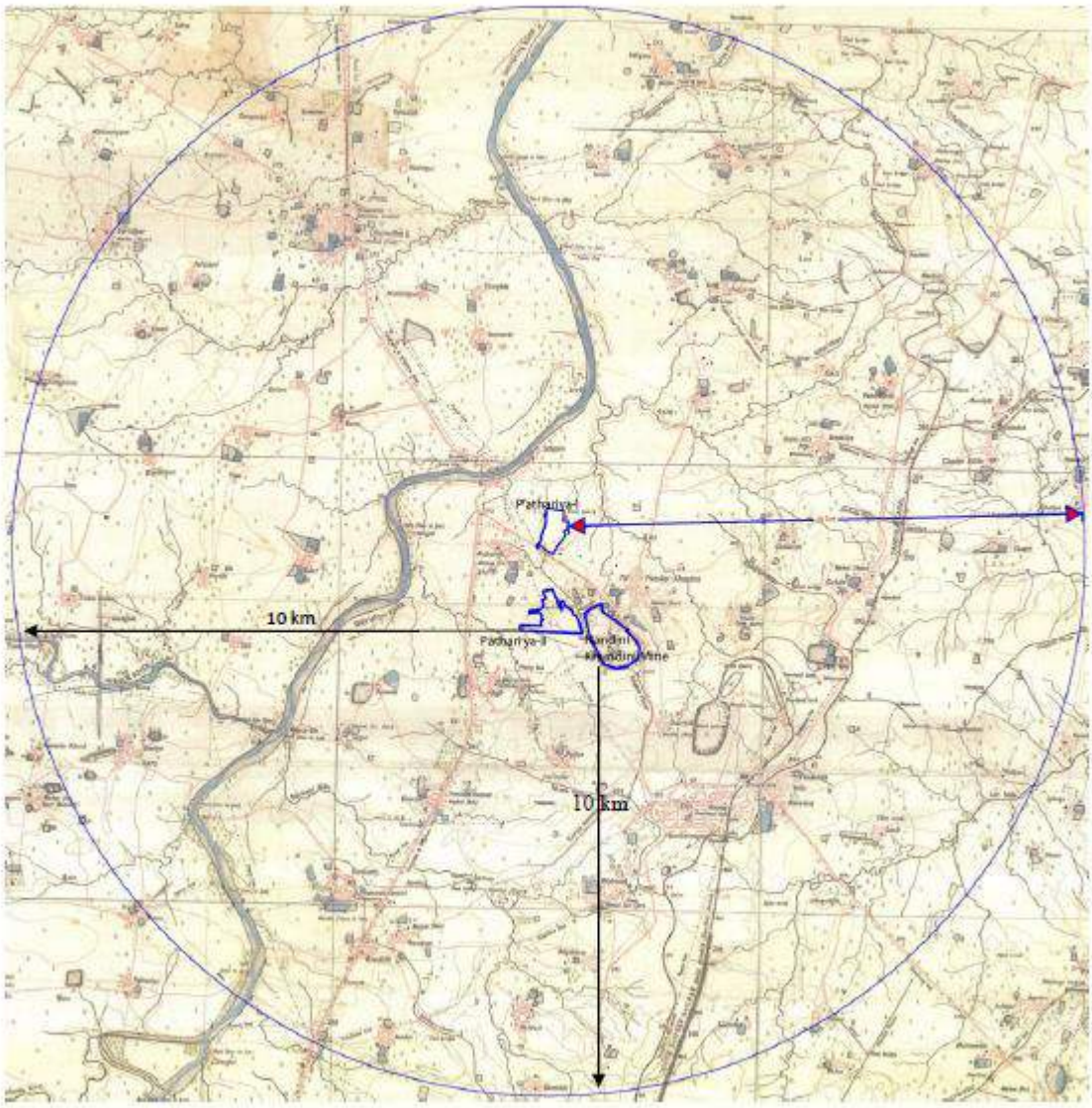


Figure 1.3 Map Showing all the Three Mines of ACC

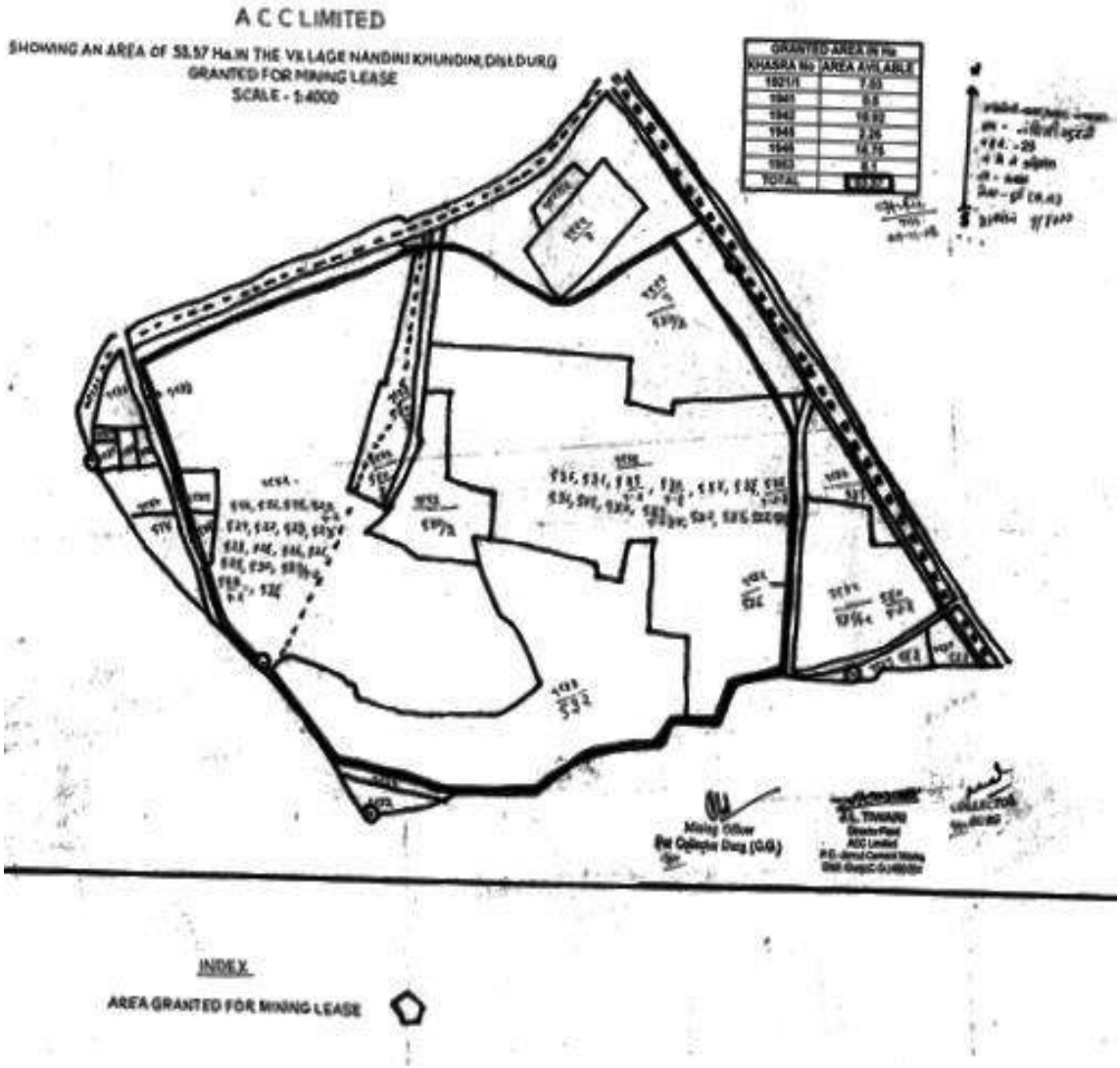


Figure 1.4 Certified Revenue Map Showing Nandini Khundini Mines

Figure 1.5 Photographs Showing NK Mine

CHAPTER 2: PROJECT DESCRIPTION

2.1 Project Profile

ACC Limited is pioneer cement manufacturing company of India, which was established in 1936. Since then many iconic and mega structures in India has been built with ACC cement. The Jamul Cement Works (JCW) of ACC Limited had started its production in the year 1965 with an installed capacity of 0.25 million tons of cement per annum (MTPA). The existing Clinker production capacity at JCW is 0.76 MTPA. The present, capacity of the plant is 1.58 MTPA of Portland Slag Cement. Slag is a waste from steel industry used as raw material for manufacturing cement. JCW has obtained environmental clearance from MoEF vide letter no. J-11011/251/2008-IA-II (I) Dated 11th January, 2013 to produce 3 MTPA Clinker and 1.5 MTPA Cement (PSC & PPC)

Additional limestone required for producing Clinker at Jamul Cement Works would be partially meet from ACC's captive Nandini Khundini limestone mine. Nandini Khundini mines is located at about 24 km road distance from Jamul Cement Works (21 km aerial distance). Capacity enhancement of Nandini Khundini Limestone Mine to the tune of 1.03 MTPA is proposed as against the present 0.15 MTPA. The limestone from Nandini Khundini Limestone mine is of Higher Grade and ROM Limestone from this mine will be utilized along with the marginal grade quality limestone generated from Jamul Limestone Mines. The limestone shall be blended with the marginal grade limestone and crushed in the proposed crusher at Jamul Limestone Mines. Rushed limestone shall be transported to Jamul Cement Works through dedicated 3 km road. Later closed pipe conveyor belt shall be developed along the dedicated road, so as to save on transportation cost and improve the ambient air quality of Jamul area.

Environmental Clearance to produce 0.15 MTPA has already being granted for Nandini Khundini Limestone Mine from MOEF vide letter no J-11015/237/2009-IA.II (M) dated 10th March 2011.

2.2 Need of Project

The cement demand in the country is going at the rate 9-10% (Compound Average Growth rate CAGR) particularly in the eastern states , due to various infrastructural projects planned by State/Central Governments and also due to rapid growth of industries, the demand is likely to be higher than average for the country.

ACC has proposed to enhance the clinker production capacity of Jamul Cement Works and to meet the eastern market demand of cement. To cater the additional Limestone requirement of JCW plant, capacity enhancement of Nandini Khundini limestone mine has been proposed. Considering the proximity of the project site in the state of Chhattisgarh, which is very well linked by rail as well as road network, It will be easier for fulfilling the demands of other eastern states of country. Also the clinker produced from Jamul cement works will be transported to ACC's other grinding units.

2.3 Location, Size and Magnitude of Operation

SN	Particulars	Details
1	Location of Mines	Nandini Khundini village Tehsil Dhamda, District Durg
2	Location of Jamul Cement Plant	15 km south of NK Mines (arial distance)
3	Topo sheet	64 G/7 ,LAT.- 21 22 40 , LONGI.- 81 23 00
4	Elevation above Mean Sea Level	284.75 m, Undulating terrain
5	Nearest Highway	NH6 (Mumbai to Kolkata) – 20 km
6	Nearest railhead	Durg – 21 km
7	Nearest railway line	Mumbai – Howrah 21 km
8	Nearest airport	Raipur – 70 km by road
9	Historical / Tourist places	None in 15 km radius
10	Ecologically sensitive areas	None in 15 km radius
11	Nearest town	Durg, 21 km

The study area consists of essentially flat land extending in South East, North- West direction. There are no hills in the close vicinity of the mine site. There is no forest within lease area. No river or nallah lies in the leased area. The site is flat and general ground level is 284.75 m above Mean Sea Level (aMSL).

The soils are sandy loam and silty clay type. The fertility of the soil along the Sheonath River is of good quality that supports good agriculture. The soil quality around mines is of poor quality; the crop yield is also poor. The soils around mines are not contaminated with heavy metals. However the limestone content of the soils of surrounding agriculture fields is high. Paddy is the main crop grown during monsoon. Other crops are barley, wheat, maize, pulses and oilseeds. The irrigation facility is not well developed. Tandula canal with its major and minor drains supplies water for irrigation only when the main canal has surplus water left after fulfilling the water requirement of Bhilai Steel Plant.
68% land of study area is covered under agriculture, 18% land is put to non-agriculture use, 4.5% land is fallow land, 4% land is cultivable wasteland, and 5.5% land is barren land. There is no forest land in the study area.

The nearest major habitation around the mining site is Dhamdha, located 8 km away in northwest direction. Jamul Cement Works and its township, Bhilai, Durg are located about 20 km away from mine. The name of big and small villages, population, direction and distance from mining lease boundary are as follows:

Pathariya – 2.0 km northwest	(population: 2695)
Nandini Khundini 0.5 km north	(population: 4369)
Medesara 2.0 km southwest	(population: 3396)
Pitora – 2.0 km west	(population: 1605)
Deorjhal – 1.3 km southeast	(population: 976)
Potiya 2.0 km south	(population: 1696)

Nandini Khundini Limestone Mines having lease area of 53.57 ha is located at Village- Nandini Khundini, Tehsil –Dhamdha in the district of Durg of Chhattisgarh State. Mining lease area over this area was first granted to Bhilai Steel Plant of SAIL. But it was later surrendered to the State Government. ACC Limited applied for the mining lease in this area and lease was granted to ACC Limited in 2008. Land of Mining Lease is partly Govt. Land and part of it belongs to BSP. BSP has issued No Objection Certificate to ACC Limited in 1990 for granting mining lease on this surrendered lease. State Government by their order no F3-18/2004/12 dated 05.02.2008 has granted mining lease for a period of 30 years to ACC Limited, Jamul Cement Works. Execution of Mining lease was done on 02.12.2008. Mining lease partly comprises of Govt. Land of 17.89 ha and rest belongs to BSP. Surface rights and enter upon permission for the total land of Mining Lease (53.57 Ha) has already been obtained from District Collector. Mining operations are yet to start in Nandini Khundini Mining Lease area.

Proposed capacity enhancement of the mine is being carried out within the existing mine lease area of 53.57 ha and no extra land is being acquired hence there will be no change in the land use pattern of project. There is no R & R involved in this project, since there will be no person affected by the project need to be displaced or additional land to be acquired. Mining lease letter is attached as Annexure. Execution of Mining Lease was also done in 2008. Mining operations are yet to start in Nandini Khundini Mining Lease area. The mining will be carried out by open cast method of mining by Shovel Tipper and will be fully mechanised. The height of bench is proposed 2.0 to 4.0 meters in OB and 7.0 meters in limestone. Width of bench will be kept more than the height. Average thickness of OB is 2 to 4 meters therefore one bench is made up of OB and 07 to 08 benches will be developed in limestone whose average thickness is approx 50 to 60 meters. Limestone is extracted and sent to plant for further processing. It is now proposed to produce 1.03 MTPA limestone from Nandini Khundini Mines.

The close view showing the mining lease area and surrounding features is given in **Figure 2.1. Figure 2.2** shows the google image of the ML area and its immediate surroundings. No nalla or road passes through the mining lease area. The earlier mined out areas are converted to water bodies as clearly visible in the google image.

Figure 2.1 Close View of ML Area showing Coordinates of the Lease Area

Figure 2.2 Google Image of Mine Lease Area

2.4 Land Details

Mining lease area of 53.57 Ha in village Nandini Khundini was granted to ACC Limited by the Chhattisgarh State Government in 2008. Execution of Mining Lease was also done in 2008. This lease was granted for a period of 30 years i.e. up till 01.12.2038.

Location / village	District	State	Area in Ha	Date of Expiry	Remark
Village – Nandini Khundini	Durg	Chhattisgarh	53.57	01.12.2038	State Govt. Order no F3-18/2004/12 dated 05.02.2008 and lease executed on 02.12.2008

Land of Mining Lease (53.57 ha) is partly Govt Land (17.89 ha) and part of it belongs to Bhilai Steel Plant (BSP land- 35.68 ha). It is reported that BSP has surrendered the lease in 1991. Chhattisgarh Government by their order no F3-18/2004/12 dated 05.02.2008 has granted mining lease for a period of 30 years to ACC Limited (Jamul Cement Works). Execution of Mining lease was done on 02.12.2008. Surface rights and enter upon permission for the total land of Mining Lease (53.57 Ha) has already been obtained from District Collector-Durg. Mining operations are yet to start in Nandini Khundini Mining Lease area. BSP surrendered the mine lease in 1991. In the intervening period (1991-2008) local villagers would have used the area for cattle grazing and funeral. After 2008, ACC fenced the area by barbed wires to prevent unauthorized entry.

Table: 2.1 Existing Land use of the Core Zone

	Present Land use pattern of ML area(Ha)	
	Description	Present Stage
1	Area excavated by BSP prior to grant of Lease to ACC	11.48 Ha
2	Old overburden dumps	1.65 Ha
3	Undisturbed Land	40.44 Ha
	Total	53.57 Ha

Table: 2.2 Post Mining Land use of the Core Zone

Post Mining (Conceptual) land use pattern of ML area(Ha)							
Sr. No.	Description	Total Area	Land Use(Ha)				
			Plantation	Water body	Public Use	Undisturbed	Total
1	Excavation (Backfill)	33.97	33.97	0	0	0	33.97
2	Water Reservoir	14.8		14.8	0	0	14.8
3	External Dump or back fill on North side of Lease	1.79	1.79	0	0	0	1.79
4	Green Belt all along lease boundary	3.01	3.01	0	0	0	3.01
	Total	53.57	38.78	14.8	0	0	53.57

Note: Upto end of mine life, Total broken area will be approx. 48.77 Ha. Out of which, area likely to be backfilled will be approx. 33.97 Ha and area left out for Water reservoir will be 14.8 Ha.
Upto end of life of mine, it is proposed that approx 38.78 Ha of plantation will be developed (including the green belt developed during initial years of mining).

2.5 Water Requirement

Water requirement will be 20 m^3/day. Water will be taken from rainwater stored in old mined-out pits inside the ML area. Worshop, mine office, etc will be located in Pathariya Lease-I site. Groundwater will not be drawn through borewells or dugwells for use in mine operations.

	Name	**Consumption KLD**	**Wastewater Generation KLD**	**Management Scheme**
1	Sprinkling on haul road for dust suppression	10	Nil	-
2	Greenery development	5	Nil	-
3	Domestic use (Toilets)	5	4	Taken to septic tanks and soak pits
Total		20 KLD	4 KLD	No discharge outside premises.

2.6 Electricity Requirement

Electricity will be required mostly used for mine dewatering purpose, in offices and for maintenance of HEMM. Power is sourced from CSPDCL through rural feeder. Approx 200000 Units/year power will be required for the proposed project.

2.7 Manpower Requirement

The project will create the direct employment of 32 people in the mines. Project will also generate indirect employment for approx 100 tipper operators which will transport ROM limestone from Mine site to Crusher which will be installed in Jamul Mines.

ACC will give preference to the local peoples during construction and operation phase of the project depending upon the skill, job requirement and capability. Several other indirect employment opportunities will be created in the surrounding areas like transport for men and material, hotel operators, vehicle drivers and attendants, workshops, grocery and retails, medical, etc. Employment details are given in Table 2.3.

Table 2.3 Man Power Requirement

Designation	Nos	Qualifications
Manager	1	Graduate in Mining Engineering with 1st Class Manager's Certificate of Competency
Mining Engineer	1	Graduate in Mining Engineering
Geologist	1	M.Sc. in Applied Geology
Asst. Manager	2	Graduate/Diploma in Mining Engineering with 1st /2nd Class Manager's Certificate of Competency
Mines Foremen	2	Diploma in Mining Engineering or Foreman's Certificate of Competency.
Mate cum Blaster	1	Mate certificate of competency holder
Electrical Supervisor	2	Diploma in Electrical Engg with Electrical Supervisor Competency (Mining)
Mechanical Engineer	1	Graduate/Diploma in Mechanical/Automobile Engineering
Engineer	1	Diploma in Mechanical/Automobile Engineering
Electricians / Auto Electricians	2	ITI in Electrical
Driller	2	ITI / Diesel Mechanic for operation of drilling machine
Blasting Crew	2	Unskilled workers
Operators	6	Diesel Mechanic cum HEO for operation of HEMM
Time Keeper	1	
Mechanics	3	ITI / Diesel Mechanic
Welder / Fitter / Khalasi	1	ITI – Welder job trained person
Helpers	3	Unskilled as Machinery attendant

2.8 Project Details

The Mining plan of Nandini Khundini Limestone mine was approved by Indian Bureau of Mines, MCCM Central Zone vides their letter no. 314(3)/2008-MCCM (CZ)/MP-12 dated 05/08/08. The limestone occurring in the area is a part of extensive occurrence seen outcropping in the region from Seonath river and to beyond Semariya. The area is located in the central part of the Chhattisgarh basin and belongs to the upper sub-division of the Raipur series. The limestone belongs to the lower Vindhyan age. The deposit is horizontally bedded and highly jointed. The limestone is usually chocolate brown in colour, fine grained and thin veins of calcite are observed at places. The limestone displays a stromatotic structure. Intercalations of shale within the limestone are also observed as also

the seepage of overburden soil through the joints into the limestone. The surface plan of the mine area is shown in **Figure 2.3**.

Mineral Processing- There is no need for any mineral beneficiation or processing as the quality of limestone raised from Nandini Khundini limestone mine is suitable for clinker manufacture.

Zero Waste Mining– ACC will adopt the zero-waste mining principle. The low grade limestone will be blended with higher grade limestone at JCW and used. No limestone resource will be discarded. This principle will help in optimal utilization of national resource base.

The Geological Plan of the mining lease area showing contours, overburden, ultimate pit limit, borehole location and limestone bearing area is given in **Figure 2.4**.

The traverse section of mineral deposits through drilled boreholes (Geological Section showing overburden depth, shelly limestone, magnesium limestone and extractable limestone) is given in **Figure 2.5.** The Conceptual Mine Plan is shown in **Figure 2.6.**

2.8.1 Mining Reserves

Nandini Khundini Limestone deposit was granted to ACC Limited in the year 2008. In 1960 Bhilai Steel Plant has done some boreholes out of which 08 holes were present in lease area awarded to ACC Limited. Since then reserves and resources were estimated under old system of categorization. I.e. proved, probable and indicated.

As per the UNFC guidelines Nandini Khundini Limestone mines can be categorized as Stratiform, Strata bound and Tabular Deposit of regular habit. After the introduction of UNFC (United Nations framework for classification of reserves and resources) system and compliance to IBM circular no 03 of 2010, exploration work was done. All drilling data of present and previous investigations were utilized and Resources are again classified under new classification.

Measured Mineral Resources: The entire mining lease area was explored thoroughly by using core drilling at smaller grid. The total resources in the lease area work out to be 55.26 million tons. Detailed break of resources are given below. Feasibility and economic viability is required to be studied for conversion of these resources into reserves. It covers area of approx 53 Ha. Deepest bore hole has reached up to 72.5 m. Average CaO grade ranges from 4.08 % in OB to 46.69% in limestone. MgO grade is < 3% in Limestone. The measured mineral resources at NKM mine is given in Table 2.4.

Table 2.4 Measured Mineral Resources

Category	Lithology	Resources (Million tons)
Measured Mineral Resources	Overburden	2.57
(UNFC Code : 331)	Limestone upper	19.42
	Mg Shaly Limestone	11.04
	Limestone Lower	22.23
	Total	55.26

Proved Mineral Reserves: Proved mineral reserve is obtained after substracting feasibile resource from measured resource. Mg Shaly Limestone is also considered under proved category due to presence of an average CaO% of 38.64%. Break up as per different litho units are given in Table 2.5.

Table 2.5 Proved Mineral Reserves

Category	Lithology	Reserves(Mio.t)
Proved Mineral Reserves	Limestone Upper	17.36
(UNFC Code 111)	Mg Shaly Limestone	9.34
	Limestone Lower	17.04
	TOTAL	43.74

Table 2.6 Estimated Reserves and Resources

Classification	Code	Quantity (MT)	Grade
(1)	(2)	(3)	(4)
Total Mineral Resources(A+B) **A) Mineral Reserve** (1) Proved Mineral Reserve **B) Remaining Resources** (1) Feasibility Mineral Resource (2) Measured Mineral Resource (3) Indicated Mineral Resource (4) Inferred Mineral Resource (5) Reconnaissance Mineral Resource * *Non mineable due to Statutory obligations. Not economical and feasible due to current cement market scenario & mining technology presently in use.*	 111 211 331 332 333 334	 **43.74** **8.95*** NIL NIL NIL NIL	Grade of Mineral is good & it is entirely blendable with Mineral of our other captive Mine (Jamul & Pathariya L/s Mine) and suitable for cement manufacturing

Based on the detailed analysis carried out and IBM threshold cut off values for limestone in Chhattisgarh (Circular No: 3/2010) the average quality of the various lithologies are given below.

Table 2.7 Quality of Limestone

Litho Unit	UNFC - 111 in Million Tons	ROM Quality					
		SiO_2 %	Al_2O_3 %	Fe_2O_3 %	CaO %	MgO %	LOI %
Limestone Upper	17.36	10.49	2.87	1.56	44.24	2.18	37.21
Mg Shaly Limestone	9.34	12.93	3.39	1.79	38.64	5.31	36.21
Limestone Lower	17.04	7.64	1.95	1.03	46.69	2.39	39.15
Total	**43.74**	**9.90**	**2.62**	**1.40**	**43.9**	**2.93**	**38.89**
Dolomite	-	9.81	2.18	1.48	33.14	11.13	39.23
Overburden	-	36.96	12.89	25.17	4.08	0.6	15.99

Sub-grade Limestone: The average quality of limestone found in Nandini Khundini is either Cement grade or High grade which will be blended with marginal grade limestone of Jamul mines. The required quality of limestone is directly raised and blended proportionately with limestone of Jamul mines before feeding to crusher.

Application of Feasibility study and categorization of reserves and resources as per UNFC Guidelines: Measured mineral resources categories have been considered for feasibility assessment. Above resources will be reducing by non-mineable parts due to statutory obligation and tonnage having grade below cut off grade. Statutorily, some part of area cannot be mined as NE part of lease has to be diverted for plantation purpose. 50 m safety barriers from public road, 7.5 m safety barriers from boundary of lease area, 7.5 m left over for development of green belt and ultimate pit slope at 45^0 for slope stability of pits etc. In Nandini Khundini deposit, some quantity of limestone reserves will be blocked due to 7.5 m safety barrier and green belt along mining lease boundary, 30 m left out for creation of green belt in NE part of Lease area and some material will be blocked due to maintenance of ultimate pit slope of 45 -60 deg all along the mineral blocks.

Table 2.8 Conversion of Measured mineral resources to Proved mineral reserves

Category	Lithology	Resources (Mio.t)
Measured Mineral Resources	Overburden	2.57

(UNFC Code : 331)	Limestone Upper	19.42
	Mg Shaly Limestone	11.04
	Limestone Lower	22.23
	TOTAL	55.26

Non mineable part of Measured Mineral Resources (Blocked due to statutory obligation): These are approx losses are estimated due to 7.5 m safety barrier and green belt along lease boundary, 30 m width area left for development of green belt in NE along lease boundary and limestone blocked due to ultimate pit limit at 45 deg.

Category	Lithology	Reserves(Mio.t)
Feasibility Mineral Resources (UNFC Code: 211)	Limestone Upper	2.06
	Mg Shaly Limestone	1.70
	Limestone Lower	5.19
	TOTAL	8.95

Proved Mineral Reserves): Proved mineral reserves are obtained after subtracting feasibility mineral resource from measured mineral resource. Mg Shaly Limestone is also considered under proved category due to presence of an average CaO % of 38.64%. Break up as per different litho units are tabulated below:

Category	Lithology	Reserves(Mio.t)
Proved Mineral Reserves (UNFC Code 111)	Limestone Upper	17.36
	Mg Shaly Limestone	9.34
	Limestone Lower	17.04
	TOTAL	43.74

Anticipated Life of Mine: The total proved limestone reserves under UNFC 111 are 43.74 MT. Total life of mine established in the mining lease of 53.57 Ha shall be approx 45 years considering production at a rate of 10.3 LTPA. Mine will work up till 2058 / 2060 AD.

2.8.2 Conceptual Mining Plan

As per conceptual mining plan of Nandini Khundini Limestone Mine, the mine shall advance in all directions towards lease boundary. In the next five years on after the commencement of mining operations, the production level from Nandini Khundini Mine will be 1.6 LTPA to the maximum of 10.3 LTPA. The method of mining will be Mechanized system of opencast mining with deep hole Drilling and Blasting activity. Loading and transportation by tipper-shovel combination. Back filling in worked out area will be done after deepest level of exploitation of limestone. It is also proposed to create a new plantation area in north side of lease as per the condition stipulated in EC. The balance mined out voids / portion of the pit will be either back filled with OB generated during mining process or will be converted into water reservoir.

The Nandini Khundini Limestone Mine will be worked by mechanised system of opencast mining method. At present, Mining operations are not started in Nandini Khundini Mine. The limestone deposit is overlain by 3 m of overburden consisting of Alluvium, black cotton soil, hard murrum and bouldary stone. Initially overburden will be removed by shovel – tipper combination and unloaded at properly defined area called Dumps. After that dumps are designed and maintained with the help of Dozer to create adequate space for future dumping. After removal of OB, limestone benches will be ready for drilling and blasting operation. Blast holes of 115 mm dia will be drilled up to 7-9 m with the help of drilling machines with 5% sub grade drilling. The complete drilling operation will be of wet drilling method and no dust will be allowed to become air borne while drilling. The blast holes will be drilled with parameters having burden of 2.5 to 3.5 m and spacing 3 to 5.5 m. These blast holes will

be charged with explosive (mixture of ANFO and booster). Around 70% of hole depth will be charged with explosives and balance 30% will be stemmed with loose soil to have effective blast. These blast holes after charging with explosives will be then normally blasted by using non-electric shock tube detonator/delay system. This will reduce the ground vibration and throw. For breaking the oversized boulders, Rock breaker will be used.The blasted stone will be loaded by Hydraulic excavators and transported by tippers to crusher located at Jamul Limestone Mine for further processing. The distance from the mines to the plant is approx 24 Km (by road). The mode of transportation chosen is by 16 ton capacity tippers. Loading of limestone is done by shovels having a bucket capacity 4.0 cubic meter. To arrest the dust pollution while hauling the limestone by tippers, water will be sprinkled on the haul road with help of water tanker. The width of the working benches will be maintained at 20 meters, bench height 7 meters and the ultimate slope will be 45 -60° from the horizontal.

Mining Benches: Following mining benches are proposed.

Bench	Level (in meters)	Remarks
	Above 280	Lateritic Soil
I	280 – 277	OB Bench
II	277 – 270	Benches developed in limestone horizon which includes Limestone Upper, Patches of Mg Shaly Limestone and Limestone Lower
III	270 – 263	
IV	263 – 256	

Accordingly, more benches will be developed upto MRL 221 in furure course of mining.The bench angle of Limestone bench will be provided less than 90 degrees for limestone and average pit slope will be maintained at 45 degrees. For overburden and soil bench angle will be maintained at 60 degrees. This is especially safe in Nandini Khundini where the deposit is massive.

2.8.2.1 Development and Production Plan

Overburden, Waste and Top Soil: Overburden will be kept in advance of limestone benches. Bench height to be maintained for overburden bench is from 3 m. Overburden handled will be dumped at suitable sites and will be dozed regularly. Waste material if generated during excavation will be backfilled in the worked out pit Proposed handling of OB and waste quantity and specified area for the next five years of the scheme period is shown in below table.

Table 2.9 Year Wise Proposed Bench Configuration: Overburden Year: 2013-2014 to 2017-18

Year	OB	Location between section line and direction	Bench RL From - To	Face Length (m)	Face Advance (m)	Height of Bench (m)	Quantity (Tons)
2013-14	OB	SL – 3 to SL – 6, W side	280 - 277	450	09	3	27010
2014-15	OB	SL – 3 to SL – 6, EW side	280 - 277	651	30	3	72230
2015-16	OB	SL – 3 to SL – 6, EW side	280 - 277	1321	18	3	64756
2016-17	OB	SL – 3 to SL – 7, EW & N side	280 - 277	787	55	3	74601
2017-18	OB	SL – 3 to SL – 7, EW & NS side	280 - 277	415	53	3	74665

Top Soil: The mining lease area in 53.57 ha has OB in the form of lateritic soil. There is no fertile top soil except lateritic soil which will be removed and stacked properly within the lease boundary. In due course of mining, if some quantity of top soil gets generated i.e. Layer of 0.2 to 0.3 m of black cotton soil then it will be used for plantation on matured dumps. The quantity of top soil cannot be envisaged in the present stage of mine.

Limestone Production: Year wise production of limestone for the next five years will be done from the central part of the mineralized area of the lease. For the cause of systematic mining and mineral

conservation, it is proposed to extract limestone from the maximum depth possible. The details of year wise limestone production for next five years are shown below:

Table 2.10 Year Wise Proposed Bench Configuration: Limestone Benches
Year: 2013 – 2014 to 2017-2018

Year	Bench	Location between section lines, Distance & Direction	Bench RL From – To	Face Length(m)	Face Advance (m)	Height of Bench(m)	Weighted Avg. CaO (%)	Quantity (Tons)
2013-14	II	SL – 3 to SL – 6, W side	277-270	422	50	7	43.2	148137.5
						Total	43.2	**148137.5**
2014-15	II	SL – 3 to SL – 6, EW side	277-270	515	18	7	43.5	159425
						Total	43.5	**159425**
2015-16	II	SL – 3 to SL – 6, EW side	277-270	1055	10	7	43.5	91035
	III	SL – 3 to SL – 4, E side	270-263	258	49	7	43.6	59500
						Total	43.55	**150535**
2016-17	II	SL – 3 to SL – 6, W side	277-270	1011	72	7	43.2	377650
	III	SL – 3 to SL – 6, EW side	270-263	491	151	7	43.8	448770
	IV	SL – 3 to SL – 5, W side	263-256	451	80	7	44	203581
						Total	43.67	**1030000**
2017-18	II	SL – 2 to SL – 6, SW side	277-270	449	56	7	44	239592.5
	III	SL – 2 to SL – 6, SW side	270-263	881	48	7	44.2	335407.5
	IV	SL – 2 to SL – 6, SW side	263-256	769	68	7	43.8	455000
						Total	44	**1030000**

Table 2.11 Summary of Limestone Production, OB Generation and Stripping Ratio

S.No	Year	LS Production in tons	OB in tons	Stripping Ratio
01	2013-14	148137.5	27010	0.18
02	2014-15	159425	72230	0.45
03	2015-16	150535	64756	0.43
04	2016-17	1030000	74601	0.072
05	2017-18	1030000	74665	0.072

Proposed Rate of Production: The proposed rate production will be 10.3 lakh tons per year from 2016-17 onwards

2.8.2.2 Development and Production (5 year block period up to end of life of mine):

The Block wise development and production, on five yearly bases after the scheme period i.e. 2015 is as follows (5 Year block period).

Table 2.12 Year-wise Limestone Production and OB Generation

Sr. No.	Plan Period Year	Limestone, Lakh Tons	Overburden, Lakh Tons
1.	2013-2018	25.18	3.13
2.	2019-2023	51.50	7.725
3.	2024-2028	51.50	7.725
4.	2029-2033	51.50	7.725
5.	2034-2038	51.50	7.725

6.	2039-2043	51.50	7.725
7.	2044-2048	51.50	7.725
8.	2049-2053	51.50	7.725
9.	2054-2058	51.50	7.725

2.8.2.3 Mining Method

Mode of Working: Nandini Khundini Limestone Mine will work as Fully Mechanized mine. Deep hole drilling & blasting will be carried out. Limestone will be raised by shovel/ tipper combination and fed to crushers.

Extent of Mechanization: The mining will be carried out by open cast method of mining by Shovel tipper combination and will be fully mechanised. In the near future there will not be any change in proposed Mining method. The machineries proposed to be deployed are given in below table.

Table 2.13 List of Mining Machinery Proposed in NK Mines

	Type	Make	Model	Capacity	No's
1	Hydraulic Excavator	Komatsu	PC – 650	4.0 cu.m	2
2	Tippers	TATA / Leyland		16 tons	As per requirement
3	Track Mounted Drill	Atlas Copco	ROC L6	115 mm dia hole	1
4	Dozer	BEML D	D 155 A-1	340 HP	1
5	Hyd Rock Breaker	Krrup on PC-220	PC-220		1
6	Jeep	Tata	Sumo Victa		1
7	Water Tanker	Tata		8000 litres	1
8	Water Pump	Mather & Platt		71.00 litres/sec	1

Blasting: Presently mining operations are not yet commenced in Nandini Khundini mine, but in future all the precautions will be taken to minimize nuisance caused by blasting. All necessary safety precautions will be taken in accordance with the Explosives Act. Precautions will also be taken as per permission given under MMR 1961, 106(2) (b) by Director of Mines Safety for deep hole drilling and blasting and usage of heavy earthmoving machinery.

Noise due to blasting will be controlled by using non-electrical initiation (NONEL). The secondary blasting will not be done & boulders so generated in due course of mining will be broken with help of hydraulic rock breaker.

Ground Vibration: Blasting will be carried out by using NONEL. Vibration Studies will be carried out on three year interval by external agency. Company has already procured an INSTANTEL make MINIMATE (approved blast induced ground vibration measuring device) to measure the frequency of vibrations generated due to blast and simultaneously improvements in blasting practice will be done. Study of same will be done internally to monitor ground vibration.

In order to minimize vibration the following precautions will be taken:

- Non -Electric detonators to initiate Blast holes.
- Care will be taken to ensure that the effective burden is not excessive and the free faces are kept sufficiently long. The burden is kept at 2.5 to 3 meters and spacing of 4.5 m to 5.5 m.
- Explosives charge per delay will be kept as low as possible.
- The depth of the hole will be normally 9-10 meters. The diameters of the holes will be 115 mm.
- Adoption of 2-3 row blasting.
- The firing of maximum possible No. of blast holes towards free face.
- Use of non electric shock tube detonators DTH and HTD detonators.

ACC will take all the above precautions for blasting in the existing lease area. Peak particle velocity will be maintained well below the permissible limit.

Type of Explosives used: 115mm dia holes will be charged with a combination of high to medium strength cap sensitive booster explosives/ ANFO. The following explosives are used.

- Ammonium Nitrate Fuel Oil Mixture — From DFPCL
- Kelvex 600 83 mm — From Keltech Energies Limited
- Kelvex-P 50 mm — From Keltech Energies Limited
- Toe Blast 83 mm — From IDL Explosives Limited
- Superdyne 50 nn — From IDL Explosives Limited
- Delay Detonators — From IDL Explosives Limited
- NONEL Detonators — From IDL Explosives Limited

Method of providing delay sequence: NONEL MS delay detonators will be used for both DTH delay and surface delay. Charge per delay will be kept at minimum level with proper delay sequence. Use of NONEL MS delay helps in reducing the charge per delay substantially which is crucial for ground vibration control.

Storage of Explosives: The explosives are stored in Government approved magazines at mine site of Jamul and Pathariya Mines, licensed by Controller of Explosives, Nagpur. In addition, permission has been taken from Chief Controller, Nagpur, to use ANFO in the mines. The explosives will be transported by explosive van under the supervision of a competent person. Ammonium nitrate will be mixed with diesel oil with strictly safety precautions under the supervision of competent person. All safety Rules and Regulations will be followed while storing and transportation of explosives. Location of magazine is inside the existing lease area of Jamul and Pathariya Mines which is already catering requirement of Jamul & Pathariya mines and will also cater requirement of Nandini Khundini Mines.

The details of magazines are as under:

- Magazines License no. E/HQ/CG/22/50 (E801) in form LE-3.

Nitrate Mixture	Class II/Divn.2	9075 Kgs.
Detonating Fuse	Class VI/Divn.2	15000 Mts.
Detonators	Class VI/Divn.3	15000 Nos.

- Magazines License no. E/HQ/CG/22/132 (E35203) in form LE-3.

Nitrate Mixture	Class II/Divn.2	9075 Kgs.
Safety Fuse	Class VI/Divn.1	10000 Mts.
Detonating Fuse	Class VI/Divn.2	15000 Mts.
Detonators	Class VI/Divn.3	15000 Nos.

(3) Magazine License no. E/HQ/CG/22/67 (E9604) in form LE-3.

Nitrate Mixture	Class II/Divn.2	1361 Kgs.
Safety Fuse	Class VI/Divn.1	40000 Mts.
Detonating Fuse	Class VI/Divn.2	2500 Mts.
Detonators	Class VI/Divn.3	10000 Mts.

ACC also have permission to use ANFO in the mine for which we have mixing shed. There are no public roads or any other building within the stipulated zone around the explosive magazine. The explosives are transported from the magazines to the blasting site in an approved van under the supervision of a competent person.

Noise: The following steps will be taken to minimize pollution by noise.

(a) Blasting will be well designed and to be blasted periodically rather than a couple of hastily unplanned blasts daily. All the explosives with detonators (NONEL) will be used within the blast hole and detonating fuse is not used for trunk line.

(b) Blasting will be planned to minimize boulders.

(c) Hydraulic rock breaker will be utilized so that secondary drilling and blasting will be avoided completely.

(d) Plaster shooting will not be carried which increases noise levels.

(e) Secondary blasting & drilling will not be done.

Fly Rocks: While Blasting, if the holes are not properly designed and charged, the main thrust of the blast will be upwards and instead of fragmenting the rock, there will be an outward surge resulting in rock fragments flying. In order to prevent fly rocks:

(a) Stemming length will be kept equal to the burden or 20-25 times the diameter of blast holes.

(b) Inter-row delay will be selected in such a way that each row pushes its burden forward rather than in an upward direction.

(c) Hydraulic rock breaker will be utilized to eliminate secondary blasting which results in greater number of fly rocks.

(d) Toe formation will be avoided by proper design of drilling and blasting as toe hole blasting involves increased risk of fly rocks.

2.8.2.4 OB Generation and Management

As there is almost uniform layer of overburden of about 2 m, the mine development which shall be carried out has been depicted on the Five Yearly Basis Conceptual Plan. The top layer of fertile soil will be dumped on the top of the dump for plantation (after formation of dumps). In the north side of lease area, space has been demarcated for development of plantation. Also the fertile soil generated during mining operation will also be dumped along lease boundary for development of green belt.

Back filling activity will be done after exploitation of limestone to the deepest level. Outside UPL, Backfilling will be done in Ist, IIIrd, IVth and Vth year. Back filling will also be done beyond the completion of this scheme. After waste backfill, the top layer will be covered with top soil and plantation will be carried out accordingly.

Inclination of OB Dumps: The slope of the individual dump will be maintained at an angle lower than natural angle of repose of material (37^{o}) and they are benched of height not exceeding 9 m in height (3 benches each of 3 m height). The bund of sufficient height shall be provided along the periphery of the dumps to prevent soil erosion. A good quantity of boulder / waste material is surrounded on the down side of the dumps in order to prevent any kind of soil erosion. Some places trench has been dug around the dump for the purpose. The top soil will be spread over the dumps and on the slopes; plantation will be done for stabilization.

Pit wise yearly generation of waste: The limestone deposit is overlain by 03 of overburdens consisting of Alluvium, lateritic soil, hard murrum and float ore. Other than this, there may be irregular occurrence of intercalated shale of argillaceous limestone throughout the area. If encountered, the weathered limestone boulders from first bench will be sorted out while handling the over burden & collected at one place and after breaking with the help of hydraulic rock breaker, supplied to crusher. In this manner 10 percent limestone from first bench may be recovered. The quantity of this limestone cannot be calculated in a defined manner, it is not taken in to accounting for the cause of production

planning in this scheme of mining. Yearly OB and other solid waste generation from NK Mines is given below

Year	OB (Tons)	Waste (Tons)
2013-2014	27010	NIL
2014-2015	72230	Nil
2015-2016	64756	NIL
2016-2017	74601	NIL
2017-2018	74665	NIL

Proposal for disposal for next five years of scheme of mining: Disposal of OB material is proposed in three ways i.e. Dumping along lease boundary for creation of green belt, filling old worked out pits in North West side of lease area for plantation and back filling of waste in working pit after complete exploitation of limestone. Designated dumping areas are located outside the mineralized zone in north western part of the lease area. The OB material generated during mining operations will be dumped in these areas. Back filling will start from first year onwards in old worked out pits by OB and it will continue beyond the completion of scheme after 5 years also. Manner of disposal of OB will be loading and transportation by shovel – tipper combination and / Compacting by dozer operation.

Year	Location of Dumps and Back fill area
2013-14	100 m North West side of SL – 7 (Back Fill)
2014-15	20 m North West side and 10 m North East side of SL – 7 (Dumps)
2015-16	70 m North East side of SL – 7 (Back Fill)
2016-17	150 m North East side of SL – 7 (Back Fill)
2017-18	200 m North West side of SL – 7 (Back Fill)

Selection of Dumping Site: The dumping yards have been selected to comply the requirements of EC granted for Nandini Khundini Limestone Deposit from MOEF. The backfill area proposed in this scheme of mining is old worked out pits in North Eastern part of lease area. Here is no public road, vegetation or streams. There is no danger from rolling stone or caving of dumps. The dumping sites selected for disposal of OB is of two types. i.e. either along lease boundary for creating green belt or on Old worked out pits.

(i) Dumping of Soil for Green Belt: Dumping will be done in north part of lease area outside UPL. It is also planned to cover total lease boundary with plantation by dumping OB along lease boundary and planting saplings.

(ii) Backfilling of OB in old worked out pits: The backfilling activity is planned by filling old worked out pits in North and North Eastern part of lease area. Back filling will also be done in worked out pits after full exploitation of limestone up to deepest possible level. Back filling will continue beyond the completion of this scheme.

Year	Approx Area (ha)	Approx Qty (Tons)
2013-14	0.139	25000 (Back fill)
2014-15	1.33	72230 (Dumping)
2015-16	0.19	57000 (Back fill)
2016-17	0.21	70000 (Back fill)
2017-18	0.21	70000 (Back fill)

Height of individual dumps: Maximum height of the dump will be 9 m and same will be benched at 3 m with gentle gradient. The general slope of the dumps will be maintained well within the safe angle of repose.

Precaution/protective works: The dumps will be made strictly as per guidelines providing proper drainage, access. A parapet wall of sufficient height, made bouldary material will be surrounded to these dumps to prevent any erosion and runoff. To stabilize the slope of the dump, trees have been planted on top and slope.

2.9 Mine Closure Plan

The mined out area will be partially back filled by overburden removed from the top surface and rest converted into Water Reservoir. The water reservoir so created will be suitably fenced and the entrances to the water reservoir will be provided with suitable doors which shall be securely locked. Adequate warning signals and signboards will also be displayed at strategic points. Security persons will also be deployed to take the stock of security.

Post mining land use pattern: The mined out area will be partially back filled by overburden removed from the surface and rest converted into water reservoirs. The plantation will be done on the remaining area in the lease.

Post Mining Land use of the Core Zone

Post Mining (Conceptual) land use pattern of ML area(Ha)							
Sr. No.	Description	Total Area	Land Use(Ha)				
			Plantation	Water body	Public Use	Undisturbed	Total
1	Excavation (Backfill)	33.97	33.97	0	0	0	33.97
2	Water Reservoir	14.8		14.8	0	0	14.8
3	External Dump or back fill on North side of Lease	1.79	1.79	0	0	0	1.79
4	Green Belt all along lease boundary	3.01	3.01	0	0	0	3.01
	Total	53.57	38.78	14.8	0	0	53.57

Note: Upto end of mine life, Total broken area will be approx. 48.77 Ha. Out of which, area likely to be backfilled will be approx. 33.97 Ha and area left out for Water reservoir will be 14.8 Ha.
Upto end of life of mine, it is proposed that approx 38.78 Ha of plantation will be developed (including the green belt developed during initial years of mining).

2.10 Infrastructure Facilities for Workers

Workers will be recruited from nearby villages. Proper training shall be imparted to the workers for skill development. All infrastructure facilties shall be provided at Pathariya-Lease-I site. However, a small canteen cum rest room with washroom and toilet, packaged drinking water facilties shall be provided at NK mine site.

2.11 Mitigation Measures

2.11.1 Water Environment

Rainwater accumulated Water reservoir inside mine area will be used for proposed expansion. The surface runoff generated during rainfall event will be diverted to water reservoirs within the mines premises. This will act as rainwater harvesting structure. Garland drains with sedimentation pits at appropriate intervals will be made around the overburden dump. Runoff from dump slopes will be passed through coir packed filters to arrest the silt before letting it to the pits. Gully along the slopes will be provided with coir packed plugs to arrest the silt. The slopes will be compacted routinely; soil

will be spread over it and stabilized by planting hers and shrubs. This will prevent soil and silt erosion. Domestic wastewater will be treated in septic tanks and disposed in soak pits. All water accumulated inside the mines premises will be checked to avoid breeding of mosquitoes. The spent oil and lubricants from workshop, vehicles, etc will be given to authorized SPCB/CPCB re-processors. There will be no discharge of wastewater outside the mine premises.

2.11.2 Air Environment

Dust is the main pollutant generated during various mining operations, including blasting, haul roads, crusher, loading and vehicular movement. Stable roads will be made inside the mining premises for movement of vehicles. Water sprinkling system (truck mounted) will be applied for dust suppression on haul roads. Regular maintenance of vehicles and equipment will be carried out. Wet drilling and controlled blasting (using latest NONEL technology) will be adopted. All conveyors shall be covered. Thick 30 m wide greenbelt will be developed on east side of the mine premises (towards Jamul village), on south side (towards Kurud village) and on north side of the mine (towards Dhaur village). Small herbs and shrubs like Bawal, Bougainvillea, Kaner, Lantana, Adhusa, Ber, Custard apple; Casurina, Thor, etc. will be planted in the first 15 m. Thereafter trees like Shisham, Gulmohar, Peepal, Jamun, Neem, Kadamb, and Aam will be planted in next 15 m.

2.11.3 Noise Environment

Material handling, movement of vehicle, blasting, loading unloading and DG sets are the main noise generating sources in the mine site. Material handling operations and movement of vehicles will be properly scheduled to minimize noise. Maintenance program for heavy vehicles will be routinely followed. Non-electric delay detonator will be used to minimize the ground vibrations. Workers working inside crusher house will be given ear plugs and ear muffs. Mining will be done only during day time. In this manner the noise level at the mine boundary will be below the national standard of 55 dBA during day time and 45 dBA during night time.

The following steps will be taken to minimize noise and vibration:

(a) Blasting will be well designed and to be blasted periodically rather than a couple of hastily unplanned blasts daily. All the explosives with detonators (NONEL) will be used within the blast hole and detonating fuse is not used for trunk line.

(b) Blasting will be planned to minimize boulders.

(c) Hydraulic rock breaker will be utilized so that secondary drilling and blasting will be avoided completely.

(d) Plaster shooting will not be carried which increases noise levels.

(e) Secondary blasting & drilling will not be done.

In order to minimize vibration the following precautions will be taken:

- Non -Electric detonators to initiate Blast holes.
- Care will be taken to ensure that the effective burden is not excessive and the free faces are kept sufficiently long. The burden is kept at 2.5 to 3 meters and spacing of 4.5 m to 5.5 m.
- Explosives charge per delay will be kept as low as possible.
- The depth of the hole will be normally 9-10 meters. The diameters of the holes will be 115 mm.
- Adoption of 2-3 row blasting.
- The firing of maximum possible No. of blast holes towards free face.
- Use of non electric shock tube detonators DTH and HTD detonators.

2.11.4 Land Environment

Overburden will be stacked at the periphery of mining lease boundary (7.5 m inside the mine boundary). The slope will be maintained at less than 37^{o}, with adequate number and size of steps / trenches made. The slopes will be compacted and spread with 8-10 cm thick soil cover and grass, legumes and small shrubs will be planted along the slopes. Coir filled bags will be fixed with wire mesh at several places along the garland drain and gully of dump to arrest the erosion. Garbage will be collected in containers and segregated at source itself. Recyclable materials will be sorted out and sold to kabadis. Inert material will be reused as landfill. Organic and other green waste will be taken to compost pit. Use of plastic inside mine area will be strictly prohibited. Mined out area will be suitably reclaimed after extracting the limestone. Reclamation will be done by backfilling the overburden. Voids will be converted to water body and given to local dhimras / fisherman community for fish cultivation.

2.11.5 Other Mitigation Measures

For reducing adverse environmental impacts from other sources, following mitigation measures are recommended:

- Wet drilling will be practiced. The drilling machine will have inbuilt water sprinkling arrangement and dust extraction system.
- Controlled blasting technique will be followed. The site will be wetted before blasting. The safety fuse shall be covered with sand layer of 15 cm thick before blasting. Blasting will be done around noon.
- Non-electric shock tube initiating system and Noiseless Trunkline Delay detonators and IKON (Digital Electronic System) (if possible) will be used to keep the air blast levels to the lowest possible limits and minimize noise and vibration.
- Ground vibrations to be continuously monitored during blasting using Minimate Seismograph, through study of the peak particle velocity at different distances.
- Hydraulic rock breaker will be used to eliminate the use of secondary blasting.
- Combination of primary rock breaker and backhoe will be used for efficient collection and loading.
- Chemical binders / wetting agents/ surfactants will be used on haul roads to reduce water consumption during sprinkling for dust suppression. Compaction, gradation and proper drainage will be provided for haul roads. Road side plantations will be developed to arrest fugitive dust.
- Low sulphur fuel will be used in the Heavy Earth Moving Equipment, trucks, dumpers, other vehicles and DG sets.
- Haul roads in mines will be stabilized. Vehicular speed in mines area will be restricted to 20 kmph.
- Depression area within the worked out site will be converted to water body. The water body will be used for pisciculture in association with surrounding villagers.

Figure 2.3 Surface Plan of Lease Area

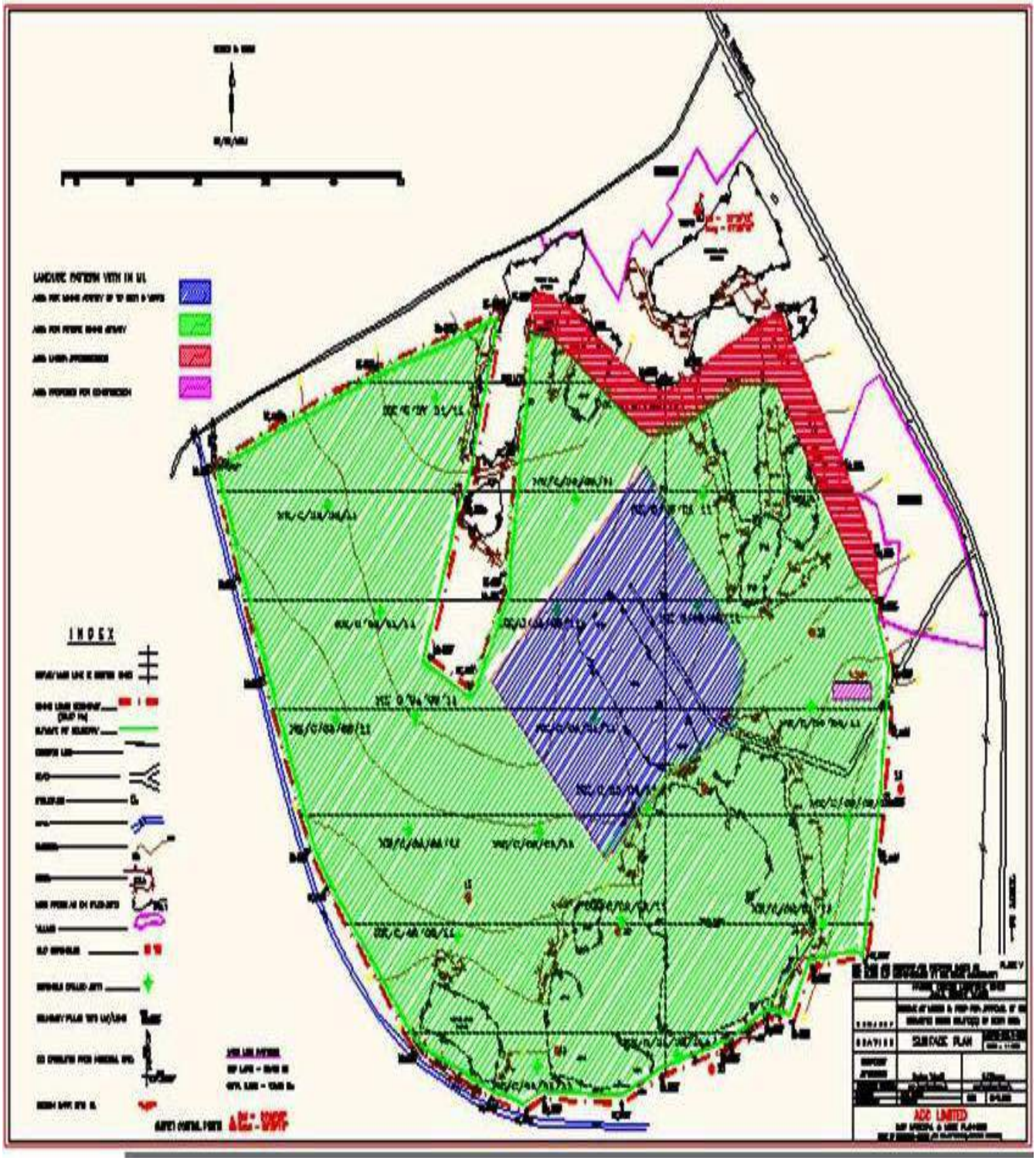
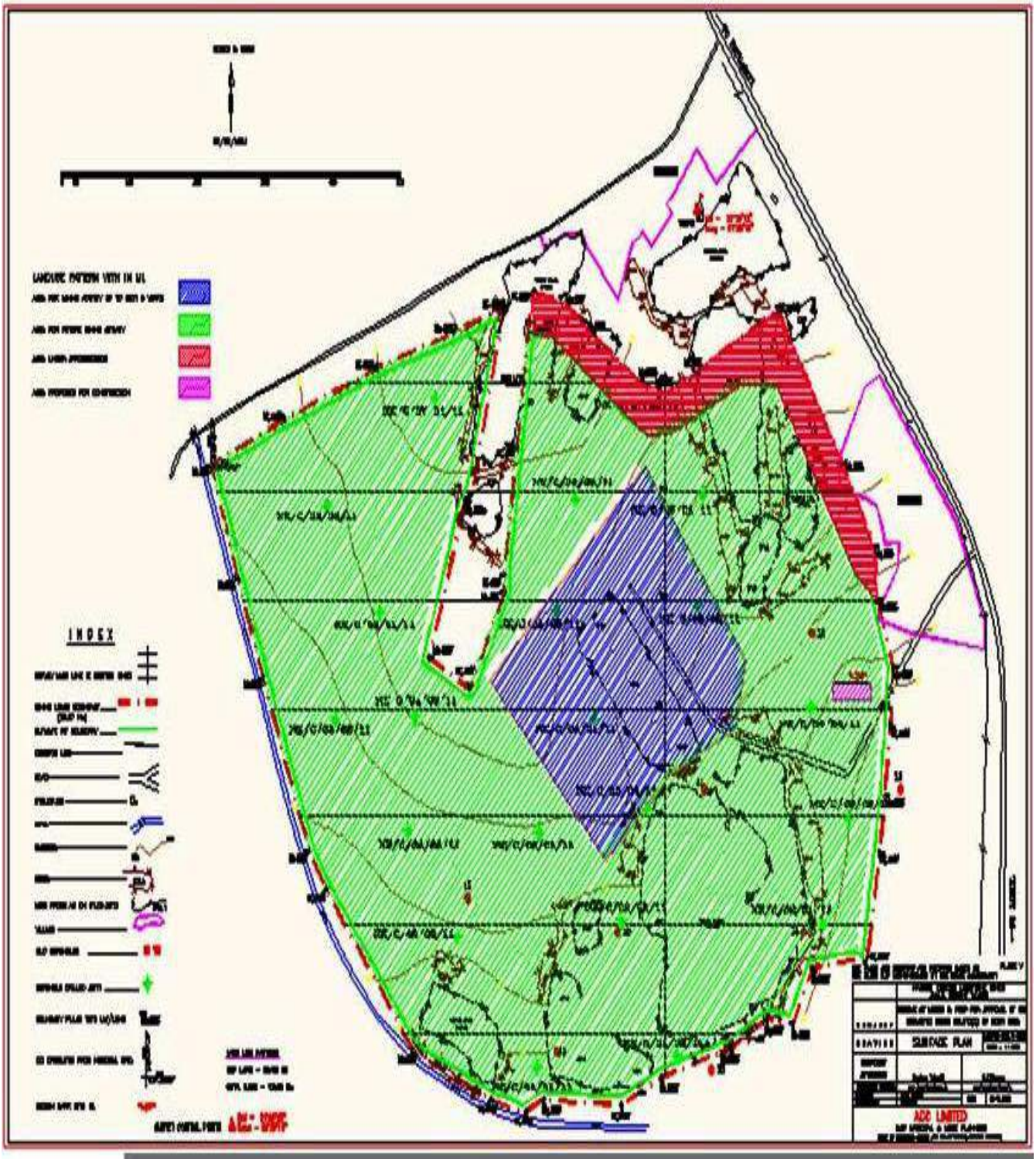


Figure 2.4 Geological Plan of Lease Area



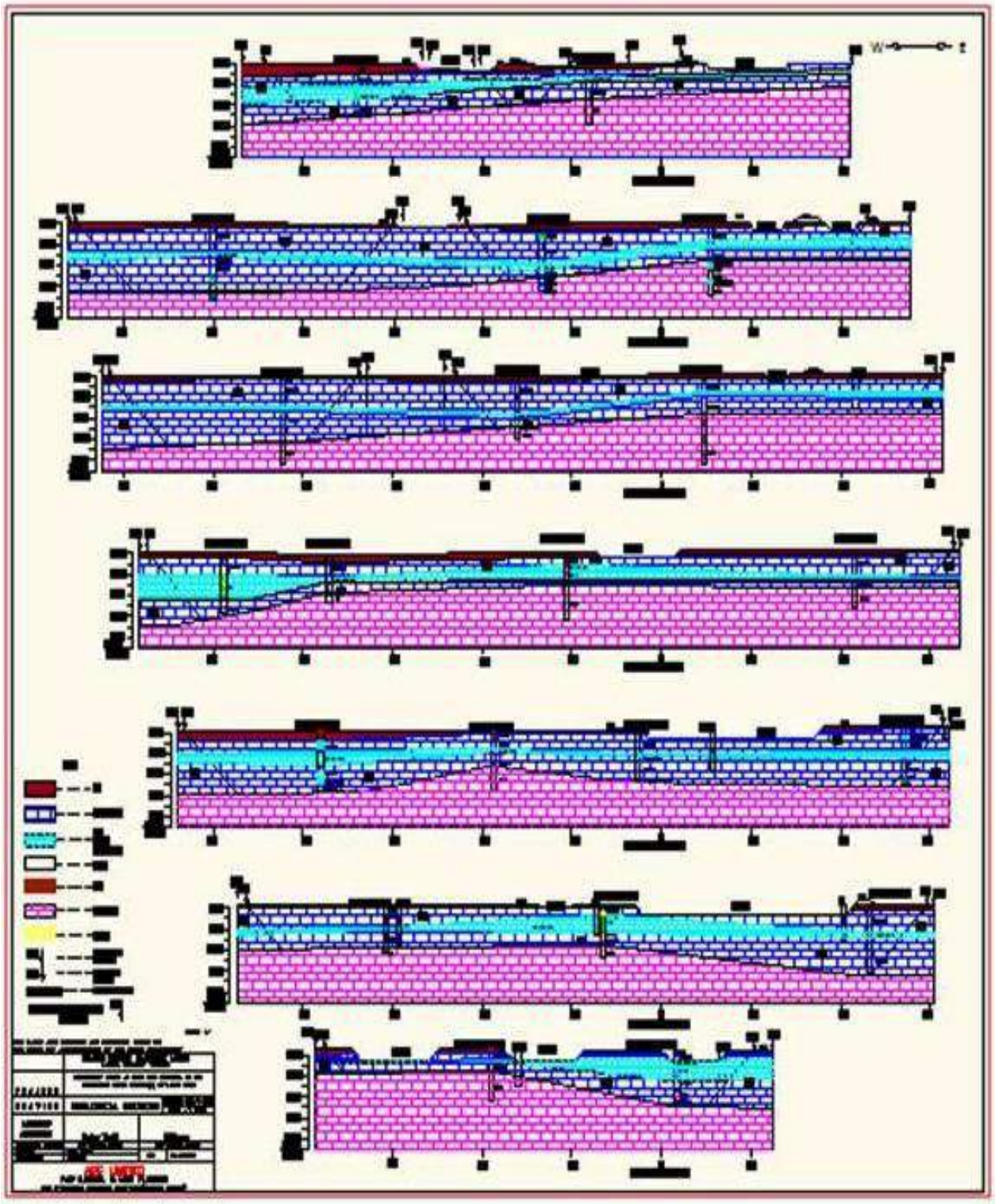
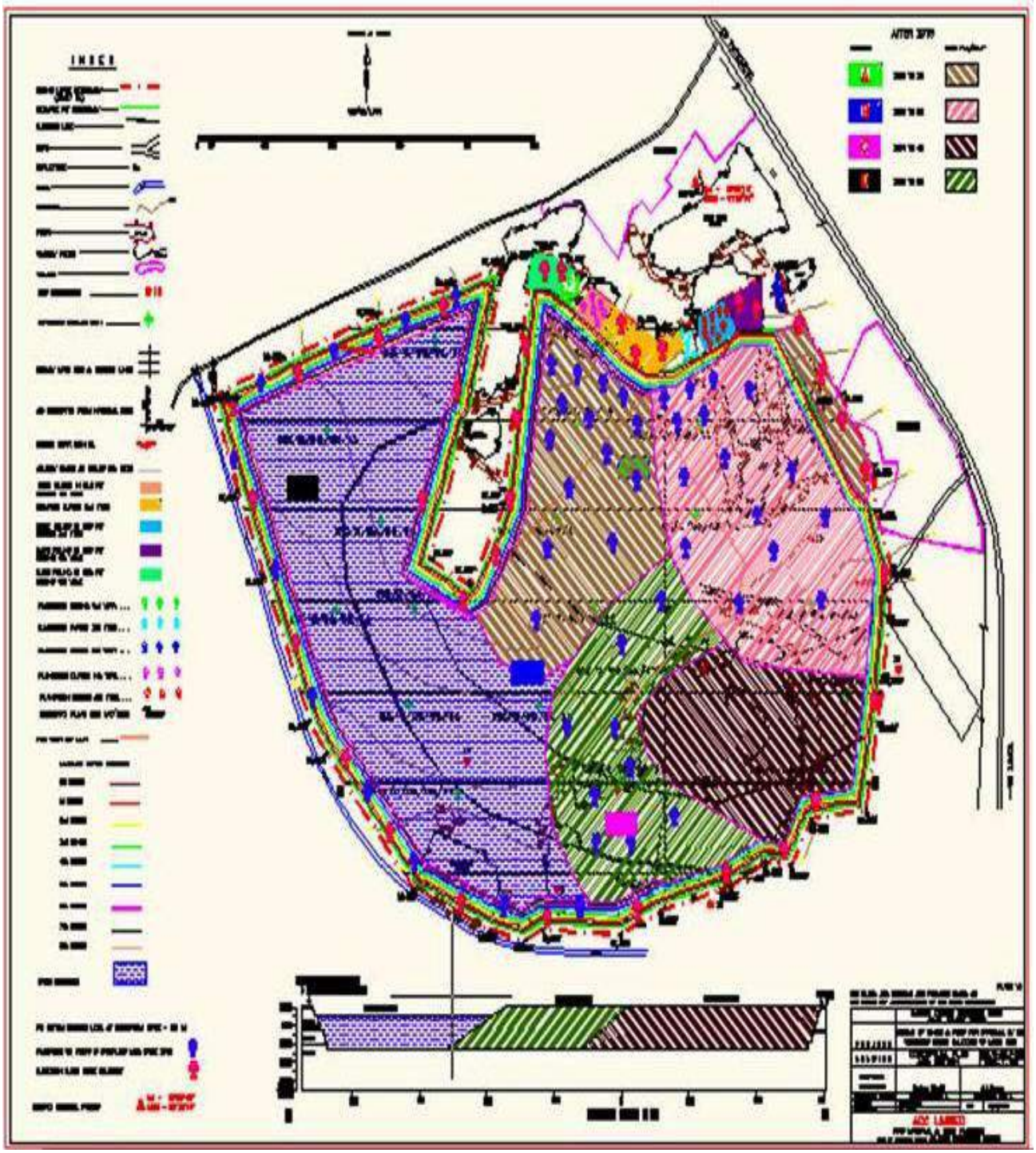


Figure 2.5 Geological Sections of Lease Area

Figure 2.6 Conceptual Mine Plan



CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT

3.1 Study Area, Period and Methodology

The baseline environmental quality has been collected during the period of March 2014 to May 2014 (Summer Season) within a study area of 10 km radial distance around the mine site. The study area of 10 km covers 10 km distance of all 3 mines of ACC as shown in Figure 1.3. The study period and methodology for various environmental components is discussed in **Table 3.1**.

Table 3.1 Components, Study Area, Study Period and Methodology of EIA

Component	Study Area	Study Period	Methodology
Meteorology	Nandini Nagar, which is within 10 km of all 3 ACC mines	Summer Season (1st March 2014 to 31st May 2014)	Weather monitoring location was established at Nandini Nagar. Wind speed, wind direction, relative humidity, and temperature were recorded on hourly basis. Long-term historical met data was obtained from Climatological Tables of IMD. Rainfall data collected from IMD.
Ambient Air Quality	Impacted and non-impacted area due to air emission from project	Summer Season (1st March 2014 to 31st May 2014)	AAQ monitoring was done at 8 locations by following the CPCB methods. Sampling locations were established at villages around the site at various upwind and downwind directions.
Noise Quality	Locations covering all category of study area	Summer Season (25th March to 5th April 2014)	Noise level monitoring was done at 8 locations at various area categories using integrated sound level meter. Measurements were taken by following the CPCB procedure.
Surface & groundwater quality	U/s & d/s of streams and groundwater of villages of study area	Summer Season (15th March to 16thMarch 2014)	Grab sampling was done and the samples were preserved and analysed for relevant parameters following the methods prescribed by APHA. Four samples of surface and eight samples of ground water were collected.
Soil Quality	Agriculture fields of study area	Summer Season (16th March 2014)	Eight samples were collected and analyzed for all relevant parameters by following IARI Methods.
Land use	10 km area of all 3 mines of ACC	-	Land use analysis using Satellite Imagery and GIS Technique
Flora & Fauna	Forests of study area of all 3 mines of ACC	Secondary data and field survey	Secondary Data collected from Forest Department and checked during field surveys. Primary data generated at site.
Demography and Socioeconomic	Study area of all 3 mines of ACC	Secondary data and field survey	Secondary Data was collected from Primary Census of India 2011 & Statistics Handbook of Durg District.

The study area map of the core zone and 10 km area of the buffer zone showing major topographical features such as land use, drainage, location of settlements, railways, highways, canals, streams, ponds, and industries / mines is shown in **Figure 3.1 and 3.2.**

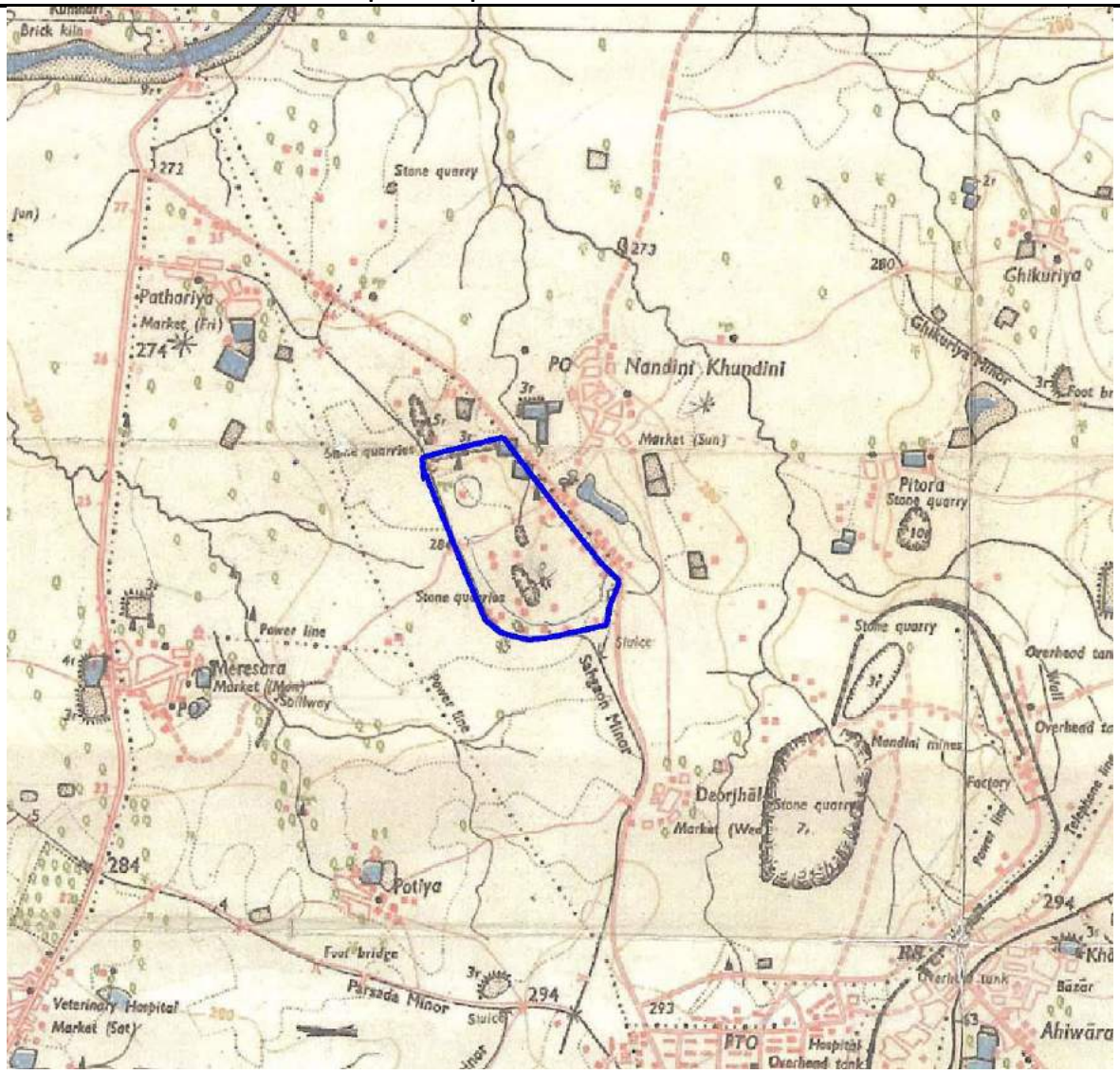


Figure 3.1 Map showing Core Zone (blue colour) and Surrounding Features

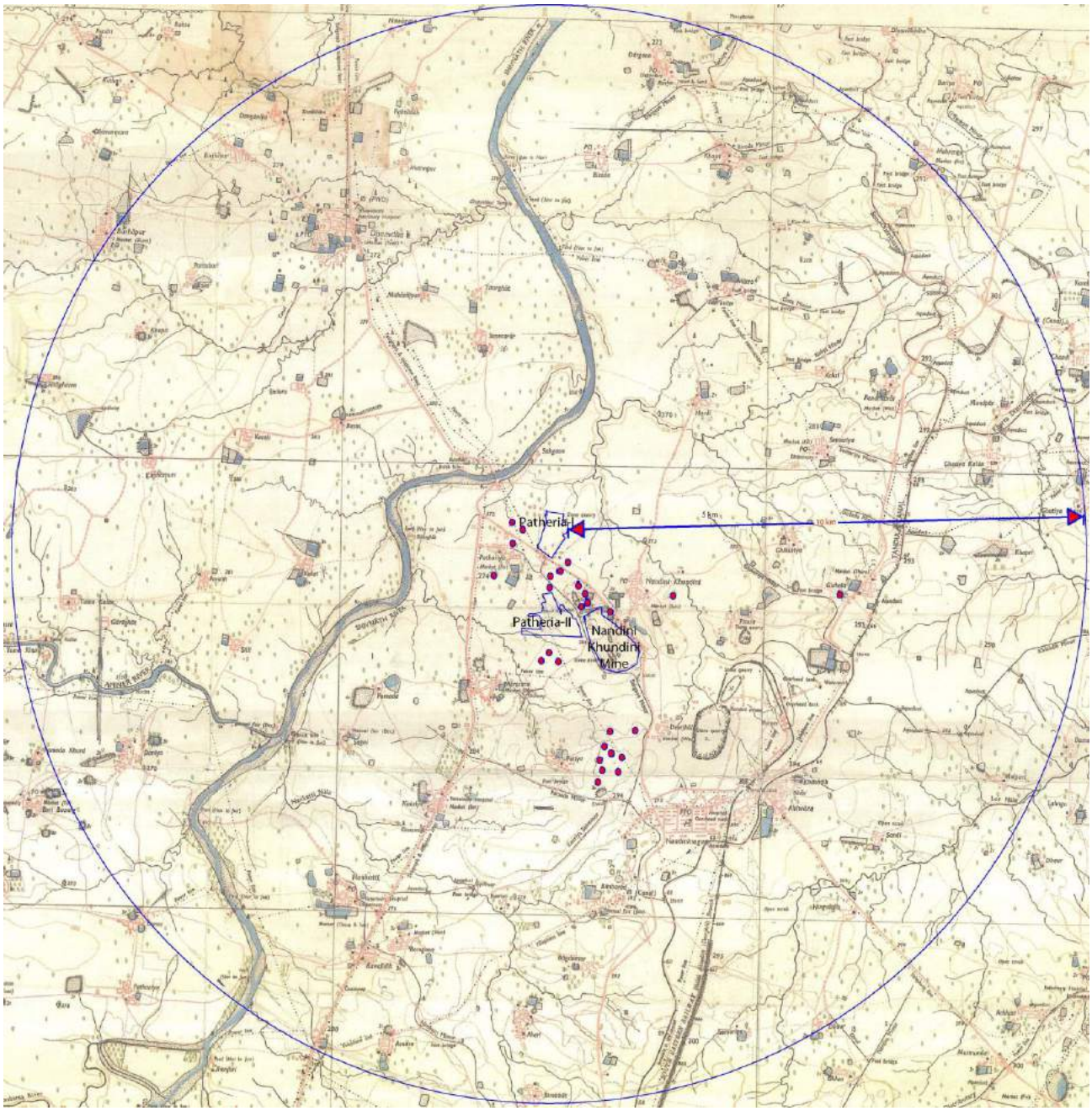


Figure 3.2: 10 km Area of Buffer Zone Showing Land use, Drainage, Settlements, Rail line, Roads, Canals, Streams, and Industries / Mines / Crusher(in dots)

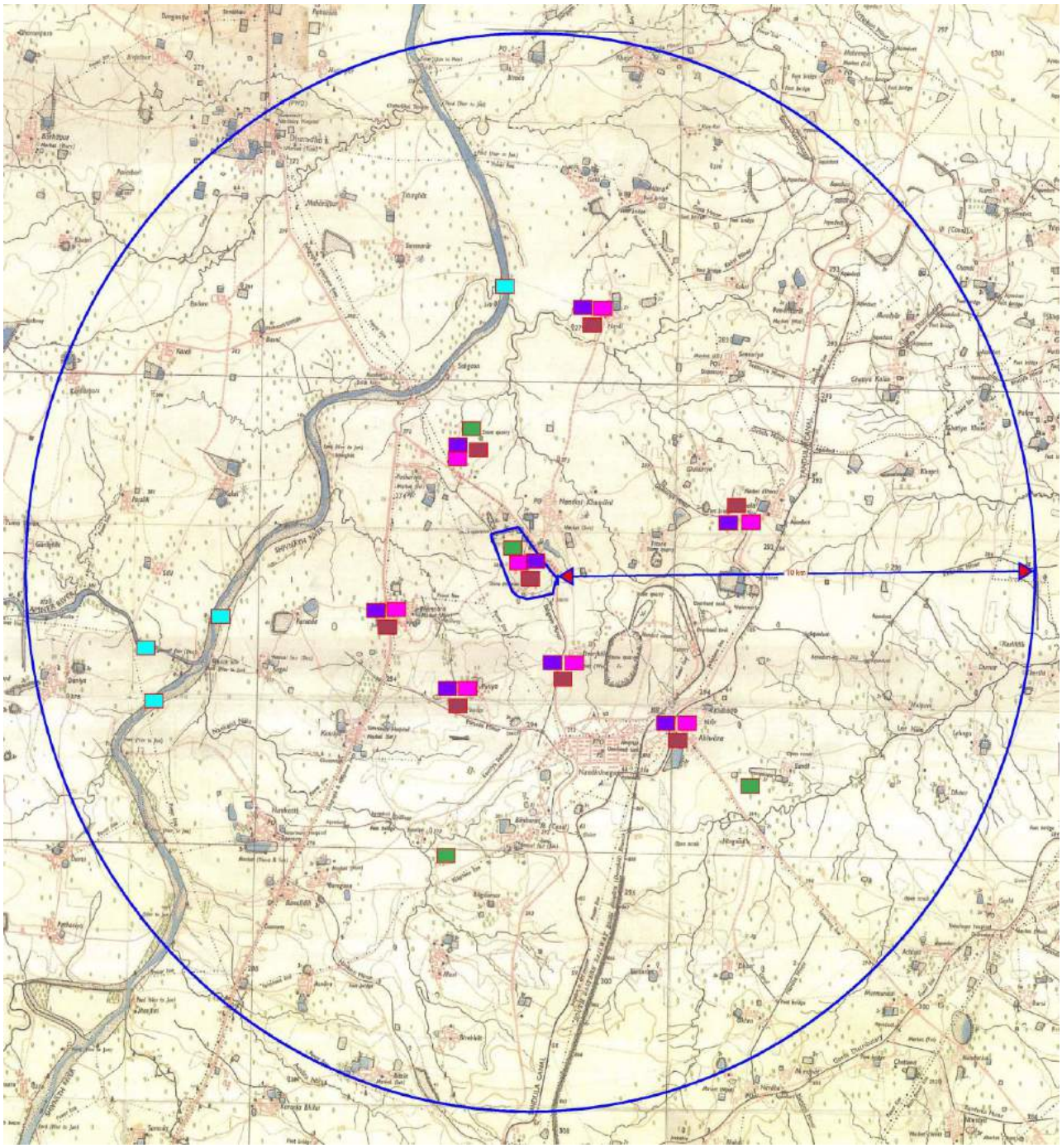


Figure 3.3: 10 km Area Map Showing NKM Lease Boundary and Environmental Monitoring Locations

Air & Noise		Surface Water		Ground Water		Soil		Ecology	

3.2 Meteorology

Historical meteorological data was obtained from Climatological Tables pertaining to nearest IMD station located at Raipur, which is presented in **Table 3.2.**

Table 3.2 Meteorological Data (Source-IMD Raipur 30 years average)

Month	Temperature (deg C) daily Max	Min	Relative Humidity, % Max	Min	Rainfall (mm)	Wind speed kmph	Predominant wind direction (from)	Cloud cover Oktas
January	27.5	13.3	60	39	6.7	4.0	N,NE	1.7
February	31.1	16.5	51	30	12.3	5.1	N, NE	1.6

March	35.5	20.8	41	24	24.6	6.2	N, NE	1.9
April	39.6	25.3	39	23	15.7	8.0	SW,W	2.2
May	42.0	28.3	39	23	18.8	9.3	SW,W	2.5
June	37.4	26.5	64	51	189.8	10.9	SW,W	5.5
July	30.8	24.0	85	76	381.0	10.7	SW,W	7.0
August	30.2	23.9	87	78	344.7	9.3	SW,W	7.0
September	31.3	23.9	81	72	230.2	7.1	SW,W	5.5
October	31.6	21.5	71	56	53.9	4.9	N, NE	3.2
November	29.6	16.5	62	45	7.4	3.9	N, NE	2.1
December	27.3	13.2	61	43	3.7	3.2	N, NE	1.7

Wind Direction: The predominant wind direction is from southwest and west direction in summer season. During winter the predominant wind direction is from north and northeast.

Wind Speed– The wind speed ranges from 3.2 – 10.9 km/hour. The wind speed during summer season ranged from 6.2–9.3 km/hr., during rainy season it was between 7.1 - 10.7 km/hr. and in winter months wind speed ranges between 3.2 - 4.9 km/hr.

Calm Periods – The calm period constitute an important factor in the dispersion of air pollution. The calm period is more during daytime compared to nighttime. The maximum calm period occur during October to February months. Monthly calm period values obtained from nearest IMD is shown in **Table 3.3.**

Table 3.3 Monthly Percentages of Calm Periods (IMD Raipur)

Calm	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Day	31	25	18	13	6	6	7	5	16	24	27	38
Night	38	25	18	15	9	5	6	9	15	27	43	57

Temperature – December and January constitutes winter month with daily mean minimum temperature around 13.2^{o}C and daily mean maximum temperature around 27.5^{o}C. May is the hottest month with daily mean maximum temperature at 42.0^{o}C and daily mean minimum temperature at 28.3^{o}C.

Relative Humidity – The air is generally dry in the region except during monsoon. March and April are driest with relative humidity between 23% - 41%. The maximum humidity during rainy season is 87% and minimum was 76%. High humidity is found during daytime and low humidity values during nighttime in all the months.

Rainfall – The annual total rainfall is 1288 mm. Over 80% of the total annual rainfall is received during the monsoon period between June to September.

Cloud Cover – In the study area, clear weather prevails in most of the time during post monsoon, winter and summer seasons. Only during monsoon months of July, August and September, moderate to heavy clouds are observed. Relevant details about the number of days with zero oktas of cloud cover (all clouds) for all months are presented in **Table 3.4.**

Table 3.4 No. of days with zero oktas of cloud cover (Raipur)

Cloud	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Day	16	16	17	12	10	2	0	0	01	7	14	16
Night	15	12	13	0	3	0	0	0	0	5	10	14

Special Weather Phenomena- The occurrence of thunderstorm is 58 days per year, mostly spread across the months of May to September. Annual Dust Storm is 0.8 days during summer. Annually 0.4 days have visibility less than 1 km, 11.4 days has visibility in the range of 1 - 4 km, 102.3 days have visibility in the range of 4 -10 km, 214.4 days between 10 - 20 km and 36.5 days have visibility above 20 km. No dust storm or thunderstorm occurred during the study period.

Inversion Occurrence- IMD station at Nagpur generates radiosonde flight data that are used for calculation of mixing height and knowing inversion conditions. High ground based inversions at 5.30 am of the order of the 90% and above is observed over central India during November and December. At 5.30 pm the ground based inversions are below 55 all over central India. The distribution of the top heights of the inversion layers over Central India for 5.30 am shows deep formation with heights varying between 400 to 1500 m. at 5.30 pm the frequency of occurrence of elevated inversion at 5.30 am to 5.30 pm over central India shows lower values of 15% and less. The percentage frequencies of ground based inversions with top height at 00 GMT and 12 GMT as well as the percentage frequencies of elevated inversion at 00 GMT and 12 GMT are shown below.

Percentage frequencies of ground based inversions with top heights (00 GMT)

Range (m)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
0-1	0	0	0	0	0	0	0	0	0	0	0	0
101-200	0	0	0	0	0	0	0	0	0	0	1	0
201-300	0	0	1	1	1	1	0	0	1	1	0	1
301-400	8	8	10	9	3	1	0	0	5	3	6	6
401-500	22	20	22	19	14	4	5	3	11	23	19	21
501-600	31	25	26	17	11	1	1	1	9	17	30	31
601-700	18	19	17	14	9	1	1	0	1	7	25	14
701-800	10	4	9	8	5	3	0	0	3	5	5	6
801-900	5	11	4	6	3	1	0	0	1	4	5	7
901-1000	1	4	4	5	5	0	0	0	0	5	1	5
1001-1250	2	1	2	1	5	0	0	0	0	1	1	1
1251-1500	0	0	1	0	1	0	0	0	0	0	0	1
> 1501	0	0	0	0	0	0	0	0	0	0	1	0

Percentage frequencies of ground based inversions with top heights (12 GMT)

Range (m)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
0-1	0	0	0	0	0	0	0	0	0	0	0	0
101-200	0	0	0	0	0	0	0	0	0	0	1	0
201-300	0	0	0	0	1	1	0	0	1	1	0	1
301-400	4	1	1	3	3	2	2	0	3	1	1	1
401-500	0	1	2	1	0	1	0	0	1	1	1	0
501-600	1	1	0	0	1	0	0	0	0	0	0	0
601-700	0	0	0	0	1	1	0	0	0	0	0	0
701-800	0	0	0	0	0	0	0	0	0	0	0	0
801-900	0	0	0	0	0	0	0	0	0	0	0	0
901-1000	0	0	0	0	0	0	0	0	0	0	0	0

1001-1250	0	0	0	0	0	0	0	0	0	0	0	0
1251-1500	0	0	0	0	0	0	0	0	0	0	0	0
> 1501	0	0	0	0	0	0	0	0	0	0	0	0

Percentage frequencies of ground based inversions with top heights (00 GMT)

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
03	06	08	05	10	09	03	06	11	04	03	01

Percentage frequencies of ground based inversions with top heights (12 GMT)

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
00	04	01	04	02	04	02	01	05	02	03	01

Mixing Height values (hourly) of the site for summer season has been obtained from IMD is shown below (CPCB Publication).

Time (IST)	Value (in m)	Time (IST)	Value (in m)
7.00	100	13.00	1000
8.00	200	14.00	1100
9.00	400	15.00	1000
10.00	500	16.00	800
11.00	600	17.00	600
12.00	800	18.00	600
--	--	19.00	600

Met Data Generated at Site: An automatic weather monitoring station was installed at Nandini Nagar, keeping the sensors free exposed to the atmosphere and with minimum interference with the nearby structures. Hourly wind speed, wind direction, temperature and relative humidity were collected and presented in **Table 3.5 and Figure 3.4.**

Table 3.5: Site Specific Meteorological Data

Month	Temperature (deg C)		Relative Humidity, %		Avg. Wind speed	Direction (from)	Calm Period
	Max	Min	Max	Min	m/s	(from)	%
March	34.6	19.8	54	20	0.5-8.8	SW, W	24.6
April	40.3	25.8	43	23	0.5-5.7	SW, W	21.8
May	44.6	28.4	41	22	0.5-5.7	SW, W	17.5

Temperature – During the study period daily mean minimum temperature was 19.8^{0}C and daily mean maximum temperature was 44.6^{o}C.

Relative Humidity –The maximum humidity during summer season is 54% and minimum was 20%. High humidity is found during daytime and low humidity values during night time

Wind Speed– The wind speed was mostly between 0.5-8.8m/s for summer season. Wind speed during the study period is presented in wind rose diagram (Figure 3.1).

Wind Direction – The predominant wind direction at site is from SW and Direction in all months

Calm Periods – Calm period is more during nighttime than daytime. Maximum calm period occur during winter months. Monthly percentage calm periods are shown in Table 3.5.

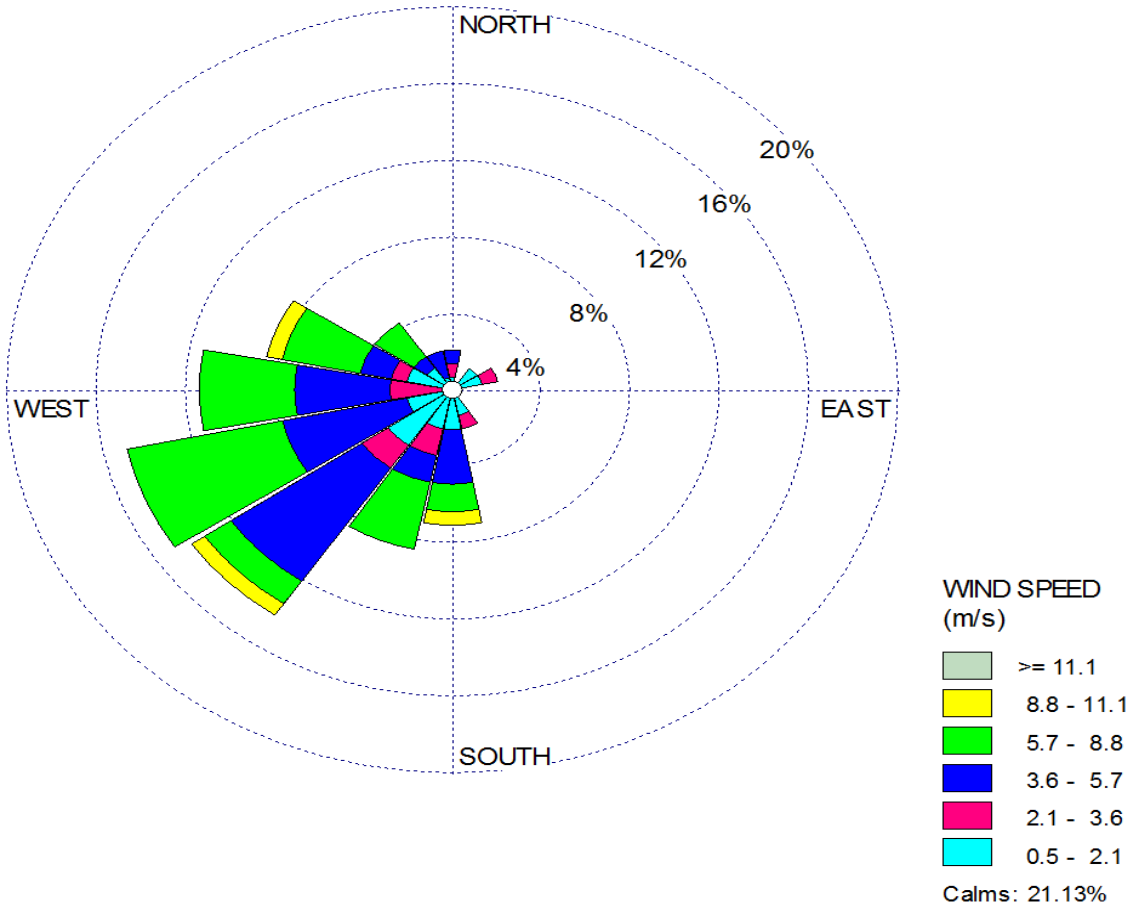


Figure 3.4 Windrose Diagram (Summer Season-2014)

3.3 Ambient Air Quality

The monitoring stations were established at upwind, downwind and crosswind directions with respect to the mine site. CPCB guidelines were followed for locating the monitoring stations. The location and height of the stations were selected to avoid the capture of re-suspended road dust and fugitive domestic emissions. The monitoring locations are shown in **Table 3.7** and **Figure 3.2.** The summary of results for $PM_{2.5}$, PM_{10}, SO_2, NO_2, NH_3, CO, O_3, BaP, Benzene, C_6H_6, As, Ni and Pb is presented in **Table 3.8.**

Table 3.6 Ambient Air Quality Monitoring Locations

	Location	Distance& Direction wrt site	Terrain features
AQ 1	Patharia-I Mine Office	1.0 km N	Near mining zone, flat terrain, trees are present, upwind direction of NKM
AQ 2	Nandani Kundini vill	Core Zone	Barren land, rugged terrain, water body present at many places,
AQ 3	Hardi vill	4.5 km NNE	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction
AQ 4	Girhola vill	4.5 km E	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction
AQ5	Ahiwara vill	3.5 km SE	Urban area, flat terrain. Concrete buildings, crosswind direction of NKM
AQ6	Potia vill	1.8 km S	Rural village, flat terrain, surrounded by agriculture land, upwind direction of NKM

AQ7	Medesara vill	2 km SW	Rural village, flat terrain, surrounded by agriculture land, lies in upwind direction of NKM
AQ 8	Deorjhal village	1.6 km SE	Rural village, flat terrain, surrounded by agriculture land, lies in crosswind direction

Table 3.7 Ambient Air Quality Monitoring Results (24-hour average)

Location	$PM_{2.5}$, µg/m³			SO_2, µg/m³			NO_2, µg/m³		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Pathariya-1	29	46	39	4.5	6.8	5.7	10.2	16.8	14.0
Nandani Khundni Mines	25	36	31	<4	5.8	4.9	9.2	14.8	11.5
Hardi	23	30	26	<4	6	4.8	9	14.3	10.6
Girhola	22	32	26	<4	5.8	4.9	9	13.8	11.1
Ahiwara	26	40	32	4.2	7.5	5.5	9.8	18.2	13.6
Potia	22	30	26	<4	5.8	4.8	9	13.8	10.8
Medesara	26	37	32	4.2	7.4	5.5	9.4	16.8	13.0
Deorjhal Village	24	35	29	<4	5.8	4.8	9.2	14.2	11.0

Table 3.7 continued..... Ambient Air Quality Monitoring Results (24-h average)

Location	PM_{10} (µg/m³)			BAP (ng/m³)	As (ng/m³)	Ni (ng/m³)	Pb (µg/m³)	Free Silica (µg/m³)
	Min	Max	Mean					
Pathariya	60	79	71	0.12	0.32	1.8	0.13	8
Nandani Khundni	58	73	66	0.08	0.26	1.3	0.11	5
Hardi	56	66	60	0.06	0.18	0.8	0.08	6
Girhola	54	70	63	0.08	0.22	1.0	0.12	5
Ahiwara	60	76	68	0.22	0.36	2.8	0.19	6
Potia	58	68	63	0.10	0.21	0.8	0.07	4
Medesara	62	76	69	0.12	0.26	1.1	0.11	6
Deorjhal Village	60	74	67	0.05	0.18	0.8	0.08	6

Table 3.7 continued..... Ambient Air Quality Monitoring Results (24-h average)

Location	Ozone(µg/m³) 8 hour			CO(mg/m³) 8 hour Average			Ammonia (µg/m³)			C_6H_6 (µg/m³)		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Pathariya	15	22	18	0.13	0.19	0.14	14	24	20	0.2	0.6	0.5
Nandani Khundni	14	22	18	0.10	0.14	0.13	12	20	18	0.1	0.5	0.4
Hardi	12	20	15	0.11	0.13	0.12	12	18	15	0.1	0.5	0.3
Girhola	14	20	17	0.13	0.17	0.15	14	22	18	0.3	0.6	0.4
Ahiwara	15	22	17	0.16	0.36	0.24	18	30	24	0.6	0.9	0.8
Potia	12	20	15	0.10	0.15	0.13	16	23	19	0.3	0.6	0.4
Medesara	10	20	15	0.12	0.16	0.14	15	20	18	0.4	0.7	0.5
Deorjhal Village	10	18	14	0.11	0.13	0.12	10	14	12	0.1	0.4	0.3

3.3.1 Observation on Ambient Air Quality

The results indicate that the ambient air quality of study area is within the prescribed National Ambient Air Quality Standards.

PM_{10}: Respirable particulate matter concentrations were observed to be in the range of 54 –79 µg/m^3. The maximum PM_{10} concentration 79µg/m^3 was observed at Pathariya-1 and minimum 54 µg/$m^3$was observed at Girhola Village.

$PM_{2.5}$: Fine Dust Particulate Matter concentrations were observed to be in the range of 22–46 µg/m^3. The maximum $PM_{2.5}$ concentration 46 µg/m^3 was observed at Pathariya-1 and minimum 22 µg/$m^3$was observed at Girhola & Potia Village.

SO_2: Sulphur Dioxide concentrations were observed to be in the range of 4.0-7.5 µg/m^3. The maximum SO_2 concentration was observed at Ahiwara and minimum was observed at Nandini Khundini Mines, Hardi, Girhola and Potia Village.

NO_2: Oxides of Nitrogen concentrations were observed to be in the range of 9.0 – 18.2 µg/m^3. The maximum NOx concentration was observed at Ahiwara and minimum concentration was observed at Hardi, Girhola & Potia village.

CO, O_3, NH_3, C_6H_6, BAP, Ni, As and Pb: Values of these pollutants are found to be well within the prescribed limit.

3.4 Ambient Noise Quality

Ambient noise measurements were taken at 6 locations, depicting various area categories. Measurements were noted as per CPCB method. Noise monitoring location and results for day time and night time is presented in **Table 3.8** and **Table 3.9.**

Table 3.8Ambient Noise Quality Monitoring Location

	Location	Distance wrt site	Terrain features
N 1	Patharia-I Mine Office	1.0 km N	Near mining zone, flat terrain, trees are present, upwind direction of NKM, close to Highway
N 2	Nandani Kundini	Core Zone	Barren land, rugged terrain, water body present at many places, close to Highway
N 3	Hardi	4.5 km NNE	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction
N 4	Girhola	4.5 km E	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction
N 5	Ahiwara	3.5 km SE	Urban area, flat terrain. Concrete buildings, crosswind direction of NKM
N 6	Potia	1.8 km S	Rural village, flat terrain, surrounded by agriculture land, upwind direction of NKM
N 7	Medesara	2 km SW	Rural village, flat terrain, surrounded by agriculture land, lies in upwind direction of NKM
N 8	Deorjhal village	1.6 km SE	Rural village, flat terrain, surrounded by agriculture land, lies in crosswind direction, close to Highway

Table 3.9 Ambient Noise Quality Results

Location Name	Category	Day time Leq dB(A)	Standard Day time Leq; dB(A)	Night time Leq; dB(A)	Standard Night time Leq; dB(A)
Pathariya-I, Mine Office	Near Mining Zone	58.6	75.0	49.8	65.0
Nandani Khundini	Core Zone	47.2	55.0	41.4	45.0
Hardi Village	Residential	49.6	55.0	42.6	45.0
Girhola Village	Residential	48.8	55.0	41.8	45.0
Ahiwara Village	Residential	48.2	55.0	41.6	45.0
Potia Village	Residential	50.2	55.0	42.4	45.0

Medasara Village	Residential	51.4	55.0	42.6	45.0
Deorjhal Village	Residential	51.4	55.0	42.6	45.0

Observation on Ambient Noise Quality

The ambient noise quality of the study area is within the prescribed National Ambient Noise Quality Standard.

3.5 Surface and Ground Water Quality

Eight ground water samples and four surface water samples were collected from different locations during study period. The water samples were examined for physico-chemical parameters and bacteriological parameters. The samples were collected and analyzed as per the procedures specified in Standard Methods. Samples for chemical analyses were collected in polyethylene carboys. Samples for bacteriological analyses were collected in sterilized bottles. Temperature, pH, conductivity and dissolved oxygen were measured at site itself. Surface water sample were analyzed for various parameters and assessed using the CPCB's BDU Criteria. The name of sampling locations is presented in **Table 3.10.** Ground water and surface water results are presented in **Table 3.11 & Table 3.12.**

Table 3.10 Water Sampling Locations

Sr. No.	Location	Distance from Project Site
Surface Water Sampling Location		
SW-1	Sheonath River before confluence with Amner river	6.5 km
SW-2	Sheonath River after confluence with Amner river	5.5 km
SW-3	Amner River before confluence with Sheonath river	7.0 km
SW-4	Dhamada Dam	8.0 km
Ground Water Sampling Locations		
GW-1	Nandini Khundini village	Site (Core zone)
GW-2	Ghikuria village	3.5 km NE,
GW-3	Hardi village	4.5 km N,
GW-4	Patheria ACC Mine office	1 km N, near
GW-5	Pathariya village	1.8 km NW,
GW-6	Medesara village	1.7 km SW,
GW-7	Potiya village	2 km S,
GW-8	Deorjhal village	1.6 km SE,

Table 3.11 Ground Water Quality Test Result

	Parameters	Nadini Khundini	Ghikuria Village	Hardi Village	Pathariya ACC Mine Office
1	pH	7.98	6.84	7.42	7.84
2	Conductivity (μmhos/cm)	1190	270	720	620
3	Total Dissolved Solids	860	208	544	458
4	Total Hardness as $CaCO_3$(mg/l)	280	130	230	260
5	Calcium as Ca (mg/l)	80	40	56	72
6	Magnesium as Mg (mg/l)	19.4	7.3	21.9	19.4
7	Sulphate (mg/l)	58		88	13.8
8	Chlorides as Cl (mg/l)	108	36	40	18
9	Nitrates as NO_3(mg/l)	9.8	5.8	9.2	7.5
10	Fluoride as F (mg/l)	0.86	0.82	0.78	0.68
11	Iron as Fe (mg/l)	0.045	0.096	0.036	0.024

12	Oil & Grease (mg/l)	Nil	Nil	Nil	Nil
13	Total coliform (MPN/100 ml	Nil	Nil	Nil	Nil

Table 3.11 continued..... Ground Water Quality Test Result

	Parameters	Pathariya Village	Medasara Village	Potia Village	Deorjhal Village
1	pH	7.74	7.44	7.60	7.95
2	Conductivity (μmhos/cm)	670	580	520	310
3	Total Dissolved Solids	496	412	388	222
4	Total Hardness as $CaCO_3$(mg/l)	280	240	220	120
5	Calcium as Ca (mg/l)	80	76	72	32
6	Magnesium as Mg (mg/l)	19.4	12.2	9.7	9.7
7	Sulphate (mg/l)	22.8	21.5	9.8	6.8
8	Chlorides as Cl (mg/l)	44	88	170	22
9	Nitrates as NO_3(mg/l)	8.6	8.9	7.5	6.2
10	Fluoride as F (mg/l)	0.72	0.76	0.72	0.66
11	Iron as Fe (mg/l)	0.026	0.032	0.028	0.018
12	Oil & Grease (mg/l)	Nil	Nil	Nil	Nil
13	Total coliform (MPN/100 ml	Nil	Nil	Nil	Nil

Table 3.12 Surface Water Quality Test Result

	Parameters	Unit	Sheonath River before confluence with Amner River	Sheonath River after confluence with Amner River	Amner River before confluence with Sheonath River	Dhamda Dam
1	pH	-	7.14	7.32	7.29	7.36
2	Conductivity	μmhos/cm	370	420	390	410
3	Total Dissolved solids	mg/l	272	302	288	276
4	Dissolved Oxygen	mg/l	4.8	4.5	4.6	4.2
5	BOD	mg/l	4.2	5.4	5.2	5.9
6	COD	mg/l	10	16	14	18
7	Oil and grease	mg/l	<0.1	<0.1	<0.1	<0.1
8	Total Coliform	MPN/100 ml	88	96	92	98

Observation on Ground Water Quality

The pH value of the samples was found to be in normal range. pH values ranges between 6.84 to 7.98. TDS values in all the sample ranges between 208-860 mg/l. Hardness contents of the sample ranges between 120- 280 mg/l. Calcium values of the ground water samples ranges between 32- 80 mg/l. Magnesium values of the ground water samples ranges between 7.3- 21.9 mg/l. Chloride values of the ground water samples ranges between 18- 170 mg/l. The ground water quality did not show any evidence of oil, metallic or bacterial contamination. All the parameters in ground water sample were well within the permissible limit of Indian Standard IS: 10500.

Observation on Surface Water Quality

Surface water quality of Sheonath River before and after confluence with Amner River was found to meet the BDU Criteria of CPCB. Water quality of Amner River and Dhamda dam was also found to meet the Best Designated Use (BDU) Criteria of CPCB. No metallic contamination was found in surface water samples.

3.6 Hydrogeology

3.6.1 Geology: The rock formation of this area belongs to the Lower Vindhyan System of Indian Geology. The limestone beds are unfossiliferous and appear to lie practically horizontal with a gentle dip of about 2 to 3 degrees in north direction. The limestone has a general strike in East-West direction.

The limestone is thick bedded (about 33 mtrs) massive and fine grained varying in color from chocolate to pale green. It is very heterogeneous in quality and affected by number of local faults. The Limestone is found to vary in composition laterally as well as vertically. The variation is mainly due to the irregular occurrence of intercalcite bands of calcareous shale's of argillaceous limestone throughout the area.

Stratigraphical Succession

The stratigraphical succession of the Chhattisgarh Super Group involving the Durg-Bhilai-Jamul area has emerged from the earliest classification of N.V.B.S. Dutta (1964) of the mid – sixties followed by successive refinement and addition of several new formations and members by Schnitzer (1969) in late sixties, Murti (1987) and with better refinement by Das et al (1992) by following the principle of Bacon "That which is most useful in practice, is most correct in theory—Schnitzer (1969) has for the first time arranged and the litho-units of his description in a stratigraphical column. Murthy (1967) has classified the Chhattisgarh Super Group into Upper Raipur Group and the Lower Chandarpur Group and identified the different Formations, Members and Litho-Units in them. Das et al (1992) have added more Members to the earlier classification and have also suggested their Intra-basinal Distribution and Correlation of different Litho-facies. In the present classification Khairagarh Sandstone of Dutt (1964) has been replaced by Deodongar (sandstone) Member for better refinement.

Accordingly, Singhora Group now serves as the basement of the Chhattisgarh Super Group with an unconformity separating them, and Singhora Group is separated from the still older Archaean and Lower Proterozoic basement with a major unconformity. The maximum thickness of the Chhattisgarh Super Group is 2330 m and that of its underlying Singhora basement is 400 m. For information the succession of Raipur, Chandrapur and Singhora Group is recorded here (after Das et al, 1992) at

Table-3.13. Stratigraphical Succession of Chhattisgarh Basin:

	Intrusive Maniari Formation (70 m)		Dolerite dykes Purple shale with dolomite, dolomitic limestone and gypsum
	Hirri Formation (70 m+)		Grey dolomite, argillaceous dolomite.
Raipur Group	Tarenga Formation (180 m)	Bilha Member	Purple dolomitic argillite
		Dagauri Member	Green clay, chert and shale Intercalation
		Kusmi Member	Pink to purple calcareous shale
	Chandi Formation (670m)	Nipania Member	Purple and green bedded limestone. Purple argillaceous stromatolitic dolomite.
		Pendri / Deodongar Member	Purple and Grey stromatolitic limestone and dolomite with flaggy limestone shale intercalation/ferruginous glauconitic arenite and shale.
		Newari member	Pink and buff stromatolitic limestone and dolomite.
	Gunderdehi Formation	Andha / Dotoparh member in the middle	Predominantly pink, purple and Grey shale with limestone intercalations/ arenite/buff to green shale member in the middle.
	Charmuria	Bagbura Member	Purple limestone (Phosphatic)

	Formation (490 m)	Kasdol Member	Dark Grey bedded limestone / argillaceous limestone with minor shale intercalation.
		Ranidhar Member	Cherty limestone and dolomite (phosphatic at places).
		Sirpur Member	Chert and clay intercalation
Chandarpur Group	Kansapathar Formation (20-200m)		Clauconitic whito to pinkish quartz arenite.
	Chaporadih Formation (20-200 m)		Purple, green, grey and black shale with siltstone/ quartz intercalation.
	Lohardih Formation (20m)		Ferruginous purple arkose and gritty wacke arenite with shale partings and conglomerate at the base.
----------UNCONFORMITY----------			
Singhora Group	Chhuipali formation (300 m)		Stromatolitic limestone and dolomite, variegated shale with minor bedded limestone, chert and siltstone intercalations.
	Bhalukona Formation (20 m +)		Quartz arenite / siltstone and minor shale.
	Sarapali Formation (60 m)		Variegated shale with siltstone chert and minor limestone.
	Rehatikhol Formation 920 m+)		Feldspathic arenite, Arkose and conglomerate at the base.
----------UNCONFORMITY----------			
Archaean and Lower Proterozoic basement			

Local Geology: Limestone occurring in this area is mostly chocolate coloured but is also grey, greenish-grey or brown in colour. It is either compact or massive with total carbonate varying from 78.0 to 90.0% or is argillaceous in nature with 30.0 to 65.0% total carbonates, wherein limestone and argillaceous matter are intermixed. The argillaceous matter shows sub-vitreous luster. Limestone 'conglomerate' has chocolate colored limestone embedded in argillaceous matrix and its quality varies widely depending upon the relative proportions of the limestone and the matrix. Both the chocolate colored limestone and the argillaceous limestone grade into one another. In addition to these types, grey colored limestone is also found to occur in small quantities mostly in Block I & IV. All these types of limestone are found to occur intermixed with each other and hence it is not possible to mine them separately. The sequence of the formations are given below in **Table- 3.14**.

Table – 3.14 Litho units with thickness

Lithology	Thickness	Age
Top Soil		Recent
Chocolate bouldary (contaminated) limestone with clay	~12 m	
Chocolate/Grey limestone	40 to 70 m	Pre Cambrian
Chocolate brown shaley limestone	3 to 30 m	
Shale (Brown/Green)	> 10 m	

3.6.2 Drainage

The drainage pattern of the study area is controlled by Sheonath River, which is passing from the western side of the mine site. The study area is drained by Amner river and other small nallahs also, which ultimately joins the Sheonath River. However most of these nallahs gets dried up during the summer and becomes active only in monsoon seasons. Drainage pattern of the Study Study area is given in **Figure 3.5.**

3.6.3 Contour Map

The contours in Topo sheet have been digitized in the GIS environment and assigned the respective elevation values in meters with reference to the mean sea level. Using the SRTM *(*Shuttle Radar Topography Mission*)* data, the elevation values has been verified. The range of elevation of this area varies from 260 - 320m. Contour Map of the Study area showing Site is shown in **Figure 3.6.**

3.6.4 Digital Elevation Model (DEM)

Based on the contour map, the Digital Elevation Model has been prepared. The Nearest Neighbour method has been used to interpolate the elevation data to develop the elevation model. This map gives clear picture that the north-western part of the area having lower elevation. Eastern part of the area has highest range of elevation. Digital Elevation Model for the area in 10 km radius from the proposed site is shown in **Figure 3.7.**

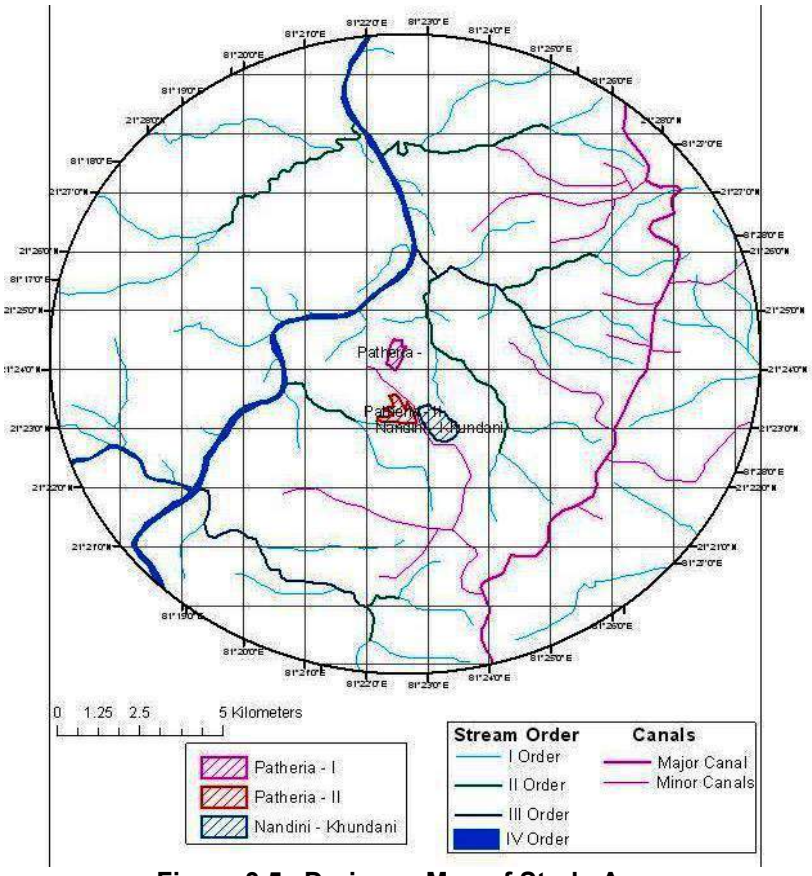


Figure 3.5 Drainage Map of Study Area

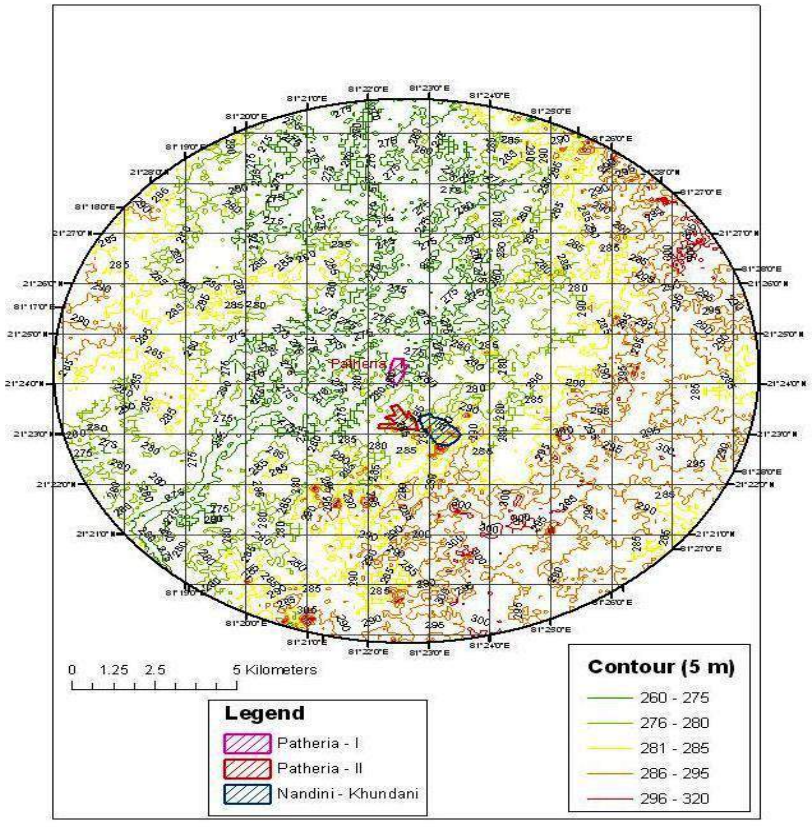


Figure 3.6 Contour Map of Study Area

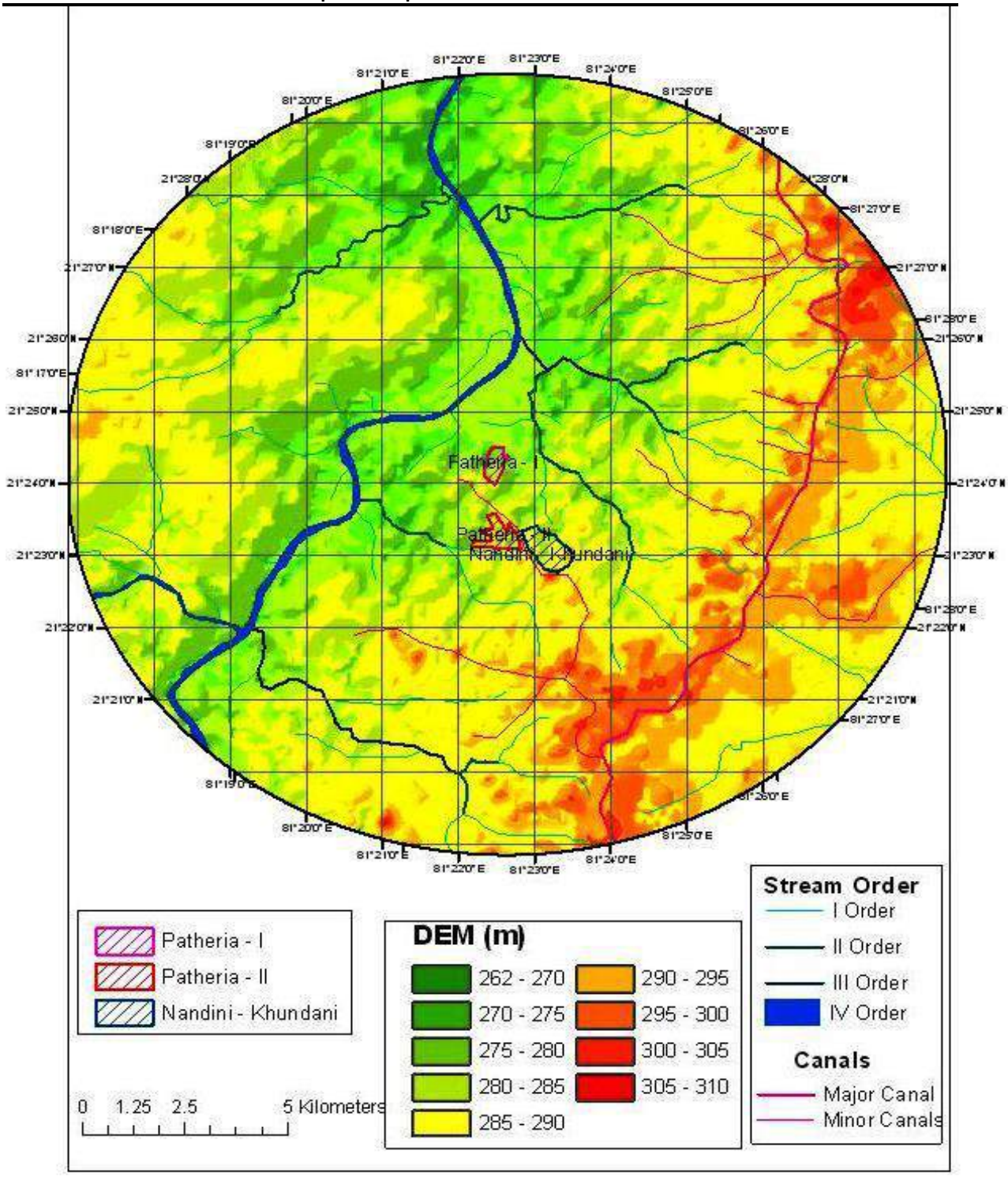


Figure 3.7 DEM & Contour Map of the Study Area

3.7 Soil Quality

Eight soil samples were collected from agriculture fields and physic-chemical characters were analyzed. At each location, soil samples were collected from three different depths; 1-5 cm, 10-20 cm and 40-50 cm below the surface. The samples were homogenized and the quantity was reduced using the coning and quartering method. The soil sampling location provided in **Table 3.15 and Figure 3.7.** Soil analysis results of soil samples are presented in **Table 3.16.**

Table 3.15 Soil Sampling Locations

S. No.	Location	Distance from Project Site
S-1	Nandini Khundini village	Site (Core zone)
S-2	Ghikuria village	3.5 km NE, downwind direction
S-3	Hardi village	4.5 km NE, downwind direction
S-4	Patheria ACC Mine office	1 km N, near Pathariya Mine
S-5	Pathariya village	1.8 km NW, upwind direction)
S-6	Medesara village	1.7 km SW, upwind direction
S-7	Potiya village	2 km S, upwind direction
S-8	Deorjhal village	1.6 km SE, crosswind direction

Table 3.16 Soil Analysis Results

	Parameters	Nandini Khundini Village	Ghikuria Village	Hardi Village	Pathariya ACC Mine Office
1	Bulk Density; g/cm^3	1.23	1.27	1.21	1.26
2	Colour	Brown	Brown	Brown	Brown
3	Organic matter; %	0.64	0.71	0.61	0.67
4	pH	7.21	7.51	7.11	7.35
5	Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
6	Bicarbonate, %	0.044	0.056	0.03	0.039
7	Conductivity, μmhos/cm	90	120	78	98
8	Chlorides, %	0.0096	0.0142	0.0076	0.0118
9	Available Potassium as K, Kg/ha	171.5	191.4	157.1	182.3
10	Available Phosphorus as P, Kg/ha	37.1	45.6	32.8	41.3
11	Available Nitrogen as N, Kg/ha	110.6	153.5	143.5	146.2

Table 3.16 continued….. Soil Analysis Results

	Parameters	Pathariya Village	Medasara Village	Potia Village	Deorjhal Village
1	Bulk Density; g/cm^3	1.37	1.33	1.36	1.29
2	Colour	Brown	Brown	Brown	Brown
3	Organic matter; %	0.74	0.52	0.69	0.46
4	pH	6.90	7.38	7.12	7.34
5	Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
6	Bicarbonate, %	0.0395	0.034	0.0372	0.018
7	Conductivity, μmhos/cm	110	92	110	88
8	Chlorides, %	0.0148	0.0131	0.0142	0.0121
9	Available Potassium as K, Kg/ha	168.1	152.8	166.2	145.6
10	Available Phosphorus as P, Kg/ha	34.9	32.1	35.6	32.4
11	Available Nitrogen as N, Kg/ha	122.6	142.7	154.1	149.5

Observation on Soil Quality: The pH of the soil varied from 6.90 to 7.51. The nitrogen values range between 110.6 kg/ha to 154.1 kg/ha. The phosphorus values range between 32.1 kg/ha to 45.6 kg/ha. The potassium values range between 145.6 kg/ha to 191.4 kg/ha. The soil quality of the study area with average concentration of nitrogen, Phosphorus and potassium is medium as per the standard soil classification.

3.8 Ecology

Vegetation in Study Area: There is no protected and reserved forest present in the study area (10 km radius). The study area has no forest land as evident from the topography map and land use records. The only vegetation cover is scanty scrub-land that too in patches. The vegetation is dominated by acacia species. Such scanty vegetation coupled by speedy industrial development and residential development has left the area devoid of any significant faunal species or wildlife.

Biodiversity of Raipur, Durg and Rajnandgaon: The flora of Raipur, Durg and Rajnandgaon districts deals with 1032 species in 568 genera and 127 families of flowering plants. Out of these 287 species in 136 genera and 25 families belong to Monocots and 745 species in 432 genera and 102 families belong to Dicots. The proportion of Monocots to Dicots is 1:2.8 and total genera to species are 1:1.8. Taking into account the entire Indian subcontinent, Hooker (1904) gives the proportion of Monocots to Dicots as 1:2.3 and genera to species as 1:7.

The flora contains about 140-tree spp., 71 shrubby spp., 75 climber spp., and the remaining, almost equally divided, annual or perennial herbs or under shrubs. There are 83 aquatic app. Epiphytes are poor, being represented only by Dendrophthoe falcate, Scurrula parasitica, Viscum nepalense, V. orientale, Vanda tessellata and V. testacea. The insectivorous plants are two spp. of Drosera and eight spp. of Utricularia.

3.8.1 Flora

Floristic diversity of Study Area

The study area (10 km radius around the project site) has long been under cultivation and at present only few small patches of degraded of tropical dry deciduous vegetation has been left, if at all. It is rather more chacterised by scattered stunted and crooked trees and shrubs species of Acacia nilotica, Dalbergia sisoo Butea monosperma, Albizia spp. Acacia leucophloea, Mangifera indica, Terminalis spp. Ficus racemosa, F. banghalensis, F religiosa, Azadirachta indica, Pithacellobium dulce, Syzygium cumini, Mitragyna parvifolia, Aegle marmelos, Diospyros melanoxylon, Bauhinia spp. , Calotropis spp., Caesalpinia bondue and with several climbers Celastrus paniculatus, amerbel, Ipomoea spp. In addition to above Albizia spp., Dalbergia sissoo, Delonix regia, Cassia fistula, Peltophorum pterocarpum Pongamia pinnata, Eucalyptus hybrids, Pterocarpus marsupium are also planted on the road sides. The ground flora during rainy and post rainy season consists of several annual or perennial spp. of grasses, sedges and other herbs and creepers, but by the middle of the winters it is completely grazed and presents a bare desolate specter. Mention may be made of two epiphytic orchids, vanda tessellata and V. tesatacea which grows freely on Mangifera indica, Butea monosperma, Diospyros melanoxylon and terminalia spp.

Ground vegetation covered by dominant shrubs and herbs is Argemone mexicana, Solanum surattense, Xanthium strumarium, Ipomea cornia, Ipomea fistulosa, Dhatura metal, Zyziphus mauritiana, Calotropis procera, Sida cordifolia, Vitex negundo, Polygonum glabrum, Cassia tora, Canabis sativa, Chenopodium album, Saccjiarum spontaneum, Vetveria zizaniodes, Cyanodon dactylon, Parthenium hysterophorus, Saccharum spontaneum, Dendrocalamus strictus The comprehensive list of the plant species (tree, shrubs, herbs, climbers and grasses) observed in the study area is given **Table 3.17.**

Aquatic Plants: The streams, drains, ponds and ditches harbour a number of water-loving species, in and around it, and these are generally grouped together as aquatic plants. However, the exact interpretation or circumscription of this group is debatable since there are numerous borderline

species, which grow both in marshy lands and water, and still others, which grow in drains and ditches which are temporarily filled up during rains. The acquatic plants found in the area are given below:

Free-floating hydrophtes: Azolla pinnata, Wolffia globosa, Lemna perpusilla, Spirodela polyrhiza, Pistia stratiotes, Trapa natans var. bispinosa and Eichhornia crassipes.

Suspended submerged hydrophytes: Ceratophyllum demersum, Utricularia aurea and U. exoleta.

Anchored submerged hydrophytes: Polypleurum stylosum, Myriophyllum oliganthum, Blyxa aubertii, B. octandra, Hydrilla verticillata, Nechamandra alternifolia, Cryptocoryne retrospiralis, Najas graminea, N.indica, Aponogeton crispus, Potamogeton crispus, P.mucronatus and P.pectinatus.

Anchored hydrophytes with floating shoots: Neptunia oleracea, Ludwigia adscendens, Ipomoea aquatica, Alternanthera philoxeroides, Hygroryza aristata and Cyperus platystylis

Anchored hydrophytes with floating leaves: Marsilea minuta, Nelumbo nucifera, Nymphaea pubescens, N. nouchali, N. rubra, Nymphoides hydrophylla, N. indica, Ottelia alismoides Monochoria vaginalis, Sagittaria guayanensis spp. Lappula, Caldesia parnassifolia, Limnophyton obtusifolium, Tenagocharis latifolia, Aponogeton natans and Potamogeton nodosus.

Emergent amphibious hydrophytes: Aeschynomene aspera, A. indica, Ammania baccifera, A. multiflora, Rotala densiflora, R.indica, R.rotundifolia, Ludwigia octovalvis, L. perennis, L. prostrata, Enhydra fluctuans, Limnophila indica, L. sessiliflora, Hygrophila auriculata, Polygonum barbatum, P. dichotomum, P. glabrum, P. hydropiper spp. Microcarpum var. triquetrum, P. limbatum, Crinum defixum, Typha angustata, Cyperus distans, C. nutans var. eleusinoides, C. pangorei, Eleocharis acutangula, E. congesta, E. dulcis, Fimbristylis schoenoides, F. tetragona, Scirpus articulatus, S. juncoides, S. lateriflorus, S. maritimus, Brachiaria reptans, Coix aquatica, Echinochloa colona, E. stagnina, Hymenachne pseudointerrupta, Ophiuros exaltatus and Phragmites karka.

Table 3.17 List of Plant Species Present in Study Area

Sr. No.	Botanical Name	Local Name	Family
1.	**Trees**		
1.	*Acacia Arabica*	Babul	Mimosaceae
2.	*Acacia catechu*	Khair	Mimosaceae
3.	*Adina cordifolia*	Haldu	Rubiaceae
4.	*Aegle marmelos*	Bel	Rutaceae
5.	*Ailanthus excels*	Mahaneem	Simarubaceae
6.	*Albizza lebbek*	Siris	Mimosaceae
7.	*Albizza procera*	Asfed siris	Mimosaceae
8.	*Anona seqamosa*	Sitaphal	Anonaceae
9.	*Anogeissus latifolia*	Dhaora	Combretaceae
10.	*Azadiracta indica*	Neem	Meliaceae
11	*Anthocephalus chinensis*	Kadamba	Rubiaceae
12.	*Butea monosperma*	Palas	Fabaceae
13	*Bombex ceiba*	Semal	Malvaceae
.14.	*Careya arborea*	Kumbhi	Lecythidaceae
15.	*Casia fistula*	Amaltas	Caesalpiniaceae
16.	*Dalbergia latifolia*	Shisham	Fabaceae
17.	*Dalbergia paniculata*	Dhobin (Dhobani)	Fabaceae
18.	*Dalbergia sissoo*	Sissoo	Fabaceae
19.	*Delonix regia*	Gulmohar	Caesalpiniaceae
20.	*Diospyros melanoxylon*	Tendu	Ebenaceae
21.	*Emblica officinalis*	Aonla	Euphorbiaceae
22.	*Eucalyptus spp.*	Nilgiri	Myrtaceae

Sr. No.	Botanical Name	Local Name	Family
23.	*Ficus bengalensis*	Bar	Moraceae
24.	*Ficus glomarata*	Gular	Moraceae
25.	*Ficus religiosa*	Pipal	Moraceae
26.	*Gardenia gummiflora*	Garudu	Rubiaceae
27.	*Grewia tiliafolia*	Damgurudu	Rubiaceae
28.	*Madhuca Indica*	Mahua	Sapotaceae
29	*Mangifera indica*	Aam	Anacardiaceae
30.	*Moringa oleifera*	Saijan	Moringaceae
31.	*Milliusa tomentosa*	Potmas	Anonaceae
32.	*Pongamia pinnata Venl*	Karanj	Fabaceae
33.	*Pterocarpus marsupium*	Bija	Fabaceae
34.	*Psidium guava*	Amrud	Myrtaceae
35.	*Salmalia malabarica*	Semal	Malvaceae
36.	*Saraca ashoka*	Ashok	Caesalpiniacea
37.	*Syzygium cumini*	Jamun	Myrtaceae
38.	*Syzygium heyneanum*	Kat Jamun	Myrtaceae
39.	*Tectona grandis*	Sagon	Verbenaceae
40.	*Terminalia indica*	Imli	Combretaceae
41.	*Terminalia arjuna*	Karra	Combretaceae
42.	*Terminalia belerica*	Bahera	Combretaceae
43.	*Terminalia chebula*	Harra	Combretaceae
44.	*Terminalia tomentosa*	Saja	Combretaceae
45.	*Zizyphus mauratiana*	Ber	Rhamnaceae
46.	*Atrocarpus hitrophylls*	Jackfruit	Moracea
Shrubs			
1.	*Arbus prectatotrius*	Gunj	Papilionaceae
2.	*Achyranthes aspera*	Apamarg	Amarantaceae
3.	*Agave Americana*	Agave	Agavaceae
4.	*Adhatoda vasica*	Adusa	Acanthaceae
5.	*Azanza lampus*	Bankapas	Malvaceae
6.	*Annona squamosal*	Sitaphal	Anonaceae
7.	*Barleria cristata*	Koranta	Acahthaceae
8.	*Calotropis procera*	Ak	Asclepediaceae
9.	*Euphorbia hirta*	-	Euphorbiaceae
10.	*Gardenia gummifera*	Bandar laddu	Rubiaceae
11.	*Grewia sapida*	Phalsa	Rubiaceae
12.	*Indigofera pulchella*	Neel	Papilionaceae
13.	*Ipomea Cornea*	Besharm	Convolvulaceae
14.	*Lantana camara*	Raimunia	Verbenaceae
15.	*Nyctanthes arbortristis*	Harsingar	Oleaceae
16.	*Pogostemon bengalensis*	Poksunga	Labiateae
17.	*Sida cardifolia*	Mamas	Malvaceae
18.	*Vitex negundo*	Nirgudi	Verbenaceae
19.	*Woodfordia floribunda*	Dhawai	Lythraceae
20.	*Jatropha hybrid*	Jatropha	Euphorbiacea
21.	*Ricinus comunus*	Arandi	Euphorbiacea
22.	*Solanum surratanse*	Yellow-berried nightshade	Solanaceae
23.	*Xanthium strumarium*	Broadbur	Asteraceae
Herbs			
1.	*Asparagus racemosum*	Sataori	Liliaceae
2.	*Argemon maxicana*	Poppy	Papavaraceae

Sr. No.	Botanical Name	Local Name	Family
3.	*Achyranthes aspera*	Apamarg	Amarantaceae
4.	*Boerhavia difusa*	Punarnava	Nyctanginaceae
5.	*Careya herbacea*	Chhoti kumbhi	Myrtaceae
6.	*Cassia tora*	Charota	Papilionacea
7.	*Canabis sativa*	Bhang	Cannabaceae
8.	*Chenopodium album*	Bathua	Chenopodiaceae
9.	*Chlorophytum tuberosum*	Safed musli	Liliaceae
10.	*Curculigo orachiolides*	Kali musli	Amaryullidace;
11.	*Hibiscus Cancellatus*	Ambari	Malvaceae
12.	*Polygala chinensis*	Bijnori	Pligalaceae
13.	*Polygonum glabrum*	Common marsh	Polygonaceae
14.	*Solanum nigrum*	Black night shade	Solanaceae
15.	*Tamarix ericoides*	Jhau	Tamaricaceae
16.	*Ocimum santum*	Tulsi	Labiatae
Epiphytes and Parasites			
1.	*Cuscuta reflexa*	Amarbel	Cuscutaceae
2.	*Loranthus logiflorus*	Bandha	Loranthaceae
3.	*Viscum nepalene*	Bandha	Loranthaceae
Climbers			
1.	*Bauhinia vahlii*	Mahul	Leguminosae
2.	*Butea superb*	Palasbel	Legumiosae
3.	*Celastrus pniculata*	Malkangini	Celastraceae
4.	*Cryptolepis buchanani*	Nagbel	Asciepiadaceae
5.	*Pueraria tuberosa*	Ghorbel	Leuminosae
Grasses and Bamboo			
1.	*Andropogon intermedius*	Ghonsi	Poaceae
2.	*Andropogon pumilus*	Dewartari	Poaceae
3.	*Bamboosa arundinaceae*	Kantabans	Poaceae
4.	*Cymbopogon martini*	Rusa	Poaceae
5.	*Cynodon dactylon*	Doob	Poaceae
6.	*Dendrocalamus strictus*	Bans	Poaceae
7.	*Dichanthium annulatum*	Marwel	Poaceae
8.	*Eragrostis tenella*	Bhurbhusi	Poaceae
9.	*Saccjiarum spontaneum*	Knas	Poaceae
10.	*Vetveria zizaniodes Nash*	Khus	Poaceae

Medicinal Plants

Ayurveda says “There is no plant on the earth, which does not possess medicinal property”, this means that each and every plant is equally important for its biological activities, ecology and environment. The conservation of medicinal plants means every species of plants in its natural habitat should be protected and preserved. Conservation of invaluable biodiversity is a national and international agenda. Because of continuous exploitation of medicinal plants from their natural habitats, it is required to replant and regenerate them in other areas having similar habitat or environment. Due to over exploitation of natural resources many plant species have become extinct from the world. The medicinal plants present in the study area with their common names and family are given in the **Table 3.18**

Table 3.18 List of Medicinal Plants and their Medicinal Value

	Name	Family	Medicinal Use
Trees			
1.	*Aegle marmelos*	Rutaceae	• Antidiuratic, antithetmintic, antipyretic, carminative tonic

	Name	Family	Medicinal Use
			• Fruit used in chronic diarrhoea & dysentery
2.	*Anona squamosal*	Anonaceae	• Fruit as apetizer • Seed oil used to kill lice
3.	*Artocarpus heterophyllus*	Moracceae	• Latex as bacteriolytic • Leaf as estrogenic
4.	*Azadirachta indica*	Meliaceae	• Oil extracted from seed as local stimulant, insecticide and antiseptic
5.	*Bombax ceiba*	Bombacaceae	• Hot aquous extract of seed as moderate oxytoic
6.	*Butea monosperma*	Fabaceae	• Gum is astringent and used in treatment of diarrhoea and dysentery • Flower decoction given in painful urinatum
7.	*Disopyros melanoxyum*	Ebenaceae	• Green fruits used to treat uterine haemorrhage, dysentery, sorectroat
8.	*Emblica offcinalis*	Euphorbiaceae	• Fruit powder coolent and laxative • Rich source of vitamin C
9.	*Ficus religiosa*	Moraceae	• Quenches thirst
10.	*Ficus benghalensis*	Moraceae	• Medicine for diabetes
11.	*Madhuca indica*	Sapotaceae	• Flowers liquor as apetizer, coolent and expectorant
12.	*Mangifera indica*	Anacardiaceae	• Controls stomach pain, diarrhoea, urine sugar
13.	*Pongamia pinnata*	Fabaceae	• Seeds are externally used for skin diseases, leucoderma, rheumatism • Powdered seeds are expectorant in bronchitis and whooping cough
14.	*Syzygium cumini*	Mystaceae	• Stem bark is used to treat sore throat, bronchitis, ulcer, dysentery • Seed powder for diabetes
15.	*Tamarindus indica*	Caesalpiniaceae	• Leaves are used to reduce inflammatory swellings & ringworm • Fruit is tonic to heart and antithelmintic
16.	*Terminalia bellerica*	Combretaceae	• Fruit powder is used as tonic and laxative
Shrubs			
1.	*Acacia nilotica*	Mimosaceae	• In pharmacy, used in preparing emulsions, tablets, pills etc.
2.	*Agave Americana*	Agavaceae	• Leaf juice is used to cure warts, cancerous ulcers • Various parts of plants used for syphilis and dysentery, diuretic, laxative alternative in toothache
3.	*Bauhinia tomentosa*	Caesalpeniaceae	• Leaf is used as an ingredient of plaster • Seeds used as tonic
4.	*Calatropis procera*	Asclepiadaceae	• Root bark used for leprosy
5.	*Lantana camara*	Verbenaceae	• Useful as an antiseptic for wounds
6.	*Vitex negundo*	Verbenaceae	• Leaves are used in rheumatism • Dried leaves smoked for relief from headache
7.	*Woodfordia fruticosa*	Lythraceae	• Dried flowers are astringent and used in dysentery, affection of mucus membrane • Leaf juice used in conjunctivitis
Herbs			
8.	*Argemone Mexicana*	Papaveraceae	• Latex is laxative and used in cataract • Seed oil used in asthma
9.	*Cynodon dactylon*	Poaceae	• plant used as antifungal, diuretic, hypoglycemic • Rhizome is useful in gastro urinary disorders • Pollen extract is beneficial in asthma
10.	*Euphorbia hirta*	Euphorbiaceae	• Plant used to treat dysentery, cough, asthma,

	Name	Family	Medicinal Use
			vomiting
11.	*Jatropha*	Euphorbiaceae	• Seeds are used as acro-narcotic, purgative • Leaf juice used for piles
12.	*Ocimum sanctum*	Lamiaceae	• Leaf juice used in curing cold, bronchitis • Flower decoction in dyspepsia
13.	*Ricinus communis*	Euphorbiaceae	• Castor oil used in skin diseases, inflammation of intestine and dysentery and as tonic • Root and leaf oil used as ailment

Threatened Plant Species

Threatened taxa are those species which are vulnerable to endangerment in the near future. Threatened status of any taxa is not a single category but is a group of there categories, critically endangered, endangered and vulnerable. On the application of different criteria of IUCN for the assessment of conservation status of taxa, no taxa were found threatened in the study area. The reported taxa have also not been enlisted in the Red Data Book of Indian plants (Nayar and Shastry, 1988).

Rare and Endangered Plant Species in the Study Area: No rare and endangered plant species was observed in the study area (Source: Red Data Book of Indian Plants, N.P Nayar and A. P. K. Sastry, B.S.I. 1988).

Agriculture: Main agricultural crop grown in study area is paddy. Other crops grown in the area are wheat, Jowar, gram, tuwar, moong, tiwara different types of vegetables and fruits. Agro-climatic condition of the area provide a range of potentialities for growing cash crops like off seasonal vegetable i.e. Tomato, chilly, brinjal, tomato, potato, Radish, bitter guard and fruits. Most of the agricultural land in the study area is rain fed. Different type of crops grown in the study area is provided in **Table 3.19**

Table 3.19 List of Cultivated Plant

A. Cereals			
S.No.	**Local Name**	**English Name**	***Botanical Name***
1.	Dhan	Paddy	*Oryza sativa*
2.	Makka	Maize	*Zea mays*
3.	Gehu	Wheat	*Triticum sp.*
B. Pulses and Oil			
1.	Arhar	Pigein Pea	*Canjanus Cajan*
2.	Til	Sesamum	*Sesamum inicum*
3.	Kulthi	Horse-gram	*Dolochos biflorus*
4.	Kusum	Safflower	*Carthemus tinctorius*
5.	Urd	Black gram	*Phaeolus mungo*
6.	Mung	Mung gram	*Phaseolus radiates*
7.	Surajmukhi	Sunflower	*Helianthus annus*
8.	Sarson	Mustard	*Brassica campestris*
9.	Matar	Pea	*Pisum sativum*
10.	Mungphali	Ground Nut	*Arachis hypogeal*
C. Fruit crops			
1.	Kela	Banana	*Musa Paradisiaca*
2.	Aam	Mango	*Mangifera indica*
3.	Nibbu	Lime	*Citrus aurantifolia*
4.	Amrud	Guava	*Psidium guajava*
5.	Papita	Papaya	*Carica papaya*
6.	Kathal	Jack-fruit	*Artocarpus heterophyllus*
7.	Seetalphal	Custered-apple	*Annona squamosa*
8.	Ber	Jujube	*Ziziphus mauritiana*
D. Vegetables			
1.	Tamatar	Tomato	*Lycopersicum esculantum*

2.	Baigan	Brinjal	*Solanum melongena*
3.	Pattagovi	Cabbage	*Brassica oleracea*
4.	Phulgovi	Cauliflower	*Brassica oleracea*
5.	Bhindi	Lady's Finger	*Abelmoschus esculentus*
6.	Barbatti	Cowpea	*Vignainensis/ unguiculatoo*
7.	Aloo	Potato	*Solanum tuberosum*
8.	Muli	Radish	*Raphanus sativas*
9.	Karela	Bitter gourd	*Momordica charantia*
10.	Torai	Ridge gourd	*Luffa acutangula*
11.	Kaddu	Pumpkin	*Cucurbita moschata*
12.	Palak	Beet	*Beta vulgaris*
13.	Lalbhaji	Amaranth	*Amaranthus spp.*
14.	Kundru	-	*Coccinia grandis*
15.	Khira	Cucumber	*Cucumis sativus*
16.	Lauki	Bottle gourd	*Lagenaria siceraria*
17.	Chichinda	Snake gourd	*Trichosanthes anguina*
18.	Lahsun	Garlic	*Allium sativum*
19.	Dhaniya	Coriander	*Coriander sativum*
20.	Mircha	Chilli	*Capcicum anum*

3.8.2 Flora- Primary Survey

Survey has been done as per the Standard protocol/ developed by EMTRC. A preliminary survey of the study area has been performed to get a general picture of the landscapes in vegetation. Traverses have been taken within different zone of the study area to note major vegetation patterns and plant communities including their growth form and dominant species. Vegetation surveys focus on vegetation types in the study area while plant species surveys aim to provide information on plant species diversity and identify plant species of conservation concern. Square shaped quadrates method was selected to study the forest vegetation.

Quadrat Method: Frame quadrats, or often simply called quadrats, are used to define sample area within the study site. Plant species inside the quadrats are identified and their abundance estimated to work out the densities of various species. In some cases, their percentage covers are also estimated. Quadrates of 10m x10m, 2m x 2m and 1m x1m were used for trees, shrubs and herbaceous communities respectively. (John G. Rau and David Wooten, Environmental Impact Analysis hand book, 1980). The locations of the quadrat chosen should be representative to various vegetation types present within the study area and usually 10 nos. of quadrats are sampled to obtain more representative results. Detailed field survey was conducted near the villages and open spaces to identify the common plants and also to identify presence of any threatened, medicinal, endangered and rare plant species in the study area. Four locations in the study area have been selected for quadrate survey. The details of the quadrate sampling locations are given in **Table 3.20 & 3.21** and **Figure 3.8**.

Table 3.20 Sampling Location Details (For Tree vegetation)

Location Code	Location Name (for tree Vegetation)	Distance & Direction wrt to Mine site	Co-ordinates
P-1	Nandini Khundani	Near NKM Mine Site	21^{o}23'32.3"N 81^{o}23'28.6" E
P-2	Patheria	Near Patheria Mine	21^{0} 24' 38.3" N 81^{0} 24' 19.6" E
P-3	Near Kaudia	4.5 km SW	21^{0} 21' 37" N 81^{0} 24' 2.7" E
P-4	Near Ahiwara	5.8 km Southeast	21^{0} 14' 27.4" N 81^{0} 21' 8.7" E

Table 3.21 Sampling Location Details (for Herbs & Shrubs)

Location Code	Location Name	Distance & Direction wrt to Mine site	Co-ordinates
S-1	Near NKM Mine	Near NKM Mine Site	21°23'30.2"N 81°23'29.8" E
S-2	Near Patheria Mine	Near Patheria Mine	21^0 24' 40.1" N 81^0 22' 20.4" E
S-3	Near Village Kaudia	4.5 km SW	21^0 21' 39" N 81^0 24' 4.6" E
S-4	Near Ahiwara	5.8 km Southeast	21^0 14' 28.3" N 81^0 21' 9.0" E

Floristic Composition– Primary Survey (Tree Vegetation): Co-existence and competition amongst various species are affected directly by the number of individuals in the community. Therefore, knowing the quantitative structure of the community becomes essential. Various diversity indices including Simpson's Diversity Index give a comparative and quantitative picture of the community existing in the study area.

To characterize vegetation in the study area, the primary data was collected and analyzed for describing the characteristics of vegetation with reference to species composition and structural attributes. The diversity measurements reflect as to how many diverse species are present, while the density measurements indicate number of individuals of a species in the study area. Species diversity is the best measure of community structure and it is sensitive to various environmental stresses. Smaller value of Simpson's Diversity Index shows healthy ecosystem and the higher value shows that an ecosystem is under environmental stress. Characteristics of tree vegetation are provided in **Table 3.22 to 3.25**.

Table 3.22 Characteristics of Tree Near NKM Mine Site.

Scientific Name	Density (per ha)	Relative Density	Frequency (%)	Relative Frequency	Dominance	Relative Density	IVI
Acacia nilotica	150	32.61	80.00	23.53	0.0099	14.21	70.35
albezia lebbeck	70	15.22	50.00	14.71	0.0143	20.52	50.44
Albiziz procera	40	8.70	40.00	11.76	0.0079	11.27	31.73
Ziziphus mauritiana	60	13.04	20.00	5.88	0.0027	3.91	22.83
Pongamia pinnata	50	10.87	50.00	14.71	0.0100	14.31	39.88
Delonix regia	60	13.04	50.00	14.71	0.0148	21.20	48.95
Dalbergia sisco	30	6.52	50.00	14.71	0.0102	14.65	35.88

Table 3.23 Characteristics of Trees Near Patheria-1Mine Site

Scientific Name	Density (per ha)	Relative Density	Frequency (%)	Relative Frequency	Dominance	Relative Density	IVI
Acacia nilotica	150.00	28.30	60.00	18.75	0.0529	35.62	82.67
Albezia lebbeck	140.00	26.42	80.00	25.00	0.0223	15.00	66.41
Albiziz procera	30.00	5.66	30.00	9.38	0.0085	5.71	20.75
Ziziphus mauritiana	20.00	3.77	20.00	6.25	0.0019	1.30	11.32
Pongamia pinnata	80.00	15.09	50.00	15.63	0.0211	14.24	44.96
Delonix regia	70.00	13.21	60.00	18.75	0.0285	19.20	51.15
Dalbergia sisco	40.00	7.55	20.00	6.25	0.0133	8.94	22.74

Table3.24 Characteristics of Trees Kaudia village

Scientific Name	Density (per ha)	Relative Density	Frequency (%)	Relative Frequency	Dominance	Relative Density	IVI
Acacia nilotica	210.00	26.25	90.00	20.00	0.0294	15.59	61.84
Acacia arabica	60.00	7.50	40.00	8.89	0.0095	5.06	21.45
Emblica officinalis	20.00	2.50	20.00	4.44	0.0053	2.80	9.74
Albizia lebbek	100.00	12.50	60.00	13.33	0.0246	13.05	38.89
Delonix regia	110.00	13.75	60.00	13.33	0.0436	23.08	50.16
Ficus religiosa	30.00	3.75	20.00	4.44	0.0199	10.57	18.76
Diospyros melonxylon	60.00	7.50	40.00	8.89	0.0048	2.56	18.95
Pongamia pinnata	110.00	13.75	60.00	13.33	0.0183	9.69	36.77
Dalbergia sisoo	100.00	12.50	60.00	13.33	0.0332	17.59	43.42

Table 3.25 Characteristics of Tree near Ahiwara

Scientific Name	Density (per ha)	Relative Density	Frequency (%)	Relative Frequency	Dominance	Relative Density	IVI
Acacia nilotica	150.00	25.00	70.00	17.95	0.0136	10.57	53.51
Accacia arabica	100.00	16.67	70.00	17.95	0.0246	19.11	53.72
Syzygium cumini	70.00	11.67	50.00	12.82	0.0232	18.02	42.51
Delbergia sisoo	100.00	16.67	70.00	17.95	0.0264	20.50	55.11
Azadirchta indica	50.00	8.33	40.00	10.26	0.0115	8.88	27.47
Delonix regia	70.00	11.67	50.00	12.82	0.0247	19.15	43.63
Zyzyphus spp	60.00	10.00	40.00	10.26	0.0048	3.74	24.00

Conclusion

Important value index-As of abundance, frequency and density and cover are important features of a plant community and they are important in their own right but individually they are inadequate to assess the importance of the species in an integrated manner. To get an overall assessment of the relative ecological importance of the constituent species in the community importance value index (IVI) of species is determined.

The importance value Index (IVI) is a statistical quantity, which gives an overall picture of the importance of the species in the vegetative community. It considers the relative values of density, frequency and basal area of every species. IVI provides an unbiased comparison of relative importance of different species in the community. IVI is an important tool to ascertain community change over time or in response to human intervention. Any change in the IVI value of species over time or in relation to human intervention is an effective way to measure the trend and the degree of community change in quantitative terms. Needless to say that reliability of the results of IVI values depends on the accuracy of field measurements.Predominantly observed tree species in the study area is *Acacia nilotica followed by Albizia lebbek, Delbergia sisoo and Delonix regia etc.* Density, diversity and IVI are given in the **Table-3.22** to **Table- 3.25** respectively.

Simpson diversity index- Simpson defined their index on the probability that two individuals randomly extracted from an infinitely large community could belong to the same species. The Simpson diversity

index in the above five site selected for the study ranges from 0.81 to 0.86 in the study area. Simpson Diversity index of the study area is provided in Table 3.26,

Simpson Diversity Index=1-Diversity

$D = \sum ni\ (ni - 1)/ N\ (N-1)$

Where, ni = is the number of individuals in the species
N = is the total number of individuals and D =Simpson index

Table- 3.26 Simpson's Diversity Index

Sr. No.	Location	Trees SDI
1.	Near NKM Mine Site	0.81
2.	Near Patheria Mine Site	0.83
3.	Near Kaudia Village	0.86
4.	Near Ahiwara	0.85

Diversity of trees in the study area

During primary observation in the field survey, it is concluded that tree flora is very scanty in the study area. Diversity is calculated by using Simpson diversity index and compare with standards. It is concluded that diversity in the above four site selected for the study ranges is low in the study area. Diversity is the mostly used concept focusing on the fact that the relationship between diversity and disturbances can be seen as a decrease in the diversity when the disturbances are increase.

Floristic Composition – Primary Survey (Shrub Vegetation): Characteristics of shrub vegetation are provided in **Table 3.27 to 3.30**.

Table 3.27 Characteristics of Shrub vegetation Near NKM Mine Site.

S.No.	Scientific Name	Density	Frequency	Abundance
1	*Lantana camara*	2.6	80	3.25
2	*Dhatura metal*	0.8	40	2.00
3	*Vilex negundo*	1.1	60	1.83
4	*Sida cordifolia*	2.4	90	2.67
5	*Calotropis procera*	0.9	50	1.80
6	*Ipomea histulosa*	0.3	20	1.50
7	*Ipomea cornea*	1.1	50	2.20
8	*Sida acuta*	0.8	40	2.00
9	*Solanum surattense*	0.7	40	1.75
10	*Xanthium stremarium*	1.3	60	2.17

(Quadrate size 2mx2m)

Table 3.28 Characteristics of Shrub vegetation Near Patheria-1Mine Site.

S. No.	Scientific Name	Frequency (%)	Density	Abundance
1	*Lantena camara*	90	2.3	2.56
2	*Dhatura metal*	70	1.1	1.57
3	*Vilex negundo*	40	0.7	1.75
4	*Sida cordifolia*	80	2.7	3.38
5	*Calotropis procera*	50	0.9	1.80
6	*Ipomea histulosa*	20	0.4	2.00
7	*Ipomea Cornea*	70	1.7	2.43
8	*Sida acuta*	30	0.4	1.33
9	*Xanthium stremarium*	80	2.1	2.63

(Quadrate size 2mx2m)

Table 3.29 Characteristics of Shrub vegetation Near Kaudia village.

S.No	Scientific Name	Frequency (%)	Density	Abundance
1	*Lantana camara*	100	4.0	4.00
2	*Dhatura metal*	40	0.6	1.50
3	*Vitex negundo*	50	1.3	2.60
4	*Sida cordifolia*	80	3.4	4.25
5	*Ziziphus Spp*	20	0.2	1.00
6	*Calotropis procera*	50	1.1	2.20
7	*Ipomea histulosa*	8940	0.6	1.50
8	*Ipomea Cornea*	70	1.7	2.42
9	*Sida acuta*	50	0.9	1.80
10	*Solanum surattense*	30	0.7	2.33
11	*Xanthium stremarium*	60	1.9	3.16

(Quadrate size 2mx2m)

Table 3.30 Characteristics of Shrub vegetation Near Ahiwara .

S.No	Scientific Name	Frequency	Density	abundance
1	*Lantana camara*	50	1.2	2.40
2	*Dhatura metal*	40	0.9	2.25
3	*Vilex negundo*	60	1.6	2.66
4	*Sida cordifolia*	90	3.6	4.00
5	*Ziziphus Spp*	10	0.1	1.00
6	*Calotropis procera*	60	1.2	2.00
7	*Ipomea histulosa*	40	0.5	1.25
8	*Ipomea Cornea*	60	1.5	2.50
9	*Sida acuta*	80	2.9	3.62
10	*Solanum surattense*	40	0.8	2.00
11	*Xanthium stremarium*	60	1.6	2.66

(Quadrate size 2mx2m)

Floristic Composition – Primary Survey (Herb Vegetation):

Table 3.31 Characteristics of Herb vegetation Near NKM Mine Site.

S.No	Scientific Name	Frequency (%)	Density(per m^2)	Abundance
1	*Casia tora*	100	1	6.10
2	*Parthenium hysterophorus*	60	0.6	3.17
3	*Solanum nigram*	20	0.2	1.00
4	*Achyranthus aspera*	80	0.8	2.38
6	*Poloygonum glabrum*	70	0.7	2.00
7	*Canabis Sativa*	50	0.5	2.80
8	*Chenopodium album*	40	0.4	2.75
9	*Boerhavia diffusa*	30	0.3	2.67
10	*Argemone maxicana*	30	0.3	2.00
11	*Oxalis corniculata*	30	0.3	2.67
12	*Cynodon dactylon*	80	0.9	5.00

Table 3.32 Characteristics of Herb vegetation Near Patheria Mine Site.

S.No	Scientific Name	Frequency (%)	Density(per m^2)	Abundance
1	*Casia tora*	90	3.5	3.89
2	*Parthenium hysterophorus*	50	2.3	4.60
3	*Solanum nigram*	20	0.4	2.00
4	*Achyranthus aspera*	70	1.9	2.71
6	*Poloygonum glabrum*	50	0.7	1.40
7	*Canabis Sativa*	50	1.2	2.40
8	*Chenopodium Album*	40	1.5	3.75
9	*Boerhavia diffusa*	50	1.1	2.20
10	*Argemone maxicana*	20	0.3	1.50
11	*Oxalis corniculata*	20	0.5	2.50
12	*Cynodon dactylon*	100	5.5	5.50

Table 3.33 Characteristics of Herb vegetation Near Kaudia village .

S.No	Scientific Name	Frequency (%)	Density(per m^2)	Abundance
1	*Casia tora*	70	0.7	4.43
2	*Parthenium hysterophorus*	90	0.9	4.56
3	*Solanum nigram*	10	0.1	3.00
4	*Achyranthus aspera*	90	0.9	4.56
6	*Poloygonum glabrum*	40	0.4	1.50
7	*Canabis sativa*	70	0.7	3.57
8	*Chenopodium album*	70	0.7	3.14
9	*Boerhavia diffusa*	60	0.6	2.67
10	*Argemone maxicana*	50	0.5	2.60
11	*Oxalis corniculata*	20	0.2	2.50
12	*Cynodon dactylon*	80	0.8	3.25

Table 3.34 Characteristics of Herb vegetation Near Ahiwara

S.No	Scientific Name	Frequency	Density	Abundance
1	*Casia tora*	50	0.5	3.40
2	*Parthenium hysterophorus*	100	1	4.60
3	*Solanum nigram*	40	0.4	3.50
4	*Achyranthus aspera*	100	1	4.00
6	*Poloygonum glabrum*	30	0.3	2.33
7	*Canabis sativa*	90	0.9	3.44
8	*Chenopodium album*	60	0.6	3.17
9	*Boerhavia diffusa*	20	0.2	2.50
10	*Argemone maxicana*	40	0.4	2.75
11	*Oxalis corniculata*	50	0.5	1.80
12	*Cynodon dactylon*	90	0.9	4.33

3.8.3 Faunal Biodiversity

The study area (10 km radius around the project site) has long been under cultivation and at present only small patches of degraded tropical dry deciduous forests have been left, if at all. There is no protected and reserved forest present in the study area. The study area has less than 1% of forest land as evident from the topography map and land use records. The only forest cover is scanty scrub-land that too in patches. The vegetation is acacia species. Such scanty vegetation coupled by speedy industrial development has left the area devoid of any significant faunal species or wildlife**.** List of fauna found in the study area is presented in **Table.3.35.** The listed fauna has been cross-checked with Red Data Book of Indian Animals (Zoological Survey of India). There is no endangered faunal species in the study area.

Mammals: No significant carnivorous and herbivorous wild animals are found in the area. Langurs (Semnopithecus entellus), Mongoose (Herpestes edwards) and Jungle Cat (Felis chaus) are the common ammals observed in the area.

Amphibian & Reptiles: Frog, Indian bull frog, snake like Indian cobra (*Naja naja*); Dhaman (*Lycodon aulicus*), Chitti (*Bungarus* spp.) and lizard are encountered at various places in study area.

Table 3.35 List of the Mammals Recorded in Buffer Zone

	Local Name	Common Name	Scientific Name	Feeding Status	Schedule
1.	Lomdi	Fox	*Vulpes bengalensis*	C	II
2.	Gilahri	Striped squirrel	*Funambulus pennanti*	H	IV
3.	Chuha	Field rat	*Bandicota bangalonsis*	H	V
4.	Sehi	Porcupine	*Hystrix Indica*	C	IV
5.	Khargosh	Hare	*Lepus nigricollis*	H	IV
6.	Jangli Billi	Jungle cat	*Felis chaus*	C	II
7.	Nevala	Mongoose	*Herpestes edwardsi*	C	IV
8.	Langoor	Langur	*Presliptis entellus*	H	II
9.	Bandar	Rhesus macaque	*Macaca mulatto*	H	III
10.	Chamgadad	Fruit bat	*Cynopterus sphinx*	C	V
11	Gidad	Jackal	-	C	IV
12	Jungle Suar	Wild boar			

H – Herbivorous, C – Carnivorous, O – Omnivorous

Table 3.35….. List of Amphibians and Reptiles Recorded in Study Area

	Common Name	Scientific Name	Vernacular Name	Family	Feeding Status	Schedule
Amphibians						
1.	Frog	*Rana tigrina*	-	-	C	IV
2.	Indian bull frog	*Hoplobatrachus tigerinus*	-	-	C	IV
Reptiles						
1.	Binocellate cobra	*Naja naja*	Nag	Elapidae	C	II
2.	Common Krait	*Bungarus coeruleus*	-	Elapidae	C	IV

	Common Name	Scientific Name	Vernacular Name	Family	Feeding Status	Schedule
Amphibians						
3.	Russell's Viper	*Vipera russellis*	-	Crotalidae	C	II
4.	Rat snake	*Ptyas mucosus*	Dhaman	Colubridae	C	II
5.	Forest Lizard	*Calotes versicolor*	-	Agamidae	C	II
6.	Indian chameleon	*Chameleon zegylanicus*	-	Chamael-eonidae	C	-

C – Carnivorous

Avifaunal Investigation

Avifauna is an important part of the ecosystem playing the various roles as scavengers, pollinators, predators of insect, pest, etc. They are also one of the bio indicators of different status of environment and affected by urbanization, industrialization and human interference. They can be used as sensitive indicators of pollution and malfunction of ecosystem.

The nocturnal birds found in the area are Bat (Pteropus giganteus) Owl (Bobo bobo), Bee-Eaters, Swallows (Hirundo rustica), Shrikes, Fairy Birds and Wegtails. All the birds are found near fresh waters and wet irrigated fields feeding actively on insects. List of bird species observed in the stud area is given in **Table 3.36**.

Table 3.36 List of the Birds Surveyed / Recorded in the Study Area

Sl No	Common Name	Scientific Name
1.	Blackheaded Oriole	*Oriolus xathornus*
2.	Barn Owl	*Tyto alba*
3.	Bank Myna	*Acridotheres ginginianus*
4.	Baya Weaver	*Ploceus philippinus*
5.	Black Drongo	*Dicrurus adsimilis*
6.	Blossom headed Parakeet	*Psittacula Cyanocephala*
7.	Ble throated Barbet	*Megalaima asiatica*
8.	Brown Shrike	*Lanius Cristatus*
.9.	Cattle Egret	*Bubukus ibis*
.10.	Crow Pheasant	*Centropus sinensis*
11.	Crimson breasted Barbet	*Megalaima haemacephala*
12.	Common Swallow	*Hirundo rustica*
13.	Common Tailorbird	*Orthotomus sutorius*
14.	Common Kingfisher	*Alcedo atthis*
15.	Dove	*Streptopelia decaocto*
16.	Coppersmith Barbet	*Megalaima haemacephala*
17.	Greater cookoo	*Centropus sinensis*
18.	Grey backed shrike	*Lanius tephronotus*
19.	Golden Back Woodpecker	*Dinopium benghalense*
20.	House Crow	*Corvus splendens*
21.	House Swift	*Apus affinis*
22.	Honey Buzzard	*Pernis ptilorhynchus*
23.	Hoopoe	*Upupa spops*
24.	House Sparrow	*Passer domesticus*

25.	Indian Roller	*Coracias benghalensis*
26.	India Tree Pie	*Dendocitta vagabunda*
27.	Indian Ring Dove	*Streptopelia decapctp*
28.	Jungle crow	*Corvus macrorthynchos*
29.	Jungle Babler	*Turdoides striatus*
30.	Koel	*Eudynamys scolopacea*
31.	Kingfisher - White throated	*Halcyon smyrnensis*
32.	Kingfisher - Whitebreasted	*Halcyon smyrnensis*
33.	Kingfisher - Common	*Alcedo atthis*
34	Little Brown Dove	*Streptopelia senegalensis*
35.	Lesser Goldenbacked Woodpecker	*Dinopium benghalensis*
36.	Large Pied Wagtail	*Motacilla maderaspatensis*
37.	Magpie Robin	*Copsychus saularis*
38.	Mayna - Pied	*Sturnus contra*
39.	Mayna - Brahminy	*Sturnus pagodarum*
40.	Mayna - Common	*Acridotheres tristis*
41.	Mayna - Jungle	*Acridotheres fuscus*
43.	Pied Cuckoo	*Clamator jacobinus*
44.	Pond Heron	*Ardeala grayii*
45.	Purple Sunbird	*Nectarinia asiatica*
46.	Redwattled Lapwing	*Vanellus indicus*
47.	Red Turtle Dove	*Streptopelia tranquebarica*
48.	Rose ringed Parakeet	*Psittacula krameri*
49.	Redvented bulbul	*Pycnonotus cafer*
50.	Spotted Dove	*Streptopelia chinensis*
51.	Sirkeer Cuckoo	*Taccocua leschenaultu*
52.	Wood Shrike	*Tephrodomis pondicerianus*
53.	Whitebrowed Fantail Flycatcher	*Rhipidura aureola*

Bird Survey: During avifauna survey actual counts of birds were made following the standard survey technique. During the study period birds observed in the study area are Red vented bulbul *(Pycronotus cafer)*, Common myna or Indian myna (*Acridotheres tristis)*, House sparrow *(Passer domesticus)*, House crow *(Corvus splendens)*, Black drongo *(Dicrurus macrocercus)*, potted dove *(Stereptopelia chinensis)*, cattle egret, common Hopei etc. Birds are found in the area because of the presence of water bodies. House sparrow, neelkanth, crow and myna (Acridotheres tristris) are seen around the human dwellings. A few species of bulbul are often noticed in the gardens. Weaver bird with its artistic nests is seen hanging over babul trees. The bird observed in specific area of the study area is listed in **Table 3.37.**

Table 3.37 Bird Observed at Specific areas in the Study Area

S.No.	Location Name	Site Dominant Species	
		Common Name	Scientific Name
1.	Near Patheria-1 Mine office	House Crow Black Drongo Sparrow Spotted Dove Common Hoopoe Greater Coucal	*Corvus splendens* *Dicrurus macrocerus* *Passer domesticus* *Streptopelia chinensis* *Upupa epops* *Centropus sinensis*

		Common Myna Jungle Babler Magpie Robin Indian Robin Asian Koel Cattle Egret Lapwing White-throated Kingfisher Common Kingfisher	*Acridotheres tristis* *Turdoides striatus* *Copsychus saularis* *Saxicoloides fulicata* *Eudynamys scolopacea* *Bubulcus ibis* *Venetlus indicus* *Halcyon Smyrmensis* *Alcedo atthis*
2.	Nandani Khundni Village/ near NKM mined out pit	Pond Heron Water Hen Little Egret Great Egret Cattle Egret Red-wattled Lapwing Common Kingfisher White Waigtail Temminck's Stint Lapwing Greater Coucal Common Myna Common Red Shark Black Drongo Green Bee Eater Rufous Tree Pie Black winged still Indian Robin Indian Grey Hornbill Black Kite	*Ardeola grayii* *Amaurormis phoenicurus* *Egretta garzetta* *Milvus migrans* *Bubulcus ibis* *Vanellus indicus* *Alcedo atthis* *Motacila alba* *Calidris temminckii* *Venetlus indicus* *Centropus sinensis* *Acridotheres tristis* *Tringa tetanus* *Dicrurus macrocerus* *Merops orientails* *Dendocitta Vagabunda* *Himantopus himantopus* *Saxicoloides fulicata* *Ocyceros birostris* *Milvus migrans*
3.	Near Sheonath River Bank	Indian Grey Hornbill Jungle Crow Common Starling Indian Robin Greylag Goose Common Pochard Water Hen Indian Moorhen Little Egret Black-winged Stilt Red-wattled Lapwing White Wagtail Grey Heron Red-wattled Lapwing Wood Sandpiper Indian Robin	*Ocyceros birostris* *Corvus macrorhynchos* *Sturnus vulgaris* *Saxicoloides fulicata* *Anser anser* *Aythya ferina* *Amaurormis phoenicurus* *Gallinula chloropus* *Egretta garzetta* *Himantopus himantopus* *Vanellus indicus* *Motacilla alba* *Ardea Cinerea* *Vanellus indicus* *Tringa glareola* *Saxicoloides fulicata*
4.	Near GhirolaVillage	House Sparrow Black Drongo House Crow Common Myna Red-vented Bulbul Red-whiskered Bulbul Grey Babbler Hume's Warbler Magpie Robin Indian Robin Paddy-field Pipit Rufous Tree Pie Common Chiffchaff Indian Roller Asian Koel Spotted Dove Blue Rock pigeon Common Hoopoe Greater Coucal	*Passer domesticus* *Dicrurus macrocerus* *Corvus splendens* *Acridotheres tristis* *Pycnonotus cafer* *Pycnonotus jocosus* *Turdoides malcolmi* *Phylloscopus humei* *Copsychus saularis* *Saxicoloides fulicata* *Anthus rufulus* *Dendocitta Vagabunda* *Phyllouscopus collybita* *Coracias benghalensis* *Eudynamys scolopacea* *Streptopelia chinensis* *Columba livia* *Upupa epops* *Centropus sinensis*

		Indian Grey Hornbill Black Kite	*Ocyceros birostris* *Milvus migrans*
5.	Near Village Potka	Grey Babbler Indian Robin Paddy-field Pipit Asian Koel Spotted Dove Greater Coucal Red-vented Bulbul Common Myna	*Turdoides malcolmi* *Saxicoloides fulicata* *Anthus rufulus* *Eudynamys scolopacea* *Streptopelia chinensis* *Centropus sinensis* *Pycnonotus cafer* *Acridotheres tristis*

Fisheries: The rivers and ponds of study area have variety of fish. The main fish found in the area are Rohu (Labeo rohita), Katla (Catla catla), Kalbaus (Labeo kalabasu), and Singhan (Mystus seenghala), Tilapia and Tangra.

Endangered animals: No National Park / Wildlife Sanctuary and Reserve / Protected Forests are present within 10 km radius of the Mining Lease area. No rare and endangered faunal species was observed in the study area.

3.9 Land Use

Table 3.38 Land use Pattern Based of Revenue Records

Tehsil	Land use (Area in Ha)					
	Forest Land	Area not available for agro uses	Barren Land Other than Fallow land	Current fallow	Fallow land	Net sown area
Durg	Nil	20722	4465	3418	3648	34953
Dhamda	Nil	9797	8353	4820	7992	57897

Sources: Statistics Hand Book 2011-12

Land use map of the study area has been prepared based on the IRS-P6 LISS4FMX latest Satellite Imagery. The land use/ land cover data of the 10 km radius study area is shown in **Figure 3.10 and Table 3.39.**The Satellite Imagery of 10 km study area is shown in **Figure 3.11.**

Table 3.39 Land use /Land cover as per Satellite Imagery

S.No.	Land use Categories	Area in Sq.Km.	Percentage
1	River and Water Bodies	17	5.4
2	Agriculture Land	189	60.2
3	Barren Land	28	8.9
4	Mixed Land use	59	18.8
5	Settlement	21	6.7

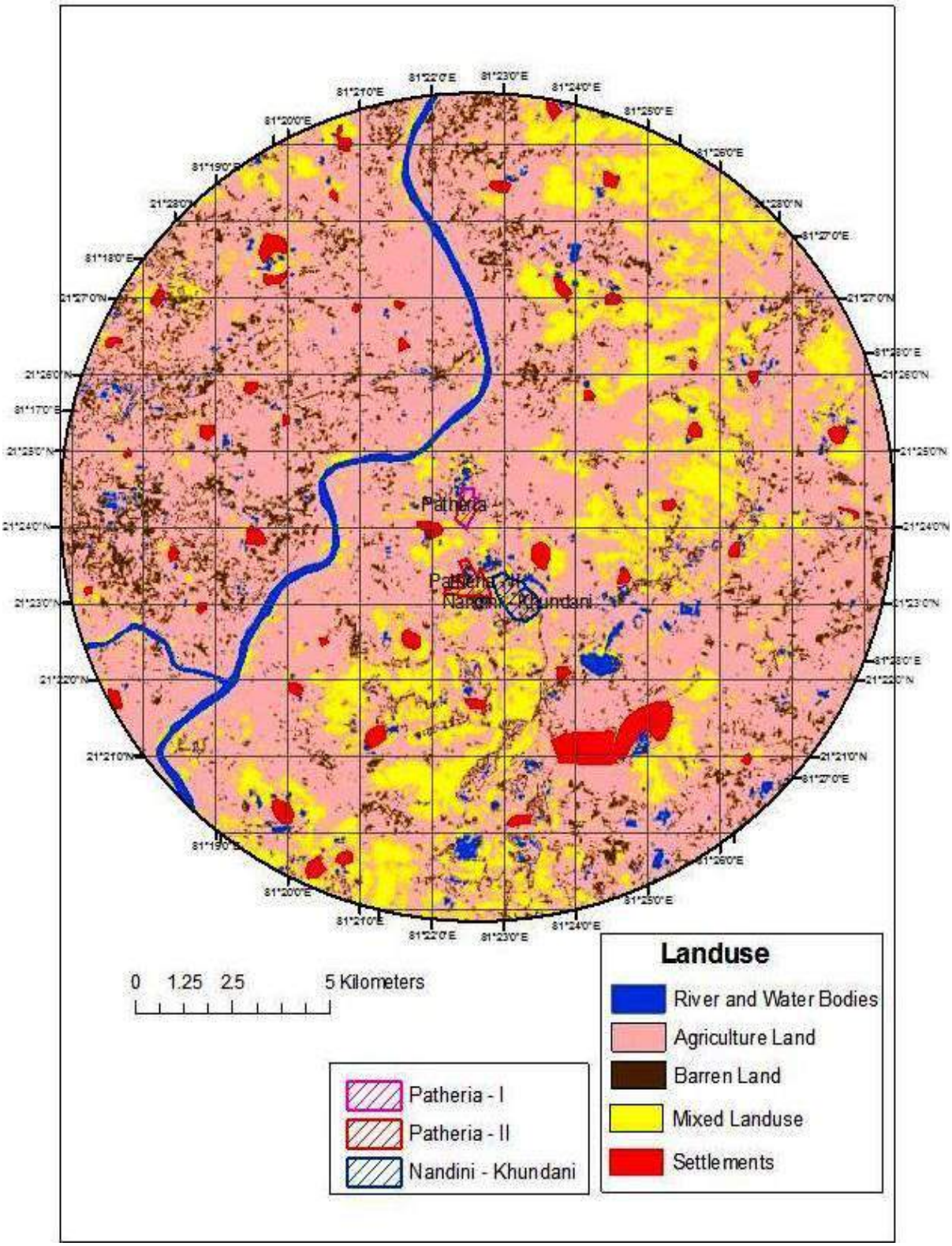


Figure 3.8 Land use Map of Study area (Based on Satellite Image)

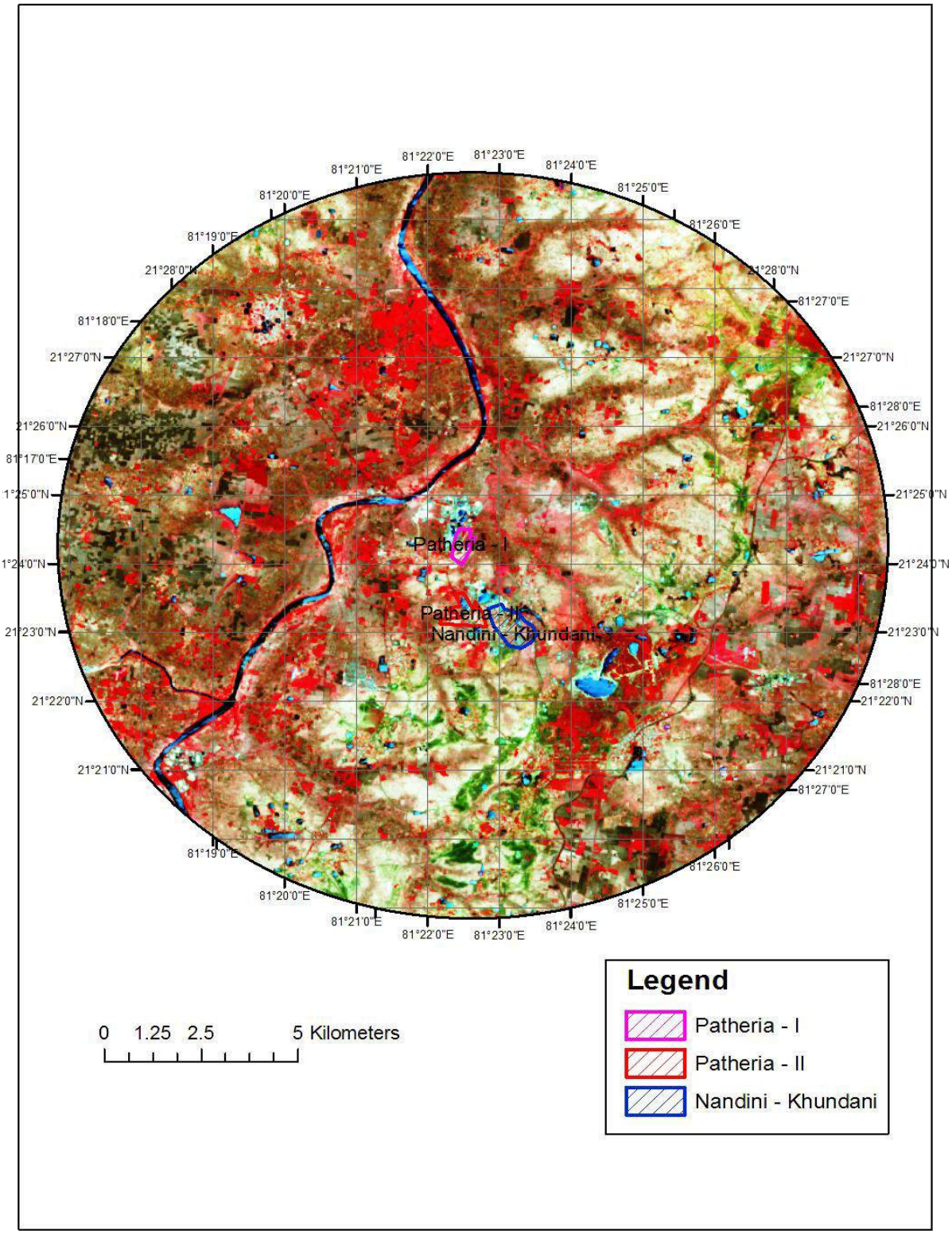


Figure 3.9 Satellite Imagery of the Study Area Showing Site and Surroundings

Agriculture

Only 27.1% land is under cultivation. Agriculture is the main economic activity of the people. The main crop of the study area is paddy. The other crops grown in the study area are wheat, jowar, maize, kutki, arhar, chana, moong, urad, tiwara, soyabeen, sugarcane, groundnut, vegetables and fruits. People are either working as agricultural labour or as cultivators.

Irrigation

Canal, Dug well and pond are the main source of irrigation in in Durg district. There is a well developed network of canal in the study area. The various sources of irrigation used in the Durg and Dhamda Tehsil are given in following table.

Tehsil	Canal		Bore well		Well		Pond		Other sources
	Gov./ Private	Area Irrigated	Number	Area Irrigated	Number	Area Irrigated	Number	Area Irrigated	
Durg	35	14461	2894	5668	265	325	29	678	1356
Dhamda	39	8830	3178	15610	77	91	7	72	1480

(Area irrigated in ha)

3.10 Demography and Socio-economics

Impact on the socio-economic environment in the vicinity of any mining area revolves around the modes of change that are likely to occur due to beneficial and adverse effects arising out of proposed mining activity. These pertain to economic output, job opportunities and strain on the existing basic amenities as well as overall impact on the quality of the environment of the region. Therefore, assessment of such an impact calls for detailed baseline information and impact on the socio-economic environment and to suggest environmental management plan in order to minimise the adverse impacts.The Socio-Economic Impact Assessment (SEIA) was carried out by collecting the data on demographic profile, infrastructural facilities, type of employment and personal interviews for the responses to the proposed project facilities and the impact of the proposed project on the socio-economic environment within an area of 10 km radius from the mine site at village Nandini Khundini, Tehsil Dhamdha, Durg Chhattisgarh.

The proposed limestone mine site is located near village Nandini Khundini, Tehsil Dhamdha, Durg district. 10 km area of the project site has been considered as study area. Administratively, the villages and settlement within this area falls in Dhamdha and Durg Tehsil of Durg District in Chhattisgarh State. There are 2 Nagar Palika and 59 villages fall within 10 km Area of the Mine site. Out of the total, only 7 villages falls in the core zone (3 km) and 52 villages and 2 Nagar Plaika falls in the buffer zone (10 km area). According to 2011 census the total population of the study area is 114455 comprising 57257maleand 57198 female. Male female ratio of the study area is 999 female / 1000 male. Total no. of households is 24191. The demographic status of Tehsil Dhamdha and study area is given in **Table 3.40.** Village wise population of the study area is given in **Table 3.41**

Table 3.40 Rural / Urban Population of Tehsil

Sub-district/ study area Name	Rural / Urban	Total Population	Total Male	Total Female
Dhamdha	Total	269990	135480	134510
Study area (10 Km)	Total	116060	58057	58003

Source: Primary Census of India 2011

Table 3.41 Village wise Population of Study Area

S.N.	Name	No of Households	Total Population	Male	Female
1	Deurjhal	210	976	492	484
2	Potia	396	1696	846	850

S.N.	Name	No of Households	Total Population	Male	Female
3	Medesara	712	3396	1703	1693
4	Nandni Khudni	885	4369	2181	2188
5	Pathariya	534	2695	1369	1326
6	Sahgaon	118	571	286	285
7	Pitaura	366	1605	800	805
Population within 3 km area of mine site		3221	15308	7677	7631
8	Dangania	192	1197	619	578
9	Nawagaon	85	418	228	190
10	Motimpur	196	879	435	444
11	Rahtadah	154	778	370	408
12	Sirnabhatha	121	531	263	268
13	Titurghat	206	1047	526	521
14	Maharajpur	58	271	119	152
15	Sonesarar	262	1378	680	698
16	Barhapur	514	2689	1330	1359
17	Birjapur	400	1827	892	935
18	Kanharpuri Jatagharra	245	1207	602	605
19	Khapri (Jatadarra)	130	550	275	275
20	Jatagharra	158	625	317	308
21	Parasbod	181	994	500	494
22	Kareli	266	1423	704	719
23	Dani Kokdi	269	1310	654	656
24	Pandora	215	1255	654	601
25	Basni	254	1299	671	628
26	Gadaghat	155	641	314	327
27	Tumakalan	272	1302	673	629
28	Parsuli	201	909	465	444
29	Silli	220	1199	585	614
30	Doma	296	1508	762	746
31	Dania	583	2422	1205	1217
32	Parsada Khurd	136	575	300	275
33	Kodia	663	3216	1621	1595
34	Parsada	261	1000	486	514
35	Sagni	242	1356	696	660
36	Aheri	486	2388	1178	1210
37	Bagdumar	351	1453	729	724
38	Birebhat	393	1681	829	852
39	Biroda	350	1802	924	878
40	Dargaon	625	2782	1386	1396
41	Kandai	187	954	505	449
42	Khajri	393	1873	930	943
43	Mohrenga	501	2610	1330	1280
44	Kokdi	127	549	267	282
45	Matra	298	1565	786	779

S.N.	Name	No of Households	Total Population	Male	Female
46	Hardi	199	1066	542	524
47	Ghikundia	205	957	463	494
48	Pitaura	366	1605	800	805
49	Semaria	392	2075	1016	1059
50	Khapri	200	949	472	477
51	Girhola	546	2810	1383	1427
52	Karhidih	90	436	222	214
53	Ghathia Khurd	175	734	359	375
54	Sandi	138	779	376	403
55	Dhaur	134	688	341	347
56	Malpuri	482	2436	1234	1202
57	Kapasda	530	2498	1263	1235
58	Hingnadih	107	520	259	261
59	Mudpar	299	1391	690	701
60	Dhamdha (NP)	2175	9961	4935	5026
61	Ahiwara (NP)	4266	20384	10215	10169
Total within 10 Km Area of the mine site		**24171**	**116060**	**58057**	**58003**

Source: Primary Census of India 2011

Scheduled Caste and Schedule Tribe Population: The schedule Caste (SC) and Schedule Tribe (ST) community are considered as socially weak, hence the state and central governments have several welfare schemes for their economic and social development. There are 8 villages of study area having no SC population and 11 villages having no ST population. Total SC population in the study area is 21737 comprising of 10725 males and 11012 females. Total ST Population in the study area is 7166 comprising of 3596 males and 3570 females.

Out of the total population the SC and ST population of the study area is 18.7% and 6.1% respectively. Out of the total villages in the study area about 17 villages have SC population more than 30 %. The distribution percentage of SC and ST population in the study area is given in **Table 3.42 and 3.43.**

Table 3.42 Village wise SC and ST population of study area

Sl. No.	Village/ Nagar Palika	SC Population	SC Male	SC Female	ST population	ST Male	ST Female
1	Deurjhal	266	143	123	203	99	104
2	Potia	464	220	244	8	5	3
3	Medesara	111	54	57	208	96	112
4	Nandni Khudni	870	422	448	153	78	75
5	Pathariya	519	235	284	381	200	181
6	Sahgaon	0	0	0	3	0	3
7	Pitaura	885	442	443	86	43	43
SC & ST Population within 3 km area of mine site		3115	1516	1599	1042	521	521
8	Dangania	4	1	3	0	0	0
9	Nawagaon	323	174	149	0	0	0
10	Motimpur	210	105	105	87	42	45
11	Rahtadah	263	110	153	279	148	131

12	Sirnabhatha	0	0	0	278	138	140
13	Titurghat	0	0	0	42	21	21
14	Maharajpur	177	77	100	0	0	0
15	Sonesarar	19	10	9	150	80	70
16	Barhapur	212	107	105	44	27	17
17	Birjapur	282	131	151	91	43	48
18	Kanharpuri Jatagharra	0	0	0	166	82	84
19	Khapri (Jatadarra)	0	0	0	0	0	0
20	Jatagharra	24	10	14	165	84	81
21	Parasbod	22	11	11	0	0	0
22	Kareli	54	30	24	0	0	0
23	Dani Kokdi	148	76	72	183	92	91
24	Pandora	8	3	5	0	0	0
25	Basni	51	26	25	156	87	69
26	Gadaghat	0	0	0	73	31	42
27	Tumakalan	36	20	16	56	34	22
28	Parsuli	16	8	8	140	74	66
29	Silli	131	55	76	0	0	0
30	Doma	0	0	0	80	37	43
31	Dania	225	112	113	54	31	23
32	Parsada Khurd	132	69	63	11	6	5
33	Kodia	595	308	287	199	98	101
34	Parsada	102	50	52	66	35	31
35	Sagni	30	17	13	81	35	46
36	Aheri	577	285	292	186	99	87
37	Bagdumar	618	296	322	0	0	0
38	Birebhat	606	311	295	46	24	22
39	Biroda	205	108	97	2	1	1
40	Dargaon	747	364	383	42	23	19
41	Kandai	732	388	344	0	0	0
42	Khajri	525	264	261	46	24	22
43	Mohrenga	965	489	476	200	99	101
44	Kokdi	325	160	165	60	27	33
45	Matra	11	6	5	143	67	76
46	Hardi	37	19	18	1	0	1
47	Ghikundia	626	314	312	117	51	66
48	Pitaura	885	442	443	86	43	43
49	Semaria	606	301	305	60	27	33
50	Khapri	310	144	166	227	117	110
51	Girhola	1836	897	939	97	49	48
52	Karhidih	348	182	166	0	0	0
53	Ghathia Khurd	355	170	185	131	68	63
54	Sandi	58	31	27	90	37	53
55	Dhaur	244	119	125	136	68	68
56	Malpuri	179	95	84	77	40	37
57	Kapasda	359	179	180	47	22	25

58	Hingnadih	0	0	0	202	96	106
59	Mudpar	687	333	354	56	26	30
60	Dhamdha (NP)	344	171	173	288	138	150
61	Ahiwara (NP)	3373	1631	1742	1383	704	679
SC & ST Population within 10 km area of mine site		21737	10725	11012	7166	3596	3570

Source: Primary Census of India 2011

Table 3.43: Distribution by Percentage of SC and ST population:

Around 10 km radius from Mine site			
Villages			
Number (SC)	% (SC)	Number (ST)	% (ST)
8	13.11	8	13.11
18	29.50	26	42.62
10	16.39	15	24.59
8	13.11	5	8.19
8	13.11	7	11.47
6	9.83	-	-
3	4.91	-	-
61	100	61	100

Occupational Structure: According to the Census definition "work" may be defined as participation, mental or physical, in any economically productive activity. People engaged in such an activity constitute the workforce. Workforce can be classified as main or marginal". A person who has worked for more than 183 days in a year is called the main worker. Marginal workers are those who have worked any time in the year preceding the census but have not worked for major part, which is not more than 183 days, of the year.

The proposed mine of ACC involves engaging skilled, semiskilled and unskilled work force. It is generally felt that engaging the locals in the various activities of the proposed project during the construction phase and also during the operational phase wherever possible will increase the work participation rate of the people in the impact area. This is one of the direct benefits accruing to the local people due to the proposed project. Occupational pattern of the study area is given in the **Table 3.44.**

Table 3.44: Occupation Pattern in Study Area

Tehsil /District	Total worker			Main worker			Marginal workers		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Study area (within 10 km Area)	29399	18506	47905	24503	11048	35551	4896	7458	12354

Source: Primary Census of India 2011

Distribution of Main Worker: The agricultural related activities are the main occupation of the study area. Farming and agricultural activities generates the maximum employment in the study area. Male and female equally counts its growth. Agricultural related activities are generally seasonal. Therefore, these agricultural workers may not be employed during all seasons. The services of agricultural labourers can be potentially utilized for the construction phase of the project. The classification of the main worker of the study area is given in **Table 3.45**

Table 3.45 Classification of Main Workers in Study Area

Tehsil /District	Classification of Main workers							
	Farmers		Agricultural workers		Domestic workers		Other workers	
	Male	Female	Male	Female	Male	Female	Male	Female
Study area (within 10 k Area)	6026	2808	7501	6232	332	151	10644	1857

Source: Primary Census of India 2011

Sex – Ratio: Sex ratio is defined as the number of women per 1000 men, is considered as an indicator of social development of the region. Generally, a higher sex ratio reflects a better social development. The sex ratio of the study area is 999.

Infrastructure Facilities:

A) Medical facility: Studying the availability of medical facilities in the villages is essential. The public health facility in the villages of the study area is very limited. People living in villages of the study area have to go out of their village to avail of any medical facility. The medical facilities available in Durg District are given below.

Availability of Medical Facility in Durg District

Year	Hospital				Available beds	
	Allopathic	Primary Health Centers	Primary Health Sub centers	Ayurvedic /Unani	Allopathic	Other
2007-08	16	67	441	111	740	60
2008-09	16	71	442	111	870	60
2009-10	16	71	442	111	870	60
2010-11	18	71	447	Nil	1110	Nil
2011-12	18	71	447	Nil	1110	Nil

Source: Statistics Hand Book Durg 2011

Availability of Medical Medical Staff in Durg District

	Year	Doctors		Other Supporting Staff			Other	Total
		Allopathic	Other	Health officer	Nurse	Compounder		
1	2007-08	123	82	489	576	76	204	1550
2	2008-09	125	83	489	581	147	203	1628
3	2009-10	134	83	481	584	154	205	1641
4	2010-11	136	83	499	587	51	187	1543
5	2011-12	140	83	502	585	48	206	1564

Source: Statistics Hand Book Durg 2011

B) Educational facility: It is well known that education is a necessity for the all round human development. The availability of educational facilities is a crucial element for attaining this. The existence of educational facilities in Durg district is given in following table.

Education Facility in Durg District

Year	Primary school	Middle school	High school	Higher Secondary school	Collage	Vocational institutes	Other a
2007-08	2655	1386	198	308	19	30	3
2008-09	2750	1435	217	348	20	34	3
2009-10	2789	1458	225	361	22	36	3
2010-11	2807	1479	231	368	31	41	4
2011-12	2815	1492	236	372	43	44	4

Source: Statistics Hand Book Durg 2011

No of teachers and students in educational institutes in Durg District is given below:

No. of Students in Educational Institutes (5-years 2007-08 to 2011-12)

Primary school		Middle School		High School		Senior Secondary School		College		Vocational institutes	
Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
182220	175452	89598	86723	33076	31166	26629	20026	5349	8222	5345	2320
188119	180157	91466	89040	36573	33176	28499	23107	6257	9295	5701	2528
191258	182091	95735	90558	35690	34924	31139	25416	7948	10294	6461	2927
193165	192873	96811	92361	53181	51490	31795	26137	9115	12164	15662	5488
193762	191986	96357	91632	51839	52472	31419	26949	11674	14592	17088	5537

No. of Teachers in Educational Institutes

Year	Primary school	Middle School	High School	Senior Secondary	College	Vocational
2007-08	9813	5101	1075	2203	427	851
2008-09	11035	6242	1213	2494	469	936
2009-10	11974	7185	1261	2985	464	1074
2010-11	10322	5918	1417	4721	576	1695
2011-12	11416	6739	1723	4910	610	1876

Education and Literacy: According to Census of India literacy rate is defined as the percentage of literates to the population of age above 6. It is important to study the extent of literacy among the people in the impact area i.e. area covering 10 km radius from the proposed site. Any developmental project will be well understood and appreciated by the literate masses. Further, it will help ACC in exploring the potential of the locals for future recruitment during the construction and operational phases of the proposed extension project. According to 2011 Census, Literacy rate of the villages in study area is around 63.6% comprising 72.1% male literates and 55.1% Female literates.

Drinking water facility: Availability of clean potable drinking water is a major precondition for good health. Hand pump. Tube well & Dug well is the only one source of drinking water. All the villages in the study area have drinking water facility. Tap water supply is also available in some villages of the study area. Hand pumps are available in all the villages of the study area.

Transportation Facilities: Most of all the villages are connected to the road in study area. The length Of road and type available in Durg District is tabulated below:

Durg district	Puckka road (length in KM)			Kachha Road(length in KM)		
	Pradhanmatri sadak	PWD	Local Body	PWD	Local Body	Forest Road
2007-08	379.35	3883.4	330.18	1122.67	129.28	25.1
2008-09	132.99	3834.97	552.47	860.9	163.55	25.1
2009-10	43.05	3706.85	559.77	643.79	86.22	197
2010-11	Nill	N-A	919.81	N-A	46.5	N-A
2011-12	Nill	N-A	959.64	N-A	45.5	N-A

Source: Statistics Hand Book Durg 2011

CHAPTER 4: ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 Identification of Impact

Workshop for maintenance of HEMM and Dumpers, lubricating storage area, diesel filling station, explosive storage magazine, dedicated roads, administrative building, canteen, etc. will not be established inside the ML area. Facilities available at nearby Patheriya Lease I mines will be availed. As per the provisions of MMRD Act, rest shelter will be developed for workers inside the mine.

The project will create insignificant environmental impact on the following components:

- Land clearing (Bhilai Steel Plant out the mining activity for nearly 20 years inside this NK lease area. No loss of agriculture land, gauchar land, forest land, ponds, village roads).
- Loss of nallas and ponds inside the ML area *(No nalla is passing with in ML area)*
- Discharge of wastewater and mine inflow water discharge (*Mine water will be stored into abandoned voids*)
- Hydrology (*reduced surface runoff from ML area*).
- Displacement of people from occupation and residential units and loss of assets (*no people or houses will be displaced*).
- Aesthetic value loss (no loss because the ML area has been explored by Bhilai Steel Plant. Further greenbelt with good species diversity shall be developed al around the ML area)
- Top soil removal (*loss of soil fertility, vegetation, microbial community*)

The project will create additional significant environmental impact on the following components:

- Drilling and blasting activities (fugitive dust, noise and vibration issues, cracks in buildings and houses)
- Ambient Air Quality (air pollution due to mining, crushing and vehicular movements).
- Ambient noise quality (blast and vibration, crusher, HEMM and vehicular movement).
- Hydrogeology (due to intersection of groundwater in ML area, increased infiltration of rainwater in ML area, mine water inflow and falling ground water level of area around the mines).
- Soil erosion from OB Dumps (causing siltation of nearby streams).

4.2 Impact on Ambient Air Quality

Drilling, blasting, excavation, transportation are the air polluting activities at the mining site. To reduce the impact of air pollution, best available measures taken at the mining site will be continued: The impact on the ambient air quality of the study area has been predicted using mathematical modeling (ISCST3) by following the guidelines developed by CPCB ("Assessment of Impact to Air Environment: Guidelines for Conducting Air Quality Modeling" Probes/70/1997-98). Modeling was carried out using the software ISCST3.

Methodology: The area source model is based on the equation for a finite crosswind line source. Individual area source have the normal east-west and north-south dimensions. CPCB guidelines (1998) on dispersion modeling states that the area sources which do not emit into a wake region should be treated as either point source with initial crosswind spread or as non-buoyant volume

source with initial vertical and cross wind speed. If an area source is treated as an effective point source modeling may proceed as it would for a point source located at the center of the area. Area sources treated as point sources may have release heights which are above the ground level but usually these sources are emitting into a structure wake. If a non-buoyant area source is treated as a volume source, it is assumed to be located at the center of the area and have initial spreads in the vertical and crosswind direction.

Emission Inventory of Limestone Mines: Emissions factors recommended in USEPA's AP42 have been followed to prepare the emission inventory. Blasting impact has not been considered because it will be done for millisecond duration and its impact will subside within 5 minutes. The emission inventory of limestone mines is shown below.

Table: 4.1 Emission Inventories of Limestone Mines

	Type of Source	Emission Factor (TSP)	Release rate g/s
1	Limestone loading in dumper, 6.5 tons per bucket (Volume)	0.012 kg/ton	0.3
2	Drilling (wet) 10 holes/day, (Volume)	0.5 kg/hole	0.068
3	Haul Trucks Movement Vehicle trips for transfer of limestone by dumpers 70 km, 20 kmph (Volume with centre to centre distance divided by 2.15 for lateral dimension)	22 lb/vmt	4.3

Note 1: lb=pounds, vmt =vehicle miles traveled

Meteorological Data: Meteorological file comprising wind direction, wind speed, ambient temperature, and stability class and mixing height has been prepared for modeling purpose. Surface meteorological data for wind speed, wind direction and ambient temperature has been generated at the project site. F Class stability during night time and B and C Class stability were assumed during day time.

Default Values: The ISCST model by default does the extrapolation of wind speed (Irwin's exponents) to the effective height of release and calculates final plume rise as per Briggs equation. Since 50% of land inside a circle of 3 km radius around the site does not have considerable build-up area, rural dispersion coefficient is considered for modeling. The model used regulatory default options for buoyancy induced dispersion, calm processing routines, default wind processing exponents, vertical potential temperature gradients.

Results and Discussion: The model was set up for calculation of 24-hour average values, so that the values could be compared with the baseline levels and national ambient air quality standards. Significant GLC values were observed inside the mining lease area (MGLC is located inside the ML area). Outside the ML area, the incremental GLC values are insignificant.

Impact of Air Emissions of Mines on Baseline Environment (24 hr avg in μg/m^3)

Parameter	Incremental glc (max)	Background Level (max in d/w side)	Superimposed value	National Standard
PM_{10}	9.0	73	82	100

Note: PM_{10} contains $PM_{2.5}$.

The ambient air quality around the mines site will remain within the national standards. There will be no instance of violation of national standards. The worst incremental GLC of Particulate Matter due to limestone mining activity will be 9.0 μg/m^3. High PM level will be observed close to dumper loading site. Since the wind is blowing from southwest side, downwind northeast side showed higher values. Maximum ground level concentration of PM will be observed at a distance of 250 m to 1000 m from boundary. The Isopleths showing the incremental PM level at various places is shown in **Figure 4.1.**

Mitigation Measures for Dust Suppression in Mines: ACC shall use dust suppression systems like road-side water sprinkling system and water tanker with rain gun facility for suppressing the dust generated from haul road. Four water tankers with rain gun facility will be adequate to suppress the dust generated from haul roads during dry and windy season. Water sprinkling system comprising pump, water pipes and nozzles will be placed along the haul roads, with rotating nozzles placed at each 25 m distance. Water for dust sprinkling will be taken from the mine pit.

4.2.1 Cumulative Impact on Ambient Air Quality

Pathariya Lease-I mine is located close to Pathariya Lease II and Nandini Khundini Mine. All the three mines belong to ACC Limited. Point 3 of TOR (bullet no.8 specifies “cumulative impact of other mines in the buffer zone shall be studied”. The same exercise has been done and the likely impacts of all three mines are shown in **Figure 4.2.**

The significant criteria pollutant from the limestone mines is only Particulate Matter. It has been observed through the mathematical dispersion modeling software (ISCST3) that the significant GLC and MGLC of each individual mines is located inside the respective ML area. Outside the respective ML area, the impacts are insignificant (that is less than 0.5 μg/m^3).

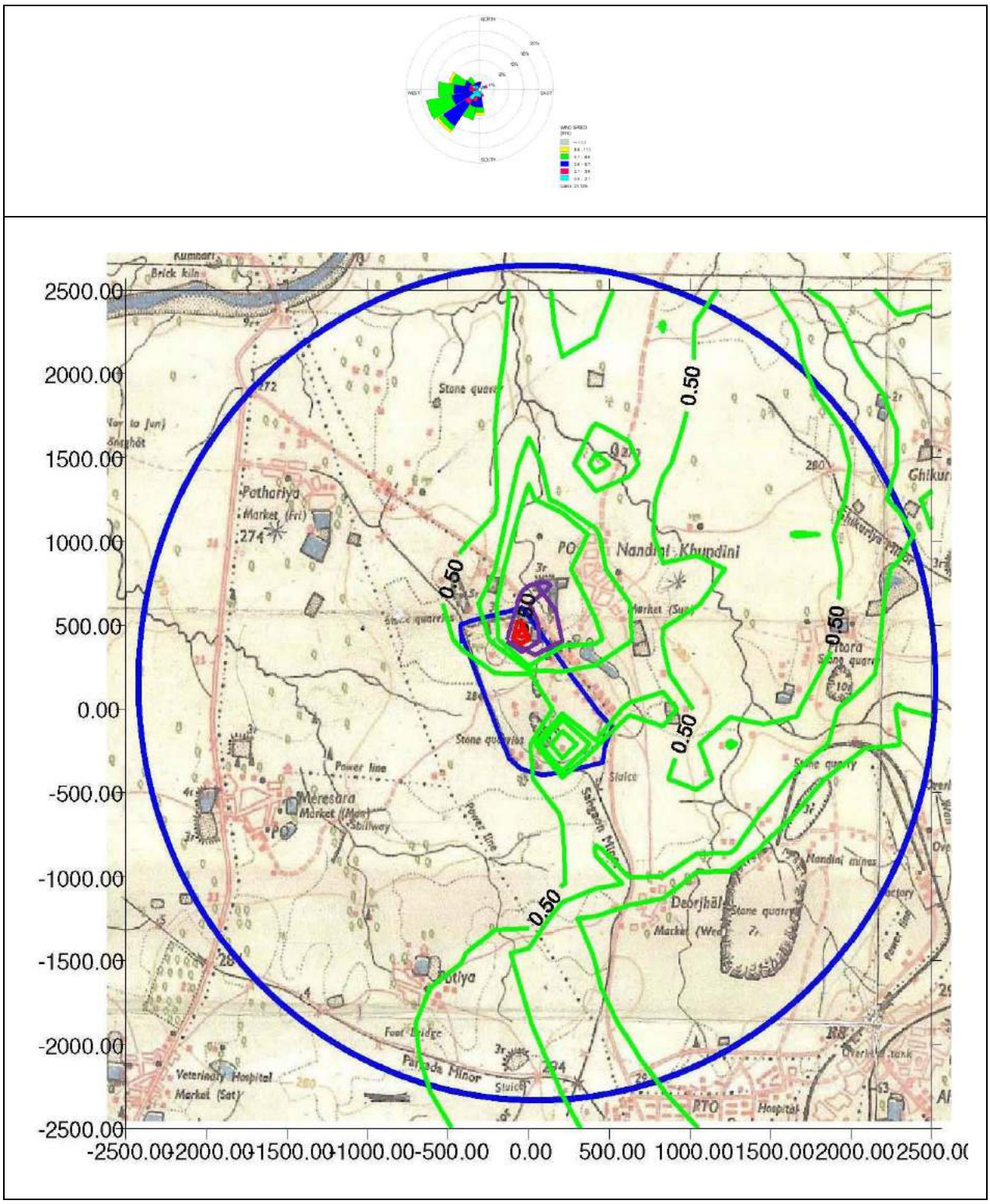
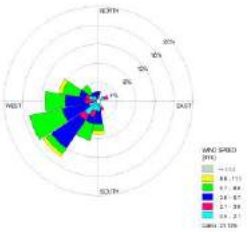


Figure 4.1 Isopleths Showing Incremental GLC of Particulate Matter



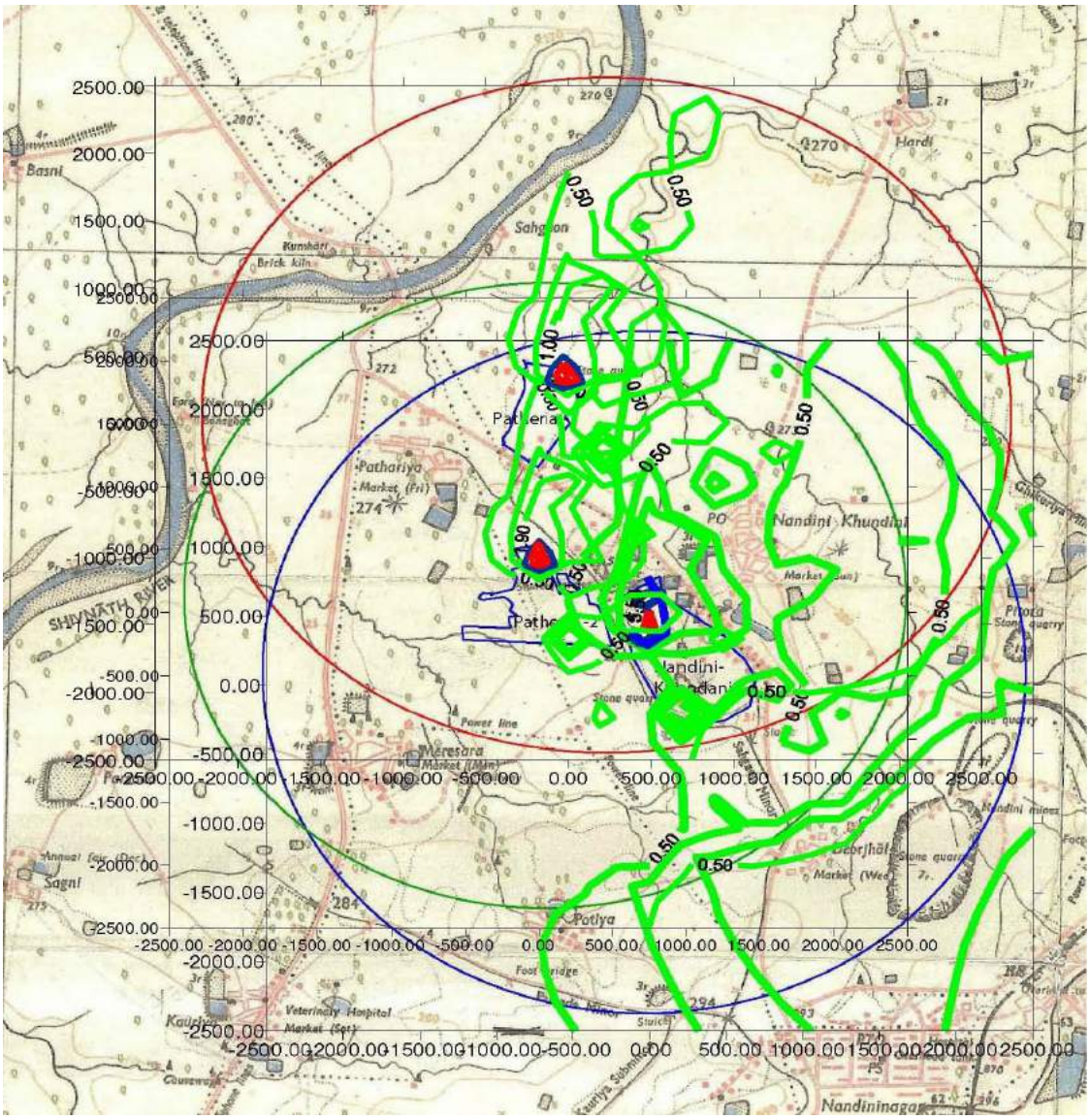


Figure 4.2 Isopleth Showing Cumulative GLC of Particulate Matter from All Three Mines (Pathariya-I, Pathariya-II and Nandini Khundini Mines)

4.3 Impact on Ambient Noise and Vibration

Noise and vibration shall be produced during drilling and blasting and also due to use of HEMM and dumpers. Mine workers will be exposed to noise creating noise related hearing problems. Surrounding people and fauna will feel psychological stress due to noise.

Table 4.2: Sound Pressure Level from Various Types of HEMM at Various Frequencies

	Type	Make	Model	Capacity	Noise Level
1	Hydraulic Excavator	Komatsu	PC – 650	4.0 cu.m	85-88 dB
2	Tippers	TATA / Leyland		16 tons	85-86 dB
3	Track Mounted Drill	Atlas Copco	ROC L6	115 mm dia hole	85-86 dB
4	Dozer	BEML D	D 155 A-1	340 HP	85-90 dB
5	Hydraulic Rock Breaker	Krrup on PC-220	PC-220		80-85 dB
6	Jeep	Tata	Sumo Victa		80-85 dB
7	Water Tanker	Tata		8000 litres	80-85 dB
8	Water Pump	Mather & Platt		71.00 litres/sec	80-82 dB

Noise Impact Prediction: With increasing distance from the source the noise level decreases due to wave divergence. Additional decrease also occurs due to atmospheric effects and interaction with objects in the transmission paths. For hemispherical sound wave propagation through homogeneous medium, noise levels at various distances can be predicted using a model based on the following principle:

$L_{p2} = L_{p1} – 20 \text{ Log } (r_2/r_1)$, where L_{p1} and L_{p2} are the sound levels at points located at distance r1 and r2 from the source. Combined effect of all the sources (A, B, C… etc.) can be determined at various locations by the following equation:

$10 \text{ Log } (10^{lpa/10} + 10^{lpb/10} + 10^{lpc/10})$, where lpa, lpb and lpc are noise pressure levels at a point due to different sources.

Based on the above principle, Noise Model has been developed where noise levels can be predicted at any distance from the source for simple flat terrain. Attenuation factors are not applied hence the modeled results are overestimate.

Figure 4.3 and 4.4 shows the noise contours at distance 100 m, 200 m, 300 m, 400 m, 500 m from various source strengths like 104 dBA (typical to HEMM movement) and 140 dBA (blasting).

Ambient Noise levels recorded at various locations in core and buffer zone were found to be within the permissible limit. The standards for occupational exposures - tolerable level is 90 dB(A) for 8 hour exposure (Frequency of noise monitoring - once in a fortnight). This level will be achieved inside mines and OB dump area through use of properly maintained HEMM. In case of overexposure found inside mines working area, workers will use ear plugs/ ear muffs.

Mitigation Measures

Site mix slurry explosive (ANFO/SMS) will be used for blasting. Noise due to blasting increases the peak level graph since very high level noise generated for short duration. It ranges between 120 dB(A) to 125 dB (A) at varying distances. The noise levels generated during blasting is instantaneous but the peak levels due to uncontrolled blasting may go as high as 140 dB(A). The blasting operation is carried out by deep hole drilling by a well trained crew team under the direct supervision of a blasting engineer. Except during adverse weather conditions, prilled ANFO explosives is used as column charge in non-cartridge form. The DGMS recommended limit for air-blast noise due to blasting is 115 dB Linear (measured at any public place). The maximum tolerable level is 120 dB Linear.

The following measures are taken to control the noise pollution and keeping the ambient noise levels below the limits:

- Controlled blasting with proper spacing, burden and stemming shall be maintained. Further, the quantum of the explosive ANFO shall also be kept to optimum. Ear plugs and ear muffs shall be provided as a precautionary measure to the workers prone to the high noise levels.
- Secondary blasting shall be avoided. Hydraulic Rock breaker shall be used to replace the secondary blasting.
- Minimum quantity of detonating fuse shall be consumed by using alternatively Raydet Excel non-electrical initiation system;
- The blasting shall be carried out during favorable atmospheric condition and high human activity timings;
- The operator's chamber of HEMM shall be safe guarded from the excessive noise;
- Blasting shall be performed strictly as per the guidelines specified under blasting technology;
- No secondary blasting will be done, instead of that rock braker will be used for further braking of big boulders.
- Overcharging shall be avoided;
- The charge per delay shall be minimized and preferably more number of delays shall be used per blasts;
- Blasting operations shall be carried out only during day time as per mine safety guidelines;
- Adequate safe distance from center of blasting shall be maintained;
- During blasting, other activities in the immediate vicinity shall be temporarily stopped;
- Drilling parameters like over burden, depth, diameter and spacing shall be properly designed to give proper blast;
- Effective stemming of the explosives shall be done in the drill holes;
- Electric detonators shall be used wherever possible;

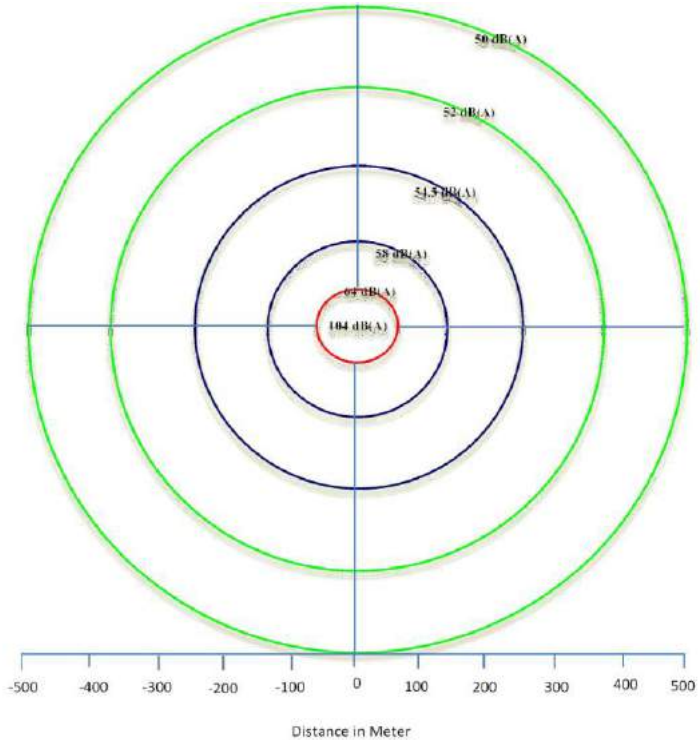


Figure 4.3 : Predicted Noise Level– (source strength 104 dBA)

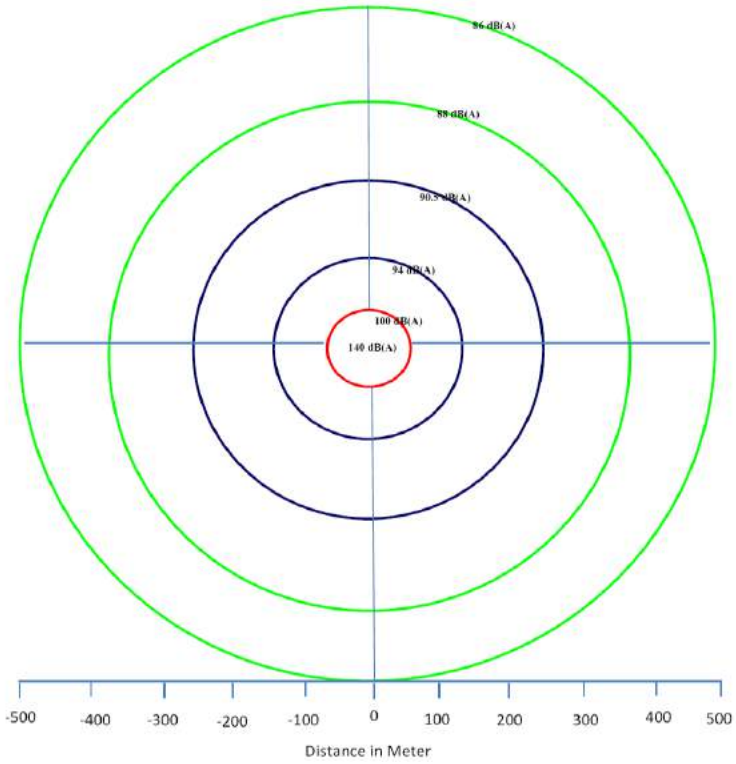


Figure 4.4 : Predicted Noise Level (Source Strength 140 dBA)

4.3.1 Impact of Ground Level Vibration due to Blasting

Blasting ease the hard strata and generates ground vibration and instantaneous noise. Ground vibration from mine blasting is expressed by amplitude, frequency and duration of blast. The variables, which influence ground vibrations, are controllable and non-controllable. The non-controllable variables include general surface terrain, type and depth of overburden and wind. Similarly, the controllable variables include type of explosives, charge per delay, delay interval, direction of blast progression, burden, spacing and specific charge and coupling ratio. Loosening of rock mass will be done by the blasting of 10 to 15 m deep and 150/270mm diameter blast holes. Millie-second delay detonators have been envisaged to minimize the ground vibration. Use of non-electric detonators will be used. Blast vibration studies will be conducted to optimize the burden & spacing and explosive requirement so as to minimize the vibration effect due to the blasting.

Vibration due to Blasting: Ground vibration, fly rock, air blast, dust and fumes are the deleterious effects of blasting on environment. The explosive energy sets up a seismic wave in the ground, which can cause significant damage to structures and disturbance to human occupants. It causes major damages to the pit configuration too. When an explosive charge is fired in a hole, stress waves propagate radially in all directions and cause the rock particles to oscillate. This oscillation is felt as ground vibration. The existing and the proposed increase in mining operations using deep hole drilling and blasting using delay detonators are bound to produce ground vibrations. The ground vibration are measured as the peak particle Velocity (PPV), which are compared vis-à-vis the circular no.7, issued by Director General of Mines Safety for safe level criteria.

Ground vibrations are caused by blasting operations, subsidence due to mining operations, deployment of mobile equipment, rock bursts and rock bumps. Blasting also generates air vibration waves. Vibration may cause structural damages, which depend on periodical acceleration due to vibration. Air blasts can damage structurally unsound buildings and cause window shattering.The

vibrations by the mechanical effects act on existing rocks and subject them to tensile, compressive and shearing stresses which spoil their mechanical characteristics with an immediate consequence. The vibrations are caused due to the permanent installation like crushers, screens, compressors, traffic and blasting. Among all these, blasting is the major source of vibration.

The ground vibrations can cause:

- Land instability: Distorts working faces of benches and downfalls of dumps;
- Cracks in buildings which are present in the mine premises and in the nearby villages;
- Psychological discomfort to human beings as well as to nearby fauna.

Mitigation Measures for Vibration Minimization: The following control measures will be planned to reduce ground vibratory conditions to sustainable statutory limits.

1) The peak particle velocity (PPV) of ground vibration will be kept below 10mm/s for 8-25hz frequency range through optimally controlled blasting techniques , after necessary field trials.

2) Drilling and charging pattern will be ideally formulated, with less explosive charge, etc., after field trials.

3) Use of suitable initiating sequence and millisecond delay detonators.

4) Reduction of amount of explosives charged per day optimally.

5) Blasting will not be carried out when strong winds are blowing towards the inhabited areas. Blasting will be done during midday time and never at night.

6) Vibration study will also be carried out at appropriate times to obtain most ideal and optimal blasting parameters.

7) Controlled blasting to avoid tension cracks which may endanger the stability of bench slopes in the mine.

8) Short delay detonators to be used in preference to detonating fuse.

9) In case of using detonating fuse, it will be covered with 750 mm thick cover of sand or drill cuttings.

10) Proper care and supervision during blasting by a competent and experienced person.

By adoption of above measures, it will be ensured that the ground level vibration due to blasting are maintained within the limits prescribed by DGMS, Dhanbad at the mining areas vide Circular No. 7 dated 29 -08-1997 as given in below

Permissible Peak Particle Velocity (PPV) at the Foundation Level of Structures (in mm/sec)

Type of structure	Dominant excitation frequency Hz		
	<8 Hz	8-25 Hz	>25 Hz
A. Buildings/structures not belonging to owner			
Domestic houses /structures	5	10	15
(Kuchha brick and cement)			

Industrial buildings (RCC and framed structures)	10	20	25
Objects of historical importance and sensitive structures.	2	5	10
B. Building belonging to owner with limited span of life			
Domestic houses/structures	10	15	25
(Kuchha brick and cement)			
Industrial buildings	15	25	50
(RCC and framed structures)			

The existing vibration level during blasting at Patheria Limestone Mines is regularly monitored by ACC Limited. The values are found to be well within the prescribed limit. The results are provided in Annexure V. Only the frequency of blasting will increase after the proposed expansion. Since the blasting intensity after the expansion of the mines will remain same, no additional vibration will occur. Use of noiseless trunk delays started to minimize the noise due to air blast, use of non-electric system of blasting for true bottom hole initiation, use of muffling mats to arrest the dust and fly rock, regular monitoring of magnitude of ground vibrations and air blast by ''Minimate Type instruments'' will be done.

4.3.2 Fly-rock due to Blasting

Fly-rock of various sizes flies high in the air during blasting, which could cause injury to people and materials. Fly-rock is another possible damage causing outcome of blasting. There are many factors, which influence these, like long explosive column with little stemming column, improper burden, loose material or pebbles near holes and long water columns in the holes.

The Central Mining Research Institute designed blast mat has been considered for muffling purpose. The criteria like weaving facility ease in handling and repeated use, flexibility, durability, economics, resistance to blast damage and overlapping facility were considered in the design. The mats were manually woven in 30-45 mm mesh size and the ropes passed through each other to avoid individual rope sliding or displacement during handling.

Mitigation Measures:

To contain fly rocks, stemming column will not be less than burden of the hole. Blasting area will also be muffled, if necessary, to stop fly rocks propagation.ACC will not use open blasting which may cause fly of rocks. NONEL method shall be used for blasting as it is a control blasting. It is a Non Electric Delay Blasting method. This measures include bottom hole initiation, proper blast design, control, effective supervision etc. to control fly rock for safety reasons. ACC, as an additional safety measure, desired to adopt muffled blasting wherever necessary.

- To use a powder factor of not more than 0.35 kg/m^3
- To blast small round of 10 - 12 holes to minimize ground vibrations.
- To adopt extensive supervision and adopt exhaustive control measure if at all blasting is conducted within 150 m of the habitat.
- 10-15 percent of the column charge at the top of the hole may be loaded in cartridge form to reduce the chance of fly rock. The cartridge diameter is be 100-125 mm. This would reduce the maximum rock throw and scatter by about 30-40 percent.

4.4 Cumulative Impact of Limestone Transportation by Road

Jamul Cement Works (Cement Plant) is connected to Patheria Lease I, Lease II and Nandini Khundini mines through Bhilai-Jamul-Dhamda State Highway. Pathariya Limestone Mine Lease-I and Lease II and Nandini Khundini Mine is located close to each other. The limestone from all the three mines will be transported using 30 tons dumpers up to the Jamul Cement Works Lime Mines at Jamul. There the limestone will be crushed. Crushed limestone shall be transported to the Cement Plant through closed pipe conveyer belt. This proposal will obviate the existing impact of vehicular emissions and improve the ambient air quality of Jamul. All the dumpers carrying limestone will converge at Nandini Khundini village and then proceed to Jamul. Therefore point between Pathariya village and Dhamda on Jamul – Dhamda road served as baseline traffic conditions and point at Nandini Khundini village on the same road served as cumulative impact point. Total limestone movement from the 3 mines of ACC will be 13,60,000 tons per year. Considering 30 tons dumper capacity, the dumper movement per day will be 275 (to and fro). This is equivalent to 1238 passenger car units (PCU).

Traffic count was done at three places at Jamul Dhamda Road by EMTRC team during the period 5th March 15th March. The point where traffic survey was done is given in **Table 4.3.** The locations are also marked in **Figure 4.4.**

Table 4.3 Traffic Survey Locations

Location	Classified Vehicle Count Locations
1	Dhamda Chowk near Pathariya village (Baseline Traffic without Mine Load)
2	Nandini Khundini village (Baseline Traffic after addition of Pathariya-I&II traffic load)
3	Jamul –Dhamda road Near ACC Jamul Mines (after addition of Jamul Mine Traffic)
4	ACC Chowk near ACC Cement Plant (Total Traffic addition from Pathariya-I&II, and Jamul Mine)

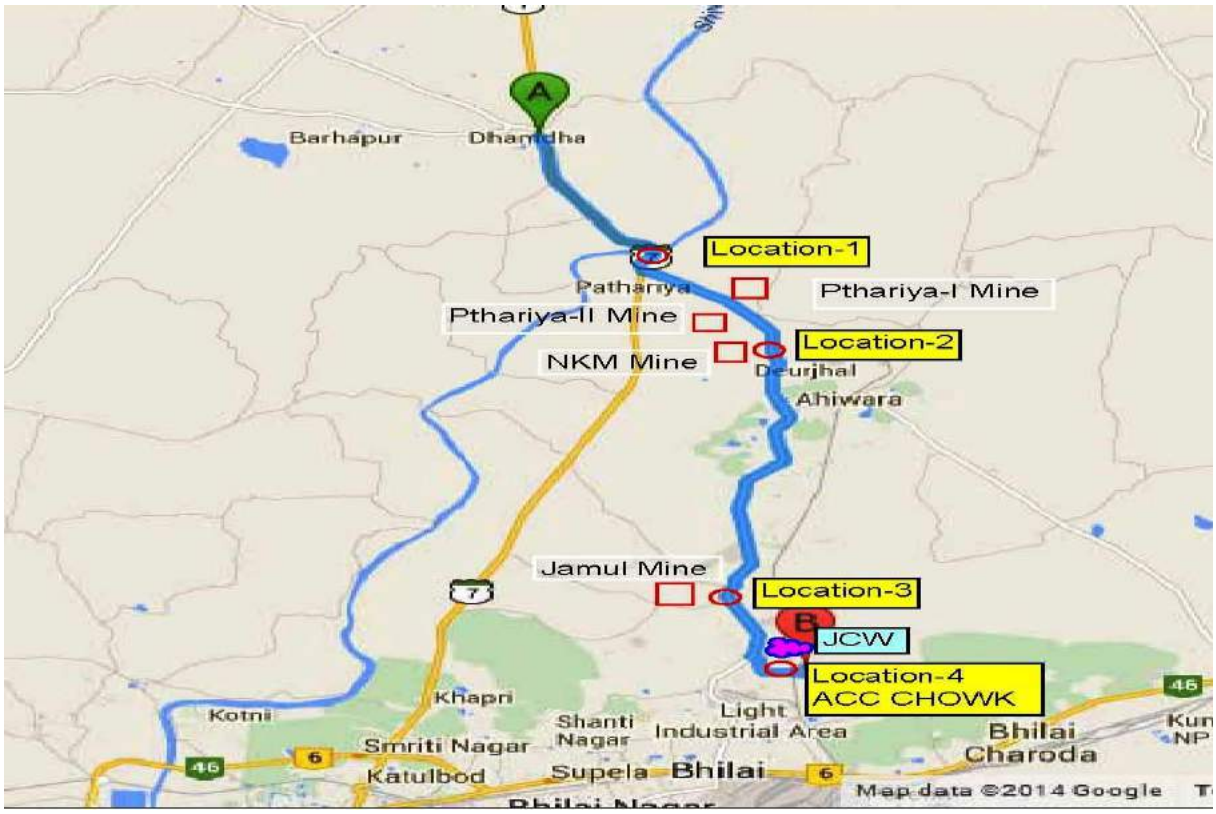


Figure 4.5 Map Showing Locations of Mines and Traffic Survey Points

The existing road conditions are described below

	Road: Dhamda to Jamul (Near Dhamdha Chowk)	
1	Pavement/ Border width (Left side)	1.4 m
2	Pavement / Border width (Right side)	1.4 m
3	Carriage width	8.0 m
4	Road type/Condition	Asphalted
5	Condition	Good
6	Lane	Single
	Road: Patharia to Jamul (Near Nandini Khundini Village)	
1	Pavement/ Border width (Left side)	3.6 m
2	Pavement / Border width (Right side)	7.0 m
3	Carriage width	3.2 m
4	Road type/Condition	Asphalted
5	Condition	Good
6	Lane	Single
	Road: Jamul –Dhamda road Near ACC Jamul Mines	
1	Pavement/ Border width (Left side)	0.5m
2	Pavement / Border width (Right side)	0.5m
3	Carriage width	7.0m
4	Road type/Condition	Asphalted
5	Condition	Good
6	Lane	Double
	Road: ACC Chowk near ACC Cement Plant	
1	Pavement/ Border width (Left side)	1.0 m
2	Pavement / Border width (Right side)	0.5 m
3	Carriage width	7.5 m
4	Road type/Condition	Asphalted
5	Condition	Good
6	Lane	Single

Summary of Traffic Volume Count

1. **Place: Dhamda to Jamul (Near Dhamdha Chowk)**

Time	2 Wheeler	3 Wheeler	Car/Jeep/ Van	Buses	Tractor	6 Wheeler 2 axle	10 Wheeler 3 axle	Above 10 Wheeler Multi axle
7:00 AM – 11:00 AM	207	-	128	38	27	95	66	10
11:00 AM - 5:00 PM	249	1	232	66	44	155	80	21
5:00 PM - 10:00 PM	146	2	122	36	21	85	34	14
10.00PM – 7.00 AM	33	-	13	2	4	21	10	6

2. **Place: Patharia to Jamul (Near Nandini Khundini Village)**

Time	2 Wheeler	3 Wheeler	Car/Jeep/ Van	Buses	Tractor	6 Wheeler 2 axle	10 Wheeler 3 axle	Above 10 Wheeler Multi axle
7:00 AM – 11:00 AM	215	53	77	57	39	85	33	2
11:00 AM - 5:00 PM	393	46	156	44	65	151	49	3
5:00 PM - 10:00 PM	256	44	43	41	44	69	36	4
10:00 PM - 7:00 AM	46	12	12	6	6	19	14	1

3. **Place: Jamul –Dhamda road Near ACC Jamul Mines**

Time	2 Wheeler	3 Wheeler	Car/Jeep /Van	Bus	Tractor	6 Wheeler 2 axle	10 Wheeler 3 axle	Above 10 Wheeler Multi axle

7:00 AM to 11:00 AM	207	144	104	32	29	123	46	20
11:00 AM to 5:00 PM	345	214	185	54	54	162	79	43
5:00 PM to10:00 PM	178	85	54	22	10	95	36	11
10:00 PM to 7:00 AM	24	21	14	6	3	34	13	4

4. Place: ACC Chowk near ACC Cement Plant

Time	2 Wheeler	3 Wheeler	Car/Jeep/ Van	Buses	Tractor	6 Wheeler 2 axle	10 Wheeler 3 axle	Above 10 Wheeler Multi axle
7:00 AM – 11:00 AM	340	84	66	38	7	37	42	-
11:00 AM - 5:00 PM	417	108	94	48	27	96	64	1
5:00 PM - 10:00 PM	215	66	41	22	8	31	36	2
10:00 PM - 7:00 AM	42	12	8	5	-	14	10	-

Estimation of Emission Load

Emission Factors by Automotive Research Association of India

Type of Vehicle	**Emission Factor**		
	CO	**NOx**	**PM**
Motor Cycle (2 stroke)	1.65	0.27	0.035
Three wheeler	0.69	0.19	0.118
Car (Petrol)	3.01	0.12	0.006
Car (Diesel)	0.51	0.67	0.12
Bus (Diesel)	6.00	9.30	1.240
Large Truck	6.0	9.3	1.24

Emission load of CO, NOx and PM(in gm/km) for different vehicle class at the various road stretches are presented in following Tables.

1. Place: Dhamda to Jamul (Near Dhamdha Chowk)

Sr. No.	**Vehicle Type**	**PM g/km**	**CO g/km**	**NO_2 g/km**
1	2-Wheeler	2.275	1047.75	171.45
2	3-Wheeler-Auto Rickshaw	0.354	2.07	0.57
3	4-Wheeler	59.4	252.45	331.65
4	Buses	176.08	852	1320.6
5	Tractor	119.04	576	892.8
6	6 Wheeler- 2 Axle	441.44	2136	3310.8
7	10 Wheeler3 Axle	235.6	1140	1767
8	Above 10 Wheeler	63.24	306	474.3
Total Emission		**1097.429**	**6312.27**	**8269.17**

2. Place: Patharia to Jamul (Near Nandini Khundini Village)

Sr. No.	**Vehicle Type**	**PM g/km**	**CO g/km**	**NO_2 g/km**
1	2-Wheeler	31.85	1501.5	245.7
2	3-Wheeler-Auto Rickshaw	18.29	106.95	29.45
3	4-Wheeler	36.28	146.88	192.96
4	Buses	183.52	888	1376.4
5	Tractor	190.96	924	1432.2
6	6 Wheeler- 2 Axle	401.76	1944	3013.2
7	10 Wheeler3 Axle	163.68	792	1227.6
8	Above 10 Wheeler	12.4	60	93
Total Emission		**1038.74**	**6363.33**	**7610.51**

3. Place: Jamul- Dhamda road Near ACC Jamul Mines

Sr. No.	Vehicle Type	PM g/km	CO g/km	NO_2 g/km
1	2-Wheeler	26.39	1244.1	203.58
2	3-Wheeler-Auto Rickshaw	54.75	320.16	88.16
3	4-Wheeler	42.84	182.07	239.19
4	Buses	141.36	684	1060.2
5	Tractor	119.04	576	892.8
6	6 Wheeler- 2 Axle	513.36	2484	3850.2
7	10 Wheeler-3 Axle	215.76	1044	1618.2
8	Above 10 Wheeler	96.72	468	725.4
Total Emission		**1210.22**	**7002.33**	**8677.73**

4. Place: ACC Chowk near ACC Cement Plant

Sr. No.	Vehicle Type	PM g/km	CO g/km	NO_2 g/km
1	2-Wheeler	35.49	1652.82	273.78
2	3-Wheeler-Auto Rickshaw	31.86	186.3	51.3
3	4-Wheeler	25.08	106.59	140.03
4	Buses	140.12	678	1050.9
5	Tractor	52.08	252	390.6
6	6 Wheeler- 2 Axle	220.72	1068	1655.4
7	10 Wheeler3 Axle	188.48	912	1413.6
8	Above 10 Wheeler	3.72	18	27.9
Total Emission		**697.55**	**4873.71**	**5003.51**

Equivalent Vehicle Population and Vehicular Emission Load

The data collected from the road stretches for the various vehicle types having different sizes and characteristics are converted into a standard equivalent unit called Passenger Car Unit (PCU). PCU Factors as suggested by IRC: 64-1990 “Guidelines for Capacity of Roads in Rural Area-Code of Practice, Indian Roads Congress” is shown in Table 4.4.

Table 4.4: PCU Factors Applied for Different Class of Vehicles

	Type of Vehicles	PCU Factors
1	Two-wheelers	0.5
2	Car, Jeep, Taxi, Utility Vehicles, Auto-Rickshaw (3-wheelers), Tempo, etc.	1.0
3	Bus, Truck, etc.	3.0
4	Tractors	4.5
5	Multi-axle truck, dumpers, etc.	4.5

	Type of Vehicles	Place Where Classified Vehicle Count done for 24-hr			
		1	2	3	4
1	Two-wheelers	498	455	377	507
2	Car, Jeep, Taxi, Utility Vehicles, Auto-Rickshaw (3-wheelers), Tempo	419	443	821	479
3	Bus, Truck, etc.	459	1416	1584	873
4	Tractors	67.5	693	432	189

5	Multi-axle truck, dumpers, etc.	67.5	639	1134	697.5
	Total PCU	**1511**	**3646**	**4348**	**2745.5**

Summary of Emission Load at Four Road Stretches

Location-1: Dhamda to Jamul (Near Dhamdha Chowk)		
PCU: 3826		
PM g/km/day	CO g/km/day	NO_x g/km/day
1097.429	6312.27	8269.17

Location-2: Place: Patharia to Jamul (Near Nandini Khundini Village) Chowk		
PCU: 3646		
PM g/km/day	CO g/km/day	NO_x g/km/day
1038.74	6363.33	7610.51

Location-3: Place: Jamul –Dhamda road Near ACC Jamul Mines		
PCU: 4348		
PM g/km/day	CO g/km/day	NO_x g/km/day
1210.22	7002.33	8677.73
Location-4: Place: ACC Chowk near ACC Cement Plant		
PCU: 2745.5		
PM g/km/day	CO g/km/day	NO_x g/km/day
697.55	4873.71	5003.51

Additional Traffic Emission Load from Patharia-I Pathariya-II & Nandini Khundini Limestone Mines to ACC Chowk

Additional Traffic Load & Vehicular Pollution Load		
1.	Total Capacity	1.36 MTPA
2.	Type of Dumper	30 tons Dumper
3.	Additional Vehicular Load on Existing Route	137 x 2 = 275 Dumpers/ day. PCU : 1238
4.	Emission Factors Applied (Dumpers)	PM = 1.24 gm/km CO = 6.0 gm/km NOx = 9.3 gm/km
5.	Additional Vehicular Pollution Load	
	PM	341 gm/km
	CO	1650 gm/km
	NOx	2558 gm/km

Additional Traffic Load & Vehicular Pollution Load from Jamul Mines to ACC Chowk (Cement Plant)		
1.	Total Capacity	1.2 MTPA
2.	Type of Dumper	30 tons Dumper
3.	Additional Vehicular Load on Existing Route	121 X 2= 242 Dumpers/ day PCU : 1089
4.	Emission Factors Applied (Dumpers)	PM= 1.24 gm/km CO= 6.0 gm/km NOx= 9.3 gm/km
5.	Additional Vehicular Pollution Load	
	PM	300gm/km
	CO	1452gm/km
	NOx	2251gm/km

Cumulative Traffic and Emission Load from all the mines to ACC Chowk		
1.	Additional Vehicular Load on Existing Route	530 Dumpers/ day PCU : 2385
2.	Emission Factors Applied (Dumpers)	PM= 1.24 gm/km CO= 6.0 gm/km NOx= 9.3 gm/km
3.	Additional Vehicular Pollution Load	

	PM	658 gm/km
	CO	3180 gm/km
	NOx	4929 gm/km

Existing and Projected Traffic and Emission Load at Different Stretches

Name of Location		Existing Traffic Volume (Number /Day)	Projected Traffic Volume (Number /Day)	Existing & Projected (PCU, Daily)		Existing and Projected Pollution Load, (gm/km/day)		
						PM	CO	NOx
1.	Dhamda to Jamul road (baseline load)	1968	-	Existing	3826 PCU	1097	6312	8269
2.	Nandini Khundini Village	2121	275	Existing	3646 PCU	1039	6363	7611
				Projected	4884 PCU	1380	8013	10169
3.	Near Jamul Mines (Cumulative Load)	2451	242	Existing	4348 PCU	1210	7002	8678
				Projected	5437 PCU	1510	8454	10929

Cumulative Traffic and Emission Load at ACC Chowk
(Traffic load from Jamul, Nandini Khundini, and Pathariya I & II Limestone Mines)

	Existing Traffic Volume (Number /Day)	Projected Traffic Volume (Number /Day)	Equivalent PCU/Day	Emission Load, (gm/km/day)		
				PM	CO	NOx
Existing Condition	4572	-	7994	2249	13365	16289
Future Condition	4572	530	10379	2907	16545	21218

Impact Assessment

Impact assessment has been done for two cases; one for ascertaining the capacity of the existing road stretches to accommodate additional PCU and another for ascertaining the cumulative air pollution load due to existing PCU and additional PCU.

Impact on the Capacity of Existing Roads

Indian Road Congress (IRC: 64 – Guidelines for Capacity of Roads in Rural Area – Code of Practice, 1990) indicates the design service value of **15000 PCU/day** for a 2-lane road (7.5 m width) and **2000 PCU/day** for a single-lane road (3.5 m width) on plain rural terrain.

Existing capacity of the 2-lane road stretches under mixed traffic conditions were studied and the PCU estimated as per guidelines of IRC. Based on above guidelines and code of practice it has been ascertained that the 2-lane road stretches is well within the design service value of 15000 PCU/day, as prescribed by the Indian Road Congress. All single lane road stretches studied requires to be converted to 2-lane road to accommodate the additional traffic.

Impacts on Air Quality

Impact assessment has been carried using the USEPA recommended software developed by US Department of Transport, CALINE4 - Dispersion Model for Predicting Air Pollutant Concentrations near Roadways.

Model Input: Meteorological data: Data considered for computations is

Stability Class	Wind speed
A (most unstable) D (Neutral) and F(most stable)	3 m/s
A (most unstable) D (Neutral) and F(most stable)	1 m/s

Following default values have been chosen to ensure worst case predictions:

a) Worst wind angle (wind blowing only towards receptor)

b) Receptor points closest to source chosen, 5m to 25 m from road

c) Worst emission factors chosen for each pollutant parameter

Parameters for prediction modeling

a) Link coordinates – straight line of 0.1 km length

b) Receptors from 5 m to 25 m

c) Width of the road including shoulders – 10 m

d) Mixing Height – 10 m

e) Vehicle per hour – Maximum 300 dumpers movement per day

f) Only incremental predictions were done, baseline considered as nil.

Emission factors as given below

CO	NOx	PM
6 g/km	9.3 g/km	1.24 g/km

Predictions: 1-hr average CO, NO_2 and PM concentrations at the receptors were modelled. The model selects wind angles that produce the highest concentrations at each of the receptors. It must be noted that the National Ambient Air Quality Standards (NAAQS-November 2009) for CO is based on hourly average; whereas NAAQS for NO_2 and PM are based on 24-hour average. 1-hour average is always higher than 24-hour average. Computations were carried out for three pollutants, namely, carbon monoxide (CO), nitrogen dioxide (NOx and NO_2) and Respirable Particulate Matter ($PM_{2.5}$ + PM_{10}).

Findings: Significant worst case findings are summarized in Table below:

Location: Jamul Dhamda Road (Near Jamul Mine) Projected Traffic Volume from Jamul Mine is **242** dumpers/day

Wind speed	Stability Class	Pollutant	Incremental concentration (Hourly average values)	Receptor distance from edge of road
3	A, D, F	CO	0.1 ppm	5 m
3	A, D, F	CO	Nil	10-25 m
1	A,D,F	CO	0.2 ppm	5 m
1	A,D,F	CO	0.1 ppm	10–25 m
3	A	NO_2	0.04 ppm	5 m
3	A	NO_2	0.01 ppm	10-25 m
3	D, F	NO_2	Nil	5 m
3	D, F	NO_2	Nil	25 m
1	A	NO_2	0.03 ppm	5 m
1	A	NO_2	0.02 ppm	10 m

1	A	NO_2	Nil	25 m
1	D, F	NO_2	0.01 ppm	5 m
1	D, F	NO_2	Nil	25 m
3	A	PM	16.5 µg/m^3 3.0 µg/m^3	5 m 25 m
3	D	PM	18.6 µg/m^3 3.8 µg/m^3	5 m 25 m
3	F	PM	19.1 µg/m^3 4.3 µg/m^3	5 m 25 m
1	A	PM	41.5 µg/m^3 8.9 µg/m^3	5 m 25 m
1	D	PM	44.6 µg/m^3 9.2 µg/m^3	5 m 10 m
1	F	PM	46.7 µg/m^3 10.7 µg/m^3	5 m 25 m

Inference Based on Modeling Results

The incremental concentrations (Hourly Average) of Pollutants viz. CO, NO_2 and PM in worst scenario are as under

1) CO: The incremental concentration of CO, varied in the range of 0.1 to 0.2 ppm (maximum) up to 25 m on either side of the road.
2) NO_2: The incremental concentration of NO_2 varied in the range of **0.01 to 0.04 ppm** upto25 m on either side of the road.
3) PM: The incremental PM concentration varied in the range of **3 to 46.7 µg/m^3**upto 25 m on either side of the road.

Findings: Significant worst case findings are summarized in Table below:

Location: Patharia to Jamul (Near Nandini Khundini Village)

Total projected Load from Nandini Khundini mine, Patharia-I & Pathariya-II mine is **275** dumpers/day.

Wind speed	**Stability Class**	**Pollutant**	**Incremental concentration (Hourly average values)**	**Receptor distance from edge of road**
3	A, D, F	CO	0.1 ppm	5 m
3	A, D, F	CO	Nil	10-25 m
1	A,D,F	CO	0.2 ppm	5 m
1	A,D,F	CO	0.1 ppm	10–25 m
3	A	NO_2	0.05 ppm	5 m
3	A	NO_2	0.02 ppm	10-20 m
3	A	NO_2	0.01 ppm	25 m
3	D, F	NO_2	Nil	5 m
3	D, F	NO_2	Nil	25 m
1	A	NO_2	0.08 ppm	5 m
1	A	NO_2	0.04 ppm	25 m
1	D, F	NO_2	0.01 ppm	5 m
1	D, F	NO_2	Nil	25 m
3	A	PM	18.8 µg/m^3 3.4 µg/m^3	5 m 25 m
3	D	PM	21 µg/m^3 4.3 µg/m^3	5 m 25 m
3	F	PM	21.6 µg/m^3 4.8 µg/m^3	5 m 25 m
1	A	PM	47.2µg/m^3 10.12 µg/m^3	5 m 25 m
1	D	PM	51.6 µg/m^3 11.2 µg/m^3	5 m 25 m
1	F	PM	52.8 µg/m^3 12.1 µg/m^3	5 m 25 m

Inference Based on Modeling Results

The incremental concentrations (Hourly Average) of Pollutants viz. CO, $NO_2$and PM in worst scenario are as under

1) CO: The incremental concentration of CO, varied in the range of 0.1 to 0.2 ppm (maximum) up to 25 m on either side of the road.
2) NO_2: The incremental concentration of NO_2 varied in the range of 0.01 to 0.08 ppm up to 25 m on either side of the road.
3) PM: The incremental PM concentration varied in the range of 3.4 µg/m^3 to 52.8 µg/m^3 up to 25 m on either side of the road.

Findings: Significant worst case findings are summarized in Table below:

Location: Cumulative Traffic and Emission Load at ACC Chawk from all the four mines

Projected traffic volume from Jamul, Nandini Khundini, and Pathariya I & II Limestone Mines is 517 (assumed 530) dumpers\day.

Wind speed	Stability Class	Pollutant	Incremental concentration (Hourly average values)	Receptor distance from edge of road
3	A, D, F	CO	0.2 ppm	5 m
3	A, D, F	CO	0.1 ppm	10 m
3	A, D, F	CO	Nil	15-25 m
1	A,D,F	CO	0.4 ppm	5 m
1	A,D,F	CO	0.2 – 0.1 ppm	10–25 m
3	A	NO_2	0.1 ppm	5 m
3	A	NO_2	0.02 ppm	25 m
3	D, F	NO_2	0.01 ppm	5 m
3	D, F	NO_2	Nil	25 m
1	A	NO_2	0.23 ppm	5 m
1	A	NO_2	0.07 ppm	25 m
1	D, F	NO_2	0.02 ppm	5 m
1	D, F	NO_2	0.01 ppm	25 m
3	A	PM	35.3 µg /m3 6.5 µg /m3	5 m 25 m
3	D	PM	39.0 µg /m3 7.8 µg /m3	5 m 25 m
3	F	PM	39.7 µg /m3 8.6 µg /m3	5 m 25 m
1	A	PM	89.2 µg /m3 19.1 µg /m3	5 m 25 m
1	D	PM	95.9 µg /m3 20.7 µg /m3	5 m 10 m
1	F	PM	96.9 µg /m3 21.9 µg /m3	5 m 25 m

Inference Based on Modeling Results

The incremental concentrations (Hourly Average) of Pollutants viz. CO, NO_2 and PM in worst scenario are as under

1) CO: The incremental concentration of CO, varied in the range of **0.1 to 0.4 ppm** (maximum) up to 25 m on either side of the road.
2) NO_2: The incremental concentration of NO_2 varied in the range of 0.01 to 0.23 ppm up to 25 m on either side of the road.
3) PM: The incremental PM concentration varied in the range of 6.5 µg/m^3 to 96.9 µg/m^3 up to 25 m on either side of the road.

As evident from the above, the incremental concentrations of the pollutants are not significant beyond 25 m from the road. Further, the impact of vehicular exhaust due to additional road traffic on account

of limestone transportation of ACC by road shall be significant up to 15 m distances from either side of the road and thereafter it shall widely disperse and become insignificant beyond 25 m.

Mitigation Measures

1. The existing road width, and its gradient, pavement surface condition, shoulder condition and traffic composition from ACC Jamul-Mines to Pathariya village is suitable for 15000 PCU/day (Indian Road Congress -IRC: 64-1990).
2. Proper traffic management practice needs to be implemented in all the road stretches.
3. ACC shall impose no-overtaking policy for all its dumpers and also impose a speed limit of 25 km/hour for its dumpers (outside ML area).
4. ACC shall ensure that all the dumpers carrying limestone shall be covered type. The dumpers shall be checked for exhaust emissions every three months, and maintained properly. Only PUC compliant vehicles shall be allowed to ply.
5. Diesel will be procured from authorised retailers, to avoid adulteration & air pollution.
6. All settlement stretch shall be maintained as Silence Zone. Use of Horns shall be prohibited along settlement stretch. Use of pressure horns shall be strictly prohibited.
7. Measures for careful / safe and clean driving habits must be employed by way of education, slogans and campaigns in order to inculcate the sense of responsibility among drivers and conductors. The settlements residing along the road must be also educated on all aspects related to road safety.

8. To ensure that road safety measures are rightly implemented, Road Safety Committee should be constituted by ACC. The committee should comprise of officials and doctors from ACC, road authority, police, transport department, panchayat members and teachers of schools and colleges. The committee must ensure that transparent process is followed by Transport Department for issuing fitness certificates for vehicles, PUC for vehicles and license for HMV drivers. The committee should ensure availability of emergency ambulance, trauma centre and blood bank facility for the accident victims. The committee should create / spread awareness regarding responsible and safe road use.

4.5 Impact on Drainage and Water Bodies

No diversion of nalla / stream will occur inside ML area. The runoff from the ML area will be directed outside the mine boundary, after silt trapping. Accumulated water in the active mine pits will be discharged into inactive pits already present in the mine lease area. The mining activity will not require any drawl from surface water or groundwater. Water will be taken from stored rainwater in abandoned mine pit. Groundwater shall be used only for drinking purpose.

The mining activity involves excavation of huge quantities of earth and blasting of rocks. In the process artificial structural disturbances are created in the massive bed rock leading to the development of secondary porosity by way of cracks and joints. These fractures in adjoining rock formations will enhance the transmissivity and specific yield of the aquifer. The blasting and mining of limestone will lead to opening up fractures thereby improving ground water flow. The water accumulated in the abandoned pits of the mine would stabilize the ground water table.

As this is an open cast mining method it will not generate any wastewater as no mineral processing is involved.

Garland drains will be constructed around the dump to carry wash off from the bunds. Gully checks will be made along the dump slope. Sedimentation pond will be constructed to which all drains carrying runoff water will be connected. Coconut fiber filters will be used all along the gully and drains to arrest the silt from runoff. The fibers will be disposed as overburden after each rainy season. The overburden slopes will be stabilized with vegetation.

The adverse impact and suggested mitigation measures is shown below:

Adverse Impact	Suggested Measures
Impact of mining on hydrogeology with special reference to situation when mining will intersect groundwater	The mining activity will create large voids, which will be filled with rainwater. Seepages from mine surface will be dewatered, as and when required and used for harvesting. The core area is underlain by limestone and sometimes overlain by thin-bedded shale. These rock formations are poor in porosity and permeability. The hydraulic conductivity and storativity values are moderate No ground water extraction structure is present within 100 m radius of the core zone. Hence there will be negligible impact on surrounding ground water quality and quantity due to mining operation. The mining activity involves excavation of huge quantities of earth and blasting of massive rocks. In the process artificial structural disturbances are created in the massive bed rock leading to the development of secondary porosity by way of cracks and joints. These fractures in adjoining rock formations will enhance the transmissivity and specific yield of the aquifer. The blasting and mining of limestone will lead to opening up fractures thereby improving ground water flow. The water accumulated in the abandoned pits of the mine would stabilize the ground water table. Groundwater quality data indicates that the quality is potable. Rainwater harvesting in pits would have dilution effect on the ground water of the surrounding area to the mine lease. Ground water pollution can take place only if the overburden contains harmful chemical substances. Limestone constitutes harmless constituents and does not contain any toxic metals that could leach down to the water table.
Impact of OB Disposal	Removed overburden will be dumped within 7.5m of the lease boundary along Eastern, Southern & Western side to form bunds. Ultimate dump slope shall be kept below 28^0. Garland drains with adequate height and width will be provided at the toe of these unstable OB benches. These drains will carry the wash off from the benches during rainy season. Coconut fibre filters and baffles will be provided in the drains at regular intervals to arrest the silt. This would help in preventing silting of water drains and nalas. All drains will join the sedimentation pond. Water collected in the sedimentation pond will be used for water sprinkling and greenery development in the mine. Regular arrangement for de-silting of the filters and pond will be made. Silt collected from the pond will be used in the reclamation of mine.
Impact due to Groundwater table intersection	The ground water occurrence around the core zone of mining lease area (villages) are mainly restricted in weathered part and cavernous and fractured zone in unconfined to semi-confined condition.

Wastewater disposal from toilets/ washrooms	Wastewater from toilets and washrooms will be taken to septic tank for disposal.

4.6 Impact of OB Dump

The topography of the existing mining lease area will change after mining. Once the mining is over the overburden will be used for backfilling the voids. Remaining voids will be converted to water body. The water body will be used for fisheries, which will benefit the local fisherman. No natural nalla or streams passes through the mining lease area. No diversion of nalla will be done. Hence there will be no impact on the drainage pattern of the mining lease area. The mining lease area is demarcated for limestone mining. There will be no change in the existing landuse pattern. The land is in the possession of ACC. Once the mining activity is over, the mined out area shall be reclamined, top soil shall be spread over it and grass and fodder grown over it for the cattles to graze.

Dumps would be made from top down by end tipping method. The environmental impact shall be on account of dump slope failure resulting in dump collapsing, erosion, and dust carryover by wind, siltation of surrounding streams. OB dump will be aesthetic problem for nearest villagers. If OB is not properly maintained during rainy season, chance of siltation of the nearest surface water body, affecting the entire watershed would exist.

The adverse impact and suggested mitigation measures is shown below:

Adverse Impact	**Mitigation Measures**
Total 6.5 Milion Tones overburden shall be generated during the life of the mine. The entire material shall be re-handled back in voids inside ML area. Issues are instability of OB dump creating major problem for land slide, subsidence, material erosion, etc.	Ultimate dump slope shall be kept below 38^0. Safety bund / embankment and garland drains with sedimentation pits shall be made around the OB dump. Maximum height of the dump will be 9 m and same will be benched at 3 m with gentle gradient. The general slope of the dumps will be maintained well within the safe angle of repose.
Dust pollution while making and re-handling the OB dump. Unloading of OB material from rear end Dump Trucks and moving it with Dozer will generate dust pollution.	The top of dump as well as slope surface shall be vegetated by hydro-seeding technique or use of pre-seeded geo-textile mats, if so required for stability. This will be done as the dump making progresses, to prevent erosion as well as excessive dust generation. Water sprinklers shall be employed while making and re-handling the dump. Wetting agent Dustron PC compound shall be added in the water for sprinkling over haul roads for reducing the water consumption. Water lines will be laid and water sprinkler arrangements will be made for growing vegetation. The external support for the vegetation will be carried out till the dump yard become self- sustaining.
Impact of leachate water from overburden on surface and groundwater quality. During rainy season, washed out silt, clay particle from OB dump will flow down and get deposited over water bodies and land surface creating problems of siltation, flooding, degradation of water and land quality.	Limestone does not contain any toxic metals that will leach out and contaminate the environment. Provision of garland drains all around the dump base shall be made. A retaining rock wall, not less than 1 meter wide and about 1 meter in height, all along the toe of the dump shall be constructed to arrest the washed fines. Series of sedimentation tank should be constructed to treat the run-off from OB before releasing it into nearest nala.
Height of OB dump shall be creating aesthetic problem for nearest villagers and their land value shall be lost.	The OB shall be re-handled back to the ML area after the mine life; re-handled to fill up the voids. The ML area shall be restored to its near original landscape as per the Government Policy. The post mining land use shall be useful to the surrounding community.

4.7 Impact on Landuse and Soil

The soil quality of the mining area is of low to moderate fertility. Rain-fed agriculture land is present outside the mining lease area, where paddy is grown. The yield of paddy is reported to be about 10-12 quintals/ha. Limestone dust in the form of fugitive dust emissions will deposit on the surrounding agriculture fields and reduce the soil fertility. In order to mitigate this impact greenbelt development plan has been provided along the mining lease periphery. Advanced mining and blasting technology shall be used to minimize the adverse impact.

Because of the large area of land disturbed by mining operations and the large quantities of earthen materials exposed at sites, erosion is a major concern. Consequently, erosion control has been considered from the beginning of operations through completion of reclamation. Erosion causes significant loading of sediments to nearby water bodies, especially during severe rainfall events. Major sources of erosion / sediment loading at mining sites include open heap and dump leaches, waste and overburden piles, haul roads and access roads, stockpiles, vehicle and equipment maintenance and reclamation areas.

Sediment-laden surface runoff typically originates as sheet flow and collects in rills, natural channels or gullies, or artificial conveyances. The ultimate deposition of the sediment may occur in surface waters or it may be deposited within the floodplains of a stream. Erosion and sedimentation processes causes the build-up of thick layers of mineral fines and sediment within regional flood plains and the alteration of aquatic habitat and the loss of storage capacity within surface waters. The main factors influencing erosion includes the volume and velocity of runoff from precipitation events, the rate of precipitation infiltration downward through the soil, the amount of vegetative cover, the slope length or the distance from the point of origin of overland flow to the point where deposition begins, and operational erosion control structures.

The site and surrounding is flat land. There is no problem of landslides in the area. The soil is sandy loam, with huge amount of murum which loses its moisture during peak summer and loose the soil particles. Mining will be done on surface that has practically no soil cover. Limestone crops are visible at surface at several places. At some places red lateriatic soil / murum mixed soil is present. The soil of the mining lease area is of poor fertility. No agriculture is done on the mining lease area. Rain-fed agriculture land is present near the mining area, where paddy is grown during July to October. No other crops are grown. The yield of paddy is reported to be about 10-12 quintals / acre. Limestone dust in the form of fugitive dust emissions will deposit on the surrounding agriculture fields and reduce the soil fertility.The adverse impacts and mitigation measures are described below:

Adverse Impacts on Soil	Mitigation Measures
Problem of subsidence and assessment of soil erosion potential and its impact. Soil erosion takes place during summer season due to loss of grass cover and strong surface winds. The loose soil erodes during rainfall.	Soil stacking shall be done in a scientific manner. The stacking height shall be kept below 3 m. Slope shall be kept as per the natural angle of repose (1 vertical and 1.5 horizontal). Mycorrhizal soil inoculation regulates soil pH for good growth of plants roots. Regulations of soil temperature and conservation of moisture and organic matter mulching shall be done for better vegetation development.
Loss of soil fertility if kept stacked and compacted over a longer duration	The soil of the mine area has low nitrogen. Leguminous plants shall be planted on the soil dump to hold soil in place and help in rooting the soil so that it will not erode and fix nitrogen. Leguminous plants like beans, chana, lobia, etc. shall

	be planted over the stacked soil. This will also keep the soil moisture, soil microbes and soil fertility intact for the entire duration. Compost shall be added in the form of aerobically digested food and crop residue and farm manure. Protective cover shall be placed on the stored topsoil by layering straw, leaves, and other organic matter on top, so the nutrients in these substances work their way down in to the soil as they decompose.
Impact on fertility of soil due to dust deposition on surrounding agriculture fields.	In order to mitigate this impact, greenbelt will be provided on the lease periphery. Advanced mining and blasting technology will be used that will reduce the adverse impact. ACC will work closely with the farmers and supply natural fertilizers / soil conditioners to them so that the damage gets compensated.

4.8 Impact on Ecology

There is no forest in the study area. Bhilai Steel Plant had carried out the mining activity for nearly 20 years inside this NK lease area, hence very little amount of top soil remains in the ML area. The soil quality of the ML area does not support the tree vegetation. Scanty growth of babul trees has been observed in some place of the ML area. No other trees present in ML area. Among the shrub and herb species Lantana camara, Xanthium strumarium, Parthenium spp, Cannabis sativa, Cassia tora, Achyranthus aspera are the dominant species. No extinct, endangered, rare and critical floral and faunal species has been found in the study area. No economically important plants, medicinal plants are found inside the ML area.

Limestone dust deposition on the agriculture fields and standing crops will reduce the soil fertility and yield of crops. Limestone dust emission will deposit on the grass of surrounding fields. This will reduce the yield of grass and affect the milk quality of cows and buffalos feeding on it. The impact will be limited to immediate vicinity of the mine boundary.

Mining activity will leads to soil erosion. Deposition of fugitive dust on pubescent leaves of nearby vegetation may lead to temporary reduction of photosynthesis. Such impacts would, however, be confined mostly to the ML area and haul roads and would also be regulated and minimised through adoption of such control measures as paving and surface treatment, water sprinkling and plantation schemes.

To prevent the generation of re-suspended road dust due to vehicular movement, internal roads will be developed. The permanent roads will be either asphalted or concrete paved. Temporary roads will be stabilized properly (free of loose soil materials) and regular water sprinkling will be done to prevent the dust nuisance. The incremental emission of air pollutants is not likely to induce any significant changes in the ecology because the national ambient air quality standards will remain within limits.

The wild fauna in the study area as well as mine area is restricted to commonly found mammals. Except domestic animals, wild animals commonly observed are reptiles, fox, hares and common birds. Good numbers of avifauna has been observed in the ML area and its surroundings; it is mainly

due to presence of water bodies inside the ML area. Further plantation will be done along the ML Premises and will help to improve the diversity of the avifauna.

Noise and vibrations produced due to blasting operations is not a continuous phenomenon, though repetitive, hence negligible impact on fauna. The blasting was normally performed once in six days controlled blasting gives less noise and vibration. The impact can be nullified or even better landscape and greenery shall be developed to reduce the noise impact.

Proposed Mitigating Measures

I. Scientific mining method shall be adopted. Environment Monitoring Cell will be created to look after the day to day environment monitoring requirement of the project and ensure that the mitigation measures are implemented and they also function effectively.

II. Stabilization of mining benches and overburden by development of vegetation cover over them: The overburden will be removed and stacked along the periphery of the mining lease within 7.5 m distance from mine boundary. Stabilization of dumps benches will be done through plantation / revegetaion / turfing. Plantation over OB dump will be undertaken from first year itself.

III. Afforestation of reclaimed mined-out areas with grass, shrubs and trees.

IV. Greenbelt development: Plantation of economically beneficial shrubs / trees, floriculture, greenbelt in and around mine lease areas, mining benches, and for avenue plantation along haul roads.

V. Institutional mechanism like separate cell to supervise and monitor various mitigation measures.

4.9 Health Impacts

Human settlement is present on the east, south and northwest (Nandini Khundini, Deorjhal & Pathariya village) boundary of the mining lease area. 30 m thick greenbelt shall be developed on sides facing these villages. Noise and dust are the main hazards. Workers involved in limestone handling and those working close to the mines are exposed to silica bearing dust. Over a long period of time such exposure is likely to result in respiratory problems like silicosis. Measures will be implemented to reduce the dust generation at the originating point by installing appropriate control devices. Plant personnel working in dust prone areas will wear personnel protective equipment like air filters over their nose. Job rotation schemes will be practiced for over-exposed persons (Those exposed to high dust levels). It will be ensured that workers are not exposed above the threshold noise limits prescribed by OSHA and Factories Act through suitable administrative controls. Personal Protective Equipment like earplugs and muffs will be provided and administrative pressure applied for using them. Auditory examination by qualified doctors upon the first employment and thereafter periodic examination will be conducted which include determination of auditory threshold for pure tones.

CHAPTER 5: ENVIRONMENT MONITORING PLAN

5.1 Environmental Management System

Environmental Management Department (EMD): The name of the proposed mine is Nandini Khundini Limestone mines. ACC owns two other limestone mines located within a distance of 1 km from Nandini Khundini mine. The names of two operating mines are Pathariya Limestone Mine- Lease I and Pathariya Limestone Mine –Lease II. The mines are administratively operated from a single point located at Pathariya Limestone Mines – Lease I. Nandini Khundini mine will also be controlled from Pathariya- Lease I. No infrastructure like administrative buildings, workshop, magazine, lubricant and diesel storage shall be provided inside the Nandini Khundini mine.

Environment Management Department already exists and is located at Jamul Cement Works plant, to take care of plant and all the integrated limestone mines Environment Management System. Existing EMD is adequate to perform the responsibilities of the proposed mines. The general institutional structure of EMD is given in Chapter 8:

The Head of EMD shall directly report to the Director Plant in close coordination with DGM Mines. In case the Head-EMD notes any non-compliance or violation of environmental law/ regulations, the same shall be brought to the notice of the GM (during the weekly review meeting). GM under the guidance of Director Plant will issue instruction and sanction budget and provide adequate resources to rectify the same.

The EMD shall study each activity and implement the mitigation measures for compliance and improvement of environmental performance. EMD shall co-ordinate with the safety and occupational health departments and prepare statistical analysis of the data. EMD shall also form a Consultative Working Group by involving responsible citizens from the surrounding community and develop action plans to address the grievances of the public related to environmental compliance of the mines and develop targets for remediation of the grievances.

Other recommended functions of the EMD are given below:

- Develop and maintain Environment Management System.
- Regular monitoring of ambient air quality around the mines and work environment monitoring inside the mines.
- Regular monitoring of water quality of the storage pits, ground water quality of surrounding villages and surface water quality of rivers and streams.
- Regular noise monitoring of the mining zone and surrounding villages.
- Green belt plantation, maintenance, development of other forms of greenery like inside the mines boundary and towards the human habitation and agriculture fields.
- Keeping records of the overburden quantity.
- Report any abnormalities found during monitoring results for immediate corrective measures.

All the above observations are compiled and documented to serve the following purposes.

- Identification of any environmental problems that are occurring in the area.

- Initiating or providing solution to those problems through designated channels and verification of the implementation status.
- Controlling activities until the environmental problem has been corrected.
- Suitability responds to emergency situation.

The staffs of the EMD shall be trained by arranging in-house training programs by inviting experts or faculty members from internal/external trainers. All staff of EMD shall be made aware of applicable environmental laws and regulations, O&M of pollution control systems, pollution monitoring equipment and new developments in the field of pollution control.

5.2 Environmental Monitoring Plan

Monitoring plan has been delineated to ensure compliance with the latest environment laws and regulations. The objectives of the monitoring plan are as follows:

- ❖ To ensure compliance with applicable environmental laws and regulations
- ❖ To verify the results of the impact assessment study.
- ❖ To study the trend, and identify any critical parameter and plan its mitigation.
- ❖ To ensure that any additional parameters, other than those identified in the impact, do not become critical at a later date.

The effectiveness of monitoring plan depends mainly how best the objective of the monitoring is addressed through its core elements for e.g.

a) Man power and Instruments
b) Monitoring networks
c) Frequency of monitoring
d) Parameters to be monitored
e) Methods and duration of sampling
f) Method of analysis.

Table 5.1 Instruments Required by EMD for Routine Environmental Monitoring

	Name of Instruments	Number	Purpose
1	PM_{10} Sampler	8	Ambient Air Quality Monitoring
2	$PM_{2.5}$ Sampler	8	Ambient Air Quality Monitoring
3	Spectrophotometer	1	Analysis of air and water samples
4	pH meter	2	pH measurement
5	Conductivity meter	1	Conductivity measurement
6	DO Meter	2	DO measurement
7	Refrigerator	2	Storing samples
8	Electronic Balance	2	Weighing
9	Oven	2	Drying
10	Desiccator	2	Desiccation

5.2.1 Ambient Air Quality Monitoring

Ambient air of the premises and surrounding area shall be monitored as per method prescribed by CPCB. The monitoring height shall not be less than 3 m from the ground. The station shall not have any obstacle around 500 m area, Station shall be 500 m away from road.

Components	Location	Parameter	Monitoring & Analysis Method	Monitoring Frequency
Ambient Air Quality	At mines boundary in upwind and downwind direction, and surrounding villages	PM_{10}	Gravimetric method TOEM Beta attenuation	Monthly or as directed by SPCB
		SO_2	Improved waste and Geake method Ultraviolet	

			fluorescence	
		NO_2	Modified Jacob & Hochheiser (Na Arsanite) Chemiluminescence	

5.2.2 Fugitive dust monitoring:

Fugitive dust monitoring shall be carried out to know the impact during blasting, excavation and loading of limestone. It shall be done at upwind and downwind direction (10 m from dust generation source) to know the impact.

Components	Location	Parameter	Monitoring &Analysis Method	Monitoring Frequency
Fugitive Dust Monitoring	Near dust generation points	PM	CPCB Method High Volume Sampling at upwind and 10m downwind direction simultaneously for 1-2 hour. @ 1100 LPM sampling rate	Monthly or as directed by SPCB

5.2.3 Equipment and Ambient noise

Component	Location	Parameter	Monitoring & Analysis method	Monitoring frequency
Ambient noise levels	Mine's boundary and Pathariya and Nandini Khundini village	Leq values in dB (A)	CPCB method using equipment as per IS-9989 & IS:9779	Monthly (separately for day and night time)

5.2.4 Water and Wastewater Analysis

Component	Location	Parameter	Monitoring & Analysis method	Monitoring frequency
Ground water quality	Observation wells inside mine (2 Nos. of Piezometer) ground water of all villages around the mine (tube wells/ bore wells)	Ground water level pH, TDS, TSS, Total Hardness, Fluoride, Nitrate, Sulphate, Chloride. Main Metals	APHA Standard Methods	Once during pre-monsoon season (May) and once during post monsoon season (November)
Surface water quality	Sheonath and Amner rivers	pH, TDS, TSS, Total Hardness, BOD, COD, O&G, NH_3, B, Coliform Count	Standard methods of APHA	Once during pre-monsoon and once during post monsoon

5.2.5 Workers Health Monitoring

Component	Location	Parameter	Monitoring & Analysis method	Monitoring frequency
Occupational health	Workers	Silicosis, heart disease, diabetes, skin problems, ENT problems, etc.	By engaging occupational health specialist	Once in a years or as per direction of DGMS

5.2.6 Community Health Monitoring

Component	Location	Parameter	Monitoring & Analysis Method	Monitoring Frequency
Health of Community	Surrounding villagers	Respirable disorders Heart diseases Diabetes Reproductive Health Child Health ENT problems	Organizing health camps in surrounding villages with qualified doctors and supporting staff. Inviting surrounding people for health check-up. CPCB Protocol to be followed during the health camps.	Once in 5 years

5.3 Reporting

The monitoring results require to be reported every six months and as frequency mentioned stipulated in Consent condition to the SPCB, CPCB and MoEF. Effective reporting mechanism has been developed as a part of Management System. The results are statistically analyzed for understanding of technical and administrative personnel. Standard reporting formats for all environmental components has been developed. The results are communicated to the HOD of the project during the monthly review meeting. In case any problems with the pollution control measures or environmental management plan has been found during the routine monitoring, it is immediately communicated to all concerned and time targeted action plan are prepared to rectify the defect. The environmental performance of the project is published in the form of sustainability report. The document also contains targets and action plan for demonstrate improvement in the environmental performance of the project.

CHAPTER 6: ADDITIONAL STUDIES

6.1 Risk Assessment

Through examination of the Mining Plan and consultation with ACC, all accident and spill scenarios has been identified that could result in environmental risk. Following scenarios fall under Maximum Credible Accident Scenario:

- Fire in Diesel tanks/ vehicles
- Surface subsidence
- Accidents due to explosives / blasting
- Accidents due to Heavy Earth Moving Machinery (HEMM)
- Mine Inundation
- Failure of mine benches

Risks associated with above said accident scenarios are described below:

6.1.1 Fire in Diesel Tanks / Vehicles

Diesel may leak from tanks and result in fire, if source of ignition is given to it. However the situation will be localized and create damage to the vehicle/ HEMM. Water accumulated in the mine pit and pumps shall be used to stop the fire.

6.1.2 Surface Subsidence

Opencast mining may cause the extracted void to collapse which will result in surface subsidence. It is always a localized one. It can lead to injury to workers and damage the mining equipment. Scientific mining plan and process is required to minimize the incident.

6.1.3 Danger due to Blasting

Blasting generates fly rocks, dust cloud, noise & ground vibrations which lead to injury, hearing impairment, damage to civil structures. Mitigation measures are necessary to minimize the damage.

6.1.4 Danger due to Heavy Earth Moving Vehicles

Heavy earth moving machineries are used in mining for various purposes such as drilling, transportation, loading & unloading. Accidental runway of vehicle, fall of vehicle from height while reversing, noise, may occur, Pedestrian struck by flying stone due to tyre edge may results in injury and equipment damage.

6.1.5 Sabotage of Explosives

Sabotage due to misuse of the explosives, theft, forceful abduction of the truck laden with explosives by antisocial elements poses serious risk.

6.1.6 Inundation

Inundation in opencast mine is broadly caused due to following reasons:

- **Water Table**- The natural ground water table becomes a source of inundation when the working crosses the water table level at depth or reaches even very close to it. The severity of inundation depends on
    - The structure and size of the water table reservoir; and

- Permeability and the structure of the formation, which are being subjected to excavation in mining.

❖ **Rainfall**- The average rainfall in the area is about 1200-1300 mm/annum In case of rains the mine cannot be saved from receiving rainwater and inundation due to rain is directly related to the surface area under excavation, and the intensity of the rain experienced.

6.1.7 Failure in Mine benches

The opencast mines operating with multiple benches shall have overall pit slope of 45^0. This risk of slope failure is there subject to stratigraphic disposition of various rock formation coupled with prevailing hydrological conditions & pit design.

Table 6.1 Assessments of Hazards and Associated Risk in Mining Activities

Activity	Hazard			Risk		Mitigation Measures
	Descriptive nature	N/AN /E	D/ ID	Frequency (HUL/UL/L/ VL)	Consequence	
Drilling	Exposed to high level noise	N	D	L	Hearing impairment	Ensure engine of drilling machine is tuned
						Use ear muffs/ear plugs
	Exposed to dusty environment	N	D	L	Dust related diseases	Use wet drilling system / dust extraction system with drilling machine
						Use dust mask
Blasting	Struck by fly rock	N	D	HUL	Serious physical injury	Use Raydet/excel (NONEL) technology Take proper shelter if present within damage zone
	Exposed to dusty environment	N	D	HUL	Dust related diseases	Pre-wet the surface Use delay detonators Optimize mix of ANFO & explosives topped with saw dust / sand, use dust mask
	Exposed to high level noise	N	D	HUL	Hearing impairment	Use ear muffs/ear plugs
	Exposed to excessive vibration	N	D	HUL	Damage to civil structures	Use hydraulic rock breaker to avoid secondary blasting NONEL delay detonation technique as per SOP Measurements of ppv during blasting
Loading	Struck by rolling big boulders	N	D	HUL	Serious/ fatal injury and equipment damage	Maintain recommended bench height, width and slope (avoid under cutting)
						Provide protective guard in front of vehicle cabin
						Wherever necessary do face dressing from top
	Struck by fall of objects	N	D	HUL	Serious physical injury	Provide protective guard in front of cabin & ensure careful operation
Transportation by tippers	Accidental runway or fall of vehicle	AN	D	HUL	Serious/ fatal injury and equipment damage	Ensure good condition of brake system by proper checking & testing
						Apply emergency steering
						Provide training to drivers for

						safe operation of equipment
						Ensure that rear view mirrors are provided
						Use audio visual alarm
						Provide spotter
	Exposed to high level noise	N	D	L	Hearing impairment	Use ear muffs/ear plug
	Fire in engine due to overheating	N	D	L	Equipment damage	Ensure proper engine cooling system
						Keep ready suitable fire extinguisher
	Pedestrian struck by flying stone due to tyre edge	N	D	L	Serious/ fatal injury	Keep the haul road free from stone pieces

Abbreviations:-

Occurrence	Impact	Frequency
N=Normal	D=Direct	HUL= Highly unlikely
AN=Abnormal	ID= Indirect	UL= Unlikely
E=Emergency		L=Likely

6.2 Risk Mitigation Measures

In order to take care of the risks identified above, the following mitigating measures will be taken in the mine area:

6.2.1 Fire in Diesel Tanks / Vehicles

Sufficient fire extinguishers will be installed at selected locations on surface like Mine office, Electrical Sub-stations, Workshop, Garage, Diesel Depot, Magazine, etc. (all are located in Pathariya-I Lease). Besides, sufficient number of water hydrants with sufficient hose pipes will be made available in the surface for fire protection.

6.2.2 Surface Subsidence

Mining operation will be carried out strictly as per the approved Mining Plan, the height and width of bench and the slope of the benches will be maimed as per the approved plan. Visual checks of the inclined bench surface will be carried out on routine basis to see for cracks, fissures, water seepage, etc. etc. In case any cracks is observed it will be attended to for stabilization.

6.2.3 Blasting

To ensure safe blasting following measures will be adopted:-

- The use of Non electric system of initiation of the blast holes by using Excel detonators and connectors. It ensures bottom hole initiation of the explosive charge, thereby reducing the ground vibration and fly rock problem.
- Use of ground vibration and air blast monitoring instrument to monitor the blasts. The instrument revels efficiency of the blasting activity.
- Complete evacuation of the area falling within 300m of the blast site by sounding siren and by sending guards to avoid any exposure of the human beings and other animals to the danger associated with blasting.
- All the blast shall be carefully planned and executed under proper supervision and ensure effective utilization of the explosives only for breaking of the rocks.

- No secondary blasting will be done. All the big boulders will be broken using Hydraulic Rock Breaker, thereby eliminating the risk of flying fragments associated with secondary blasting.

6.2.4 Heavy earth moving machineries

All the accidental scenarios due to HEMM will be minimized ensuring following mitigation measures:-

- Good condition of the brake system by proper checking & testing
- Apply emergency steering
- Provide training to drivers for safe operation of equipment
- Ensure that rear view mirrors are provided
- Use audio visual alarm
- Provide spotter
- Provide mirrors at the curve edge of roads.

6.2.5 Sabotage of Explosives

Suitable explosives van duly licensed by the Controller of Explosives is being utilized for daily transportation of explosives from originating point to mine site. The area is not prone to any subversive activities by antisocial elements. The schedule of movement of explosive van is randomly scheduled and kept secret. The storage, transportation and use of explosives are carried out with complete safety, in accordance with the Indian Explosive Act & Rules, 1883. The entire magazine area is fenced by high chain links with barked wire at top. Security guards are provided for surveillance of the area around magazines. The storage and maintenance of stock records for all the magazines is done by an authorized magazine in-charge under the guidance of blasting engineer. The magazine is kept under lock and key and guarded by security person round the clock. Necessary foolproof arrangements are made for transportation of detonators in separate vehicles to the blasting site.

6.2.6 Inundation

To mitigate inundation due to rainfall, dewatering pump will be installed at the mine pit. It will take care of the incoming water in the pits from rain, seepage and other unavoidable sources. The accumulated water in the working pit will be pumped out into empty / vacant pit or discharged into the canal passing through the south side of the lease area.

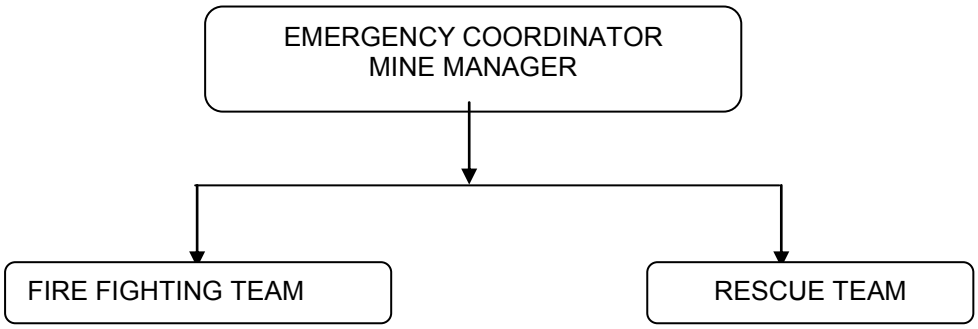
6.3 Disaster Management Plan

Disaster Management Plan is formulated with an aim to take such action after the disaster which limits the damage to the minimum. In order to take care of above hazards/disasters the following control measures will be adopted:

- All safety precautions and provisions of Mine Regulation Act and DGMS will be strictly followed during all mining operations;
- Entry of unauthorized persons will be prohibited;
- Fire fighting and first aid provisions in the mines office complex and mining area will be ensured;
- Provisions of all the safety appliances such as safety boots, helmets, goggles, ear plugs/muffs etc. will be made available to the employees;
- Training and refresher course for all the employees working in hazardous premises;
- Working of mine, as per approved plans and regular updating the mine plans;
- Cleaning of mine faces will be regularly done;

- Handling of explosives, charging and blasting will be carried out by competent persons only;
- Provision of magazine at a safe place with fencing and necessary security arrangement;
- Regular maintenance and testing of all mining equipment as per manufacturer guideline;
- Adequate safety equipments will be provided at explosive magazine; and
- Increasing the awareness of safety and disaster through competitions, posters and other similar drives.

There is an organization exist for dealing with the emergency situations. Co-ordination among key personnel and their team has been shown in Fig 5.1. The emergency organization is headed by emergency leader called Site Main Controller (SMC) who is mine manager. In his absence senior most person available at the mine are the emergency leader till arrival of mine manager. There are two teams for taking care of emergency situation- Fire fighting team and Rescue team. A tele-communication network and wireless shall connect Site Emergency Control Room (SECR) to control various departments of the mine, fire station and neighboring industrial units/mines.



Organization for Dealing with Emergency Situations

6.3.1 Roles and Responsibilities of Emergency Team

(a) Site Main Controller (SMC)

The SMC or emergency leader shall assume absolute control of site and shall be located at SECR.

(b) Incident Controller (IC)

Incident controller shall be a person who shall go to the scene of emergency and supervise the action plan to overcome or contain the emergency. Shift supervisor or Environmental Manager shall assume the charge of IC.

(c) Roll Call Coordinator

A senior person from administration or personnel department shall be Roll Call Coordinator. The roll call coordinator will conduct the roll call and will evacuate the mine personnel from assembly point. His prime function shall be to account for all personnel on duty.

(d) Search and Rescue Team

There shall be a group of people trained and equipped to carryout rescue operation of trapped personnel. The people trained in first aid and fire fighting shall be included in search and rescue team.

(e) Emergency Security Controller

Emergency Security Controller shall be senior most security person located at main gate office and directing the outside agencies (e.g. fire brigade, police, DM, Civil/Defence representatives and media men etc.

(f) Shift Medical officer

He shall be a doctor/trained compounder at the first aid center/medical center of mine.

6.3.2 Outside Organizations Involved in Control of Disaster

In the event of fire, population inside and outside mine boundaries, vegetation and animal etc. may be affected. In such circumstances secondary fire may also take place. In such an event, help shall be taken from outside agencies also. The organizations that shall be involved are as follows:

a) State and local authorities: District Collector, Revenue Divisional Officer, etc.
b) Chief Inspector of Explosives
c) Environmental agencies: Member Secretary of State Pollution Control Boards, District Environmental Engineer
d) Fire Department: District Fire Officer
e) Police Department: District Superintendent of Police, SHOS of nearby Police Stations
f) Public Health Department:
    - District Medical Officer
    - Residential medical officers of PHCs in a radius of 3 km around mine site
g) Local Community Resources
    - Regional Transport officer
    - Divisional Engineer Telephones
h) Director General of mine Safety

The outside organizations shall directly interact with district magistrate who in consultation with SMC shall direct to interact with mine authorities to control the emergencies.

6.3.3 Hazard Emergency Control Procedure

The onset of emergency, will in all probability, commence with a major fire or explosion and shall be detected by various safety devices and also by members of operational staff on duty. If located by a staff member on duty, he will go to nearest fire alarm call point, break glass and trigger off the fire alarms. He will also try his best to inform about location and nature of fire to the fire fighting dept. The following key activities will immediately take place to interpret and take control of emergency.

1. On site fire crew led by a fireman will arrive at the site of incident with fire foam tenders and necessary equipment.
2. Emergency security controller will commence his role from main gate office
3. Incident controller shall rush to the site of emergency and with the help of fire crew and will start handling the emergency.
4. Site main controller will arrive at SECR with members of his advisory and communication team and will assume absolute control of the site. He will receive information continuously from incident controller and give decisions and directions to all emergency personnel.

After all key emergency personnel have taken up positions, the incident Controller will use communication system to convey and receive the messages. At the site of incident, the incident controller will directly handle the emergency with the help of fire fighting personnel. At the main gate Emergency Security Controller and Mine Manager will contact external agencies. At the site, first aid centre medical officer will take control of medical support services. Site Main Controller will be directing and deciding a wide range of desperate issues. In particular SMC has to decide and direct:

- Whether incident controller requires reinforcement of man power and facilities.
- Whether mine is to be shut down or more importantly kept running
- Whether staffs in different locations are to remain indoor or to be evacuated and assembled at designated collection centre.

- Whether missing staff members are to be searched or rescued.
- Whether off-site emergency plan to be activated and a message to that effect is to be sent to district head quarter.
- Whether staffs in different locations are to remain indoor or are to be evacuated and assembled at designated collection centre.
- Whether and when district emergency services are to be called.
- Respond to any large size complaints from outside public and to assess an off-site impact arising out of the on-site emergency.

When the incident has eventually been brought under control as declared by the Incident Controller, the SMC shall send two members as inspectors to incident site for:

- An assessment of total damage and prevailing conditions with particular attention to possibility of re-escalation of emergency which might, for the time being, be under control.
- Inspection of other parts of site which might have been affected by impact of incident
- Inspection of personnel collection and roll call centres to check if all persons on duty have been accounted for.
- Inspection of all control rooms of mine to assess and record the status of respective departments and any residual action deemed necessary.

Post Emergency, the inspectors will return to SECR with their observations and report of findings and will submit the same to SMC. Based on these reports, SMC will communicate further directives to all emergency management sub-centres and will finally declare and communicate termination of emergency and authorise step by step restoration of normal operation of the affected mine area. The fire siren will be sounded with all CLEAR – SIGNAL.

In all other type of emergencies like surface subsidence etc., similar action will be taken as in case of fire and explosion explained above. During entire period of emergency the site will remain out of bounds to external visitors except

- District Fire Personnel
- District Hospital Ambulance and Staff
- District Administration
- Factory Inspectorate and Labour Commissioner
- Officers of State Pollution Control Board
- Insurance Authorities
- Directorate General of Mine Safety
- Chief Controller of Explosives

All the members of public, political parties, gram panchayat etc. will be dealt with from the main gate office by Emergency Security Controller and Personnel Manager.

6.3.4 Fire Extinguishers at Different Locations

Table 6.2: Name of Site and Type of Fire Extinguishers

Name of Site	Type of Fire Extinguishers
Electrical equipment, power panels, control rooms and pump house	CO_2 type, foam type, dry chemical powder type
Mine Office	Dry chemical type, foam type

Rescue and Repair Services

Effective working of rescue team is essential during a disaster. In order to make the services of rescue team effective following equipment/items shall be provided to the team:

- Gas mask respirators
- Fire proximity suits
- Petromax lamp/Torches
- Axes/hand saw
- Fire entry suits
- Fire blankets
- Ropes
- Ladders
- Rubber glove
- Blanket
- Rubber shoes or industrial shoes

6.3.5 Alarm System to be followed during Disaster

On receiving the message of 'Disaster, from site Main Controller, fire station control room attendant will sound SIREN I WAILING TYPE' FOR 5 MINUTES. Incident controller will arrange to broadcast disaster message through public address system. On receiving the 'message of "Emergency Over" from Incident Controller the fire station control room attendant will give "All Clear Signal,, by sounding alarm straight for two minutes. The features of alarm system will be explained to one and all to avoid panic or misunderstanding during disaster.

6.3.6 Actions to be taken on hearing the Warning Signal

On receiving the disaster message following actions will be taken:

- All the members of advisory committee, mine manager, security controller, etc. shall reach the SECR.
- All other persons in the mine area will remain ready in their respective units for crash shutdown on the instruction from SECR.
- The persons from other sections will report to their respective officer.
- The concerned section will take immediate action to remove contractor's personnel outside the mine gate.
- Alert signals will be given to the residents of surrounding villages.

6.3.7 Identification and Reporting System

When any near miss takes place same it should be brought to the notice of the supervisor and also to the concerned Departmental Head and the Safety Department. Then the respective department head report it to the ACC Near Miss Reporting Server (NMRS). Near Miss Reporting Box shall be kept at prominent places with Reporting Format so that no near miss incident can be missed. The Safety Department Head investigate the same incident along with the floor supervisor and corrective measures shall be taken as soon as possible. For near miss of critical nature Departmental Head along with Safety Head shall do the investigation and corrective action shall be taken. In the departmental safety meeting learning's from the previous near miss shall be discussed. To promote the Near Miss reporting system, Highest and Best near miss reporting person are awarded during the monthly safety gate meeting.

Cause analysis of the Near Miss Incident and SOT Format (to be filled by ACC, after operation)

	Cause analysis of the near miss incident	Percent
1	Poor housekeeping/ disorderly housekeeping	
2	Operating equipment without authority	
3	Failure to adhere to warning signal/ alarm	
4	Failure of securing himself adequately	
5	Inadequate warning system	
6	Congestion	
7	Defective tools, equipment or material	
8	Failure to follow procedures	
9	Failure to use PPE	
10	Using equipment improperly	
11	Improper lifting	
12	Improper placement	
13	Inadequate guards or barriers	
14	Traffic congestion at workplace	
15	Operating at improper speed	

6.4 Social Impact Assessment

EMTRC team visited Nandini Khundini village, Pathariya village and other villages of study area and carried out need based social survey. During survey EMTRC team identified the existing infrastructure base and thrust areas where ACC is doing and can further extend CSR activities for the upliftment of social and economic profile of the rural people. Following amenities and facilities have been created by ACC Jamul.

(a) **Hospital:** A well-equipped hospital is provided at ACC colony, which has full time male and lady medical officers assisted, by compounders and nurses. Necessary medicines and medical aid is available for the company employees as well as for the inhabitants of the nearby villages. A LSDM dispensary is also under operation at Pathariya Mines which is approx. 1 km from Mine site.

(b) **Housing:** The employees are provided with well-designed houses having electricity and water connections. The colony is well laid out with tree-lined lanes, parks, gardens etc.

(c) **Schools:** For the education facility of colony children and nearby village children, Bal Mandir, Middle School & D.A.V. Public School is available up to higher Secondary, which follows the teaching syllabus of Central Board of Secondary Education.

(d) **Bank Branch:** State Bank of India has a local branch in ACC Jamul colony for the benefit of the employees.

(e) **Co-operative Society:** The employee's co-operative society is given all assistance by the management. It provides loans to the needy ones.

(f) **Recreation:** Recreational facilities for the employees and their families have also been provided i.e. Sports club well equipped with indoor and outdoor games, library, television and film screening facilities.

(g) Children Park: A well-equipped children's park has been maintained for the recreation of the employees' children.

The social infrastructure is moderately developed in villages around mine site which comprises of schools, markets, temples, state highway, community centers, hospitals, etc. ACC has plans to maintain and improve this infrastructure under CSR initiatives.

6.4.1 Need Based Assessment of Study Area

Educational and Literacy Enhancement

Problem Identified: Most of the villages in the study area have primary and secondary schools. Most of the primary and secondary schools have toilet. But the condition of the toilets is bad. There is no sweeper in schools. Playground, Boundary wall is not available in most of the schools. There is lack of basic learning materials available in the school which is essential for creating interests among the primary level students for joyful atmosphere. Villagers demanded that there is huge space available in existing school premises which are lying abundant and this space may be developed / constructed for high school. This would help their children to get better education in the village itself. Need based study is being carried out by NGO and reputed outside agencies and based on their report CSR department plan their Yearly CSR activities in the nearby villages.

Health Care & Medical Facilities

Problem Identified: Medical facilities in the study area are average. Govt. Scheme of medical van is available for emergency. Primary health center is available in most of the villages of study area. However the medical facilities available are not adequate. In emergency, people go to Bhilai, Jamul, Durg and Dhamada for getting better medical facilities which are far from these villages. The villagers have demanded better medical facilities in their villages.

Drinking Water Supply and Sanitation

Problem Identified: Open well and hand-pumps are the main drinking water sources in the study area. There is no proper sanitation facility available in villages. Sewage is getting collected in puddles, due to lack of drainage facility which results in various vector borne diseases. No drainage facility is available resulting in water logging all over the villages and also domestic animals wastes are also mixing in water logging areas. All the wastewater generated from villages is going directly into nearby nala and river without any treatment. This unhygienic condition also leads to bad odour problem. Some of the common diseases endemic to the villages are malaria, diarrhea, dysentery, gastric problems.

Training, Employment & Empowerment

Problems Identified: While interviewing the youths and teachers of the study area, main problems identified was unemployment. Most of the youth are demanding employment. Most of the youth are not doing any fruitful job and spending most of their time in playing and other non-productive activities. Some of the youth are going other town in search of job. No training centres are available in the villages in which youth can get the vocational training for their livelihood.

Source of Income: In relation with occupation of the villagers, the main source of income in villages is either agriculture or daily wages earning.

Lack of Sports Facilities: There is no facility for sports and games in the village and due to non-availability of sports equipment and lack of guidance of any skilled person; there is no proper sports activity for children. Young people of the village desire to have facilities and equipments for sports in the village.

Lack of Community Market (Hat) Facilities: Hat facility is not available in the village; villagers travel long distance to reach the markets. The nearest market is Dhamda which 8-9 km away from the village. To add to their woes, poor transportation facility makes their daily life difficult.

Housing Infrastructure: Majority (more than 80%) of the families lives under kutchha roof. Kutchha houses are made up of grass, tile, wood, mud and bricks. The majority of the houses in all the villages have single storied residential houses. Almost 80% houses do not have separate kitchen; they cook either in the compound or in the verandah. The ventilation facility in the house is also poor.

Lack of Public Sewer / Toilet Facility: Drainage facility (sewer and sewerage) is not present in the villages. There are no public toilets in the village. More than 80% of the total household surveyed does not have the toilet facility.

Road Condition: Most of the roads of the study area are pucca. All the villages of the study area are well connected to the nearest towns or cities through Pradhanmantri Gram Sadak or PWD Road. Road accidents are common because of increase in vehicular traffic and lack of road-use awareness among the rural people.

Environmental Problems Identified:

There are more than 20 stone crushers in the study area. Most of the stone crushers are located along the Dhamdha road and close to agriculture fields. Plenty of fugitive dust emissions were seen during crushing and screening activity. Workers were not wearing any type of Personal Protective Devices, like nose or ear masks. The dusts from stone crushers were depositing on the agriculture fields. Uncontrolled blasting in the stone mines also creates problems of fly rock and dust. Few accidents due to fly rock have been reported from the nearby villagers. It has been reported that groundwater level has decreased in some villages, but most of the villagers said that they do not face any groundwater problem. Indoor air pollution due to biomass burning in domestic chulhas and poor ventilation in kitchen / home is the major cause of air pollution exposure in almost all the villages.

Road safety awareness is found to be poor among the rural people and particularly children. No good hospital, blood bank facility, trauma centre or ambulance facility is available in the study area. People suffers mostly from water borne diseases, like gastroenteritis, diarrhea, malaria, etc. Women were found to be suffering mostly from upper respiratory tract disorders. The diseases observed in the cattle stock of study area are Pleura Pneumonia and Foot & Mouth disease. Other diseases in order of severity are as follows: Hemorrhagic septicemia, black quarter and Pastes des pert ruminants. Garbage disposal facility is non-existent in all the villages of the study area.

6.4.2 CSR Plan

ACC is fully conscious of its Corporate Social Responsibility towards the surrounding community. ACC shall play leading and meaningfull role in bringing qualitative improvement in the life of community and surrounding environment. The highlights of the CSR Policy of ACC are given below:

- Ensure an increased commitment at all levels in the organization, to operate its business in an economically, socially & environmentally sustainable manner, while recognizing the interests of all its stakeholders.
- To directly or indirectly take up programmes that benefit the communities in & around its work centers and results, over a period of time, in enhancing the quality of life & economic well-being of the local populace.
- To generate, through its CSR initiatives, a community goodwill and help to reinforce a positive & socially responsible image of ACC.

ACC will earmark annual budget for CSR activities as per rules mentioned in MMDR 2015. Split-up of Rs.5 Lakhs CAPEX for undertaking various community development activities in villages surrounding the Nanadini Khundini mines is given in Table 6.3.

Table 6.3 Name of CSR Activity and Break-up of CSR Fund

S.N.	CSR Activity	Nos. / Quantity	Total Cost Rs. Lakhs
Health Facility			
1	Organizing Health Camps for diagnostic care, distribution of free medicines and raising awareness about proper healthcare.	2 camps per year (alternate year for cattle and human)	0.30 Lakhs
Education			
2	School Infrastructure Improvement (Separate toilets for boys and girls and boundary wall construction, donating furniture and computer)	2 schools per year	0.50 Lakh
3	School Infrastructure Improvement (supply books and teaching aids & sports materials)	2 schools per year	0.20 Lakhs
4	Running of Coaching institutes for competitive exams in village for students. Scholarship for bright and poor students (@500 /month)	4 students per year	0.24 Lakhs
Sanitation			
5	Making Public Toilet (Sulabh Sauchalaya type) and maintenance of sanitary and drainage system.	1 village per year	0.26 Lakh
Agriculture			
6	Training and awareness camps for farmers for improving the yield of crops, use of proper fertilizers and hybrid seeds.	1 camp per year	0.10 Lakh
7	Distribution of hybrid seeds and organic fertilizers to poor farmers	10 farmers per pear	0.40 lakh
Infrastructure Development			
8	Support for maintenance of community halls in villages	1 village per year	0.25 Lakh
9	Village road maintenance	1 village per year	0.25 Lakh
10	Aganbadi Infrastructure Development	1 village per year	0.10 Lakh
11	Making sewer and drains in villages	1 village per year	0.20 Lakh
12	Making solid waste disposal facility in village (including compost making facility)	1 village per year	0.10 Lakh
13	Making ventilation facility in kitchens of rural households	10 house per year	0.20 Lakh

Road Safety and Awareness			
14	ACC will form a Road Safety Committee and bear its expenses. The committee shall comprise of official of ACC, its doctors, officials of transport department and highway authorities, police, panchayat members and teachers of local schools and colleges. The safety committee will ensure implementation of road safety mitigation measures given in Chapter 4. The committee will create / spread awareness among the road users regrinding responsible and safe road use.	Ongoing process, expenditure to be shared by 3 mines of ACC, NKM, Pathariya-I and II Proportionate share of NK Mines given in column 4	0.25 Lakh
15	Provide financial assistance to local hospital to develop blood bank and trauma centre with 2 beds.		0.25 Lakh
16	ACC will coordinate with the State Transport Department and Local Administration, cooperate for developing plans and provide financial assistance for the development, maintenance and upkeep of Highway from Pathariya to Jamul making culverts, footpaths, road dividers, traffic lights, and undertake road side plantation and provide scientifically designed noise barriers at Nandini Khundini village and Deorjhal village		0.35 Lakh
Training and Women Empowerment			
17	Training the local youths in various mining fields in ACC's Training Institute at Jamul	5 youths per year	0.10 Lakh
18	Income Generation and Women Empowerment: Distribute sewing machines, papad making, pattal making, providing training for skill development, providing exposure visits related to understanding marketing mechanisms, making aware about ill effects of female infanticide and importance of increasing female literacy rate	1 village per year	0.15 lakh
Rainwater Harvesting			
19	Make small anicuts / weirs on the nallas around the project site in consultation with irrigation department to store rainwater for use in agriculture and pasture / grass land development. Deeping of ponds in the villages for storing rain water and recharging of ground water.	1 anicut / weir and 1 to 2 pond Deeping per year	0.30 Lakh
20	Develop roof top rainwater harvesting structures in villages surrounding the site.	4 structures in 1 village per year	0.40 Lakh
21	Provision for Miscellaneous Activities (as per demand of the CSR Committee	-	0.1 Lakh
Total		--	Rs.5.0 Lakhs

Note: Additional expenditure has been earmarked to fulfill the commitments made in response to Public Hearing. The commitments and earmarked budget is given in Questinnaire prepared by ACC Limited, attached as Annexure 7.

Time frame for implementation of CSR: The CSR activities shall be started along with the operation of mines.

Implementing Mechanism: The CSR Department of ACC shall implement the CSR Plan by making a Consultative Committee comprising the Village Elders, Panchayat Members, Block Development Officer and District Collector. Annual Audit of the CSR spending shall be done by appointing an

Independent Firm. The CSR spending data shall be submitted to district administration, CECB and MOEF on six-monthly basis. The committee will include representatives of District Administration, elected members, project authority, Panchayat, member, etc. The committee shall comprise the following members:

a) Representativve of State Administration	Member
b) Panchayat members of nearest village	Member
c) Woman (social worker) from nearest village	Member
d) Representative of well-known NGO in the area	Member
e) Manager (CSR), ACC	Member Secretary

Monitoring and Evaluation: The monitoring and evaluation of the work proposed by ACC shall be monitored through its dedicated staff engaged in the CSR Department. Regular progress report of the activities of the work undertaken by the company should be prepared and presented to the top management of the company for review. The CSR team will review the progress of work on monthly basis. A monthly review meeting shall be held under the head of the CSR department. Apart from this, the company will get monitoring and evaluation of the work proposed to be undertaken by a reputed external agency. This will ensure a neutral and an outsider's view on the progress of work undertaken by the company.

6.5 Public Hearing

Public Hearing for production capacity expansion (0.15 to 1.03 MTPA) of NanditaKhundini mines was conducted on 19 -3-2015, 11 AM by Chhattisgarh Environment Conservation Board. The hearing was conducted at mine site, village Nandini Khundini. ADM, Durg presided over the hearing. ACC representative made a presentation in the beginning describing the project, environment status, pollution control measures, management plan and socio-economic development activities undertaken by ACC. 89 people signed the attendance register. 41 people spoke during the hearing and raised some issues and made suggestions. 24 written representations were received to which ACC responded in writing. The proceedings of public hearing and other documents shared by Chhattisgarh Environment Conservation Board with MoEF&CC vide letter no 579/TS/CECB/2015 dated 05/05/2015 are enclosed herewith as Annexure VI. Issues raised by public present during the Public Hearing and Action Plan prepared by ACC Ltd are given in the Questionnaire prepared by ACC (attached as Annexure 7)

Summary of complaints / queries raised by public present during the Public Hearing and reply given by ACC are given below:

Sr. No.	Issue Raised by Villagers	Reply by ACC in English
1	Poisonus gases and gun powder dust from Blasting	Mining operations at Nandini khundini mine has yet not started. ACC will carry out controlled blasting and use latest technology like NONEL and approved explosives for blasting.
2	Drainage and Canals passing through mine lease may get affected	There is no such nalla or canal passing through the mining lease area.

3	Mine lease area land is being used for Grazing, Disposal and Funeral	The ML area had been a mining field of BSP since 1971, the same has been granted to ACC in the year 2008. • Almost 25 % of the mining area is a broken up area. • Nandini Khundini Limestone mining lease was held by Bhilai Steel Plant since 1971 to 1991. The lease was denotified vide Gazette Notification dated 9th June, 1992 prior to grant to ACC in 2008. • The mining lease (53.57 ha) was granted to ACC Limited by the Chhattisgarh Government vide their office letter no. F 3- 18/2004/12 on 5th February 2008. • The mine lease area has already obtained environmental clearance from the MoEF vide letter no. J-11015/237/2009/IA.II (M) dated 10th March 2011. • Govt had granted the working permission to the ACC Nandini Khundini limestone for Mine vide letter dated 24.4.2011 (17.89 ha) and 11.09.2014 (35.68 ha)
4	Problem from Blasting	Nandini Khundini limestone mine will be fully scientific mechanised opencast mine with all latest technology of operation. • ACC will provide thick vegetations barrier in three layers (green belt of 15 meters) between the habitation and the mine • Controlled blasting with proper monitoring will be integral part of the mining process. • No Secondary blasting will be done. Hydraulic Rock breaker /mechanized breaking will be done to eliminate the secondary blasting
5	Drinking water problem and water tank provision	• ACC will put up the proposal to the village Panchayat to provide series of Syntax tanks connected to bore well for resolving the village water problem. • Based on the approval from the panchayat and relevant government authorities the project will be implemented.
6	Air Pollution related problem and control	• Wet drilling will be practiced. The drilling machine will have inbuilt water sprinkling arrangement and dust extraction system. • Controlled blasting technique will be followed. The site will be wetted before blasting. Blasting will be done around noon. • Ground vibrations to be continuously monitored during blasting using Minimate • Mechanised breaking will be used to eliminate the secondary blasting. • Compaction, gradation and proper drainage will be provided for haul roads. • Haul roads in mines will be tabilized. Vehicular speed in mines area will be restricted to 20 kmph and water sprinkling will be carried out. • Plantation shall be done on both side of the roads of Mines • Area has been already demarked wherein green belt has been developed and further developed.
7	Reparing of Main Road from Nandini Khundini	As requested the option will be explored after discussion with the relevant authorities.
8	Health Camps at Village	• Medical Health Camps are being organised periodically at different villages like Pathariya, Madesra and Nandini Khundini. • Free medicines are distributed to the villagers. • Eye camps are being organised and Spectacles and goggles are being distributed In future also organisation of health camps in villages will continue.

9	Employment to near by villagers	ACC will give preference to the local peoples depending upon the skill, job requirement and capability. Several other indirect employment opportunities will be created in the surrounding areas like Transport of raw material, hotel operators, vehicle drivers and attendants, workshops, grocery and retails, medical, etc.
10	Provision for Sulab Sauchalay	ACC will help in building Sulabh Sauchalay in the Village as per the requirement of Village Panchayat.
11	Green Belt development	Thick greenbelt will be developed around the periphery of mine and will start from the village side.
12	School will get affected by blasting	The nearest school is approx. 100 meters away from the mining lease boundary (East side). With the scientific mining being adopted and a greenbelt being developed at the lease boundry there is no possibility of any accident. As per the mining plan, the mining activity will start from the south side of mine lease area. This is fully scientific mechanised opencast mine with all latest technology of operation. A wide thick greenbelt will be developed around the periphery of mine and will start from the village side. During the EIA study it is observed that there is no significant impact on the nearby by school and village.
13	Dust pollution Level in the area is high due to presence of several mines and crushers	The ambient air quality was measured for PM_{10} and $PM_{2.5}$ as per standard. The levels are well within the prescribed limit.
14	VNR Seeds supply seeds to the surrounding area. This plant is located close to NK mines boundary. Dust and blasting will affect the quality of seeds and machinery in adverse way	Mining in this area was done by Bhilai Steel Plant from 1971 to 1991. ACC got the ML area in 2008 and is planning to start mining after implementing all pollution mitigation measures and getting Environmental Clearance. The baseline data of air, water, soil and noise is meeting the standard. EIA predicted that the standard will be met by this mine. Controlled blasting will be done and ground vibrations will be monitored. Greenbelt (15 m width) will be developed all along the mine boundary.
15	Hand pumps and dug wells will get dry	The water accumulated in mine pit will enhance the water table of dugwells and handpumps of surrounding areas. The Hyderogeological Report of the mine reveals that the impact of opencast mining will be limited within the ML boundary.
16	Discharge of water accumulated in mine pit will create problem in surrounding areas	Surplus water from mine pit will be disposed in the mined out pit. No water will be discharged outside under normal circumstances. In case any discharge is required, the mine water will be treated and then discharged into nearby natural streams.
17	CSR Activities to cover all issues like education, health, sanitation, hygiene, environment	ACC will abide by the CSR provisions contained in the MMD Rules 2015. The need based analysis of the area has been done and CSR activities for a budget of Rs.5 lakhs proposed. The amount will be spent in consultation with local administration, including panchayats of nearby villages.
18	VNR Seeds supply seeds to the surrounding area. This plant is located close to NK mines boundary. Dust and blasting will affect the quality of seeds and machinery in adverse way	Mining in this area was done by Bhilai Steel Plant from 1971 to 1991. ACC got the ML area in 2008 and is planning to start mining after implementing all pollution mitigation measures and getting Environmental Clearance. The baseline data of air, water, soil and noise is meeting the standard. EIA predicted that the standard will be met by this mine. Controlled blasting will be done and ground vibrations will be monitored. Greenbelt (15 m width) will be developed all along the mine boundary.

CHAPTER 7: PROJECT BENEFITS

The cement demand in the country is going at the rate 9-10% (Compound Average Growth rate CAGR) particularly in the eastern states , due to various infrastructural projects planned by State/Central Governments and also due to rapid growth of industries, the demand is likely to be higher than average for the country. Keeping this in view ACC has proposed to enhance the clinker production capacity of Jamul Cement Works and meet the eastern market demand of cement. Therefore to fulfill the Limestone requirement of the plant capacity enhancement of the captive limestone mines has been proposed. Considering the proximity of the project site in the state of Chhattisgarh, which is very well linked by rail as well as road network, It will be easier for fulfilling the demands of other eastern states of country. Clinker produced from Jamul cement works will be sent to the grinding units of ACC located in various [parts of the country.

Execution of project will also generate direct as well as indirect employment. The project will create the direct employment of about 32 people in the mines. This include additional man power requirement of 7 workers for the proposed capacity expansion. It will also generate indirect employment for approx. About 100 tipper operators which will transport ROM limestone from Mine site to Crusher which will be installed in Jamul Limestone Mine. ACC will give preference to the local people, depending upon the skill, job requirement and capability.

Limestone mining will generate substantial revenue for the state of Chhattisgarh, through payment of royalty. The project will also boost the infrastructure development of the area.

The main benefit envisaged from the project is that the natural resource and skilled manpower available in Chhattisgarh State will be utilized to produce Cement in the State itself. This will give a boost to the socio-economic status of Chhattisgarh by way of direct and indirect taxes, employment and infrastructure development.

ACC will encourage formation of Self Help Group by the surrounding villagers. The social development scheme includes construction of community centers and schools, maintaining roads, rain shelters, providing drinking water facility to the nearby villages, making toilets in schools and for community, providing free medical camps, providing scholarships to bright students and sportsperson, etc. Income generating schemes that will be implemented for upliftment of poor sections of the society includes vocational training in the field of bee keeping, mushroom cultivation, growing fruits and vegetables, development of fodder farms, etc.

CHAPTER 8: ENVIRONMENTAL MANAGEMENT PLAN

This chapter describes the administrative aspects for ensuring that mitigate measures are implemented and their effectiveness monitored, after approval of the EIA. Environmental Management Plan provides a logical framework within which identified environmental impacts are managed. In order to effectively manage the social and pollution management, following plans are described.

1. Creation of Environmental Management Department
2. Institutionalized Management Structure
3. Environment Management Plan Air
4. Environment Management Plan Noise
5. Environment Managemet Plan Water & Waste water
6. Landuse Management
7. Internal OB Dump Management
8. Green belt Development and Management
9. Occupational Health Management
10. Rain Water Harvesting

8.1 Environment Management Department (EMD)

The organizational structure of Environment Management Department (EMD) responsible for routine environmental management and monitoring measures, implementing the EMP and complying with the conditions stipulated by ECB and MOEF is shown in **Figure 8.1**.The Head of EMD shall directly report to the Director Plant in close coordination with Manager Mines. In case the Head-EMD notes any non-compliance or violation of environmental law/ regulations, the same shall be brought to the notice of the Director Plant / GM. The EMD shall study each activity and implement the mitigation measures for compliance and improvement of environmental performance. EMD shall co-ordinate with the safety and occupational health departments and tabulate data. **Functions of EMD:** The EMD shall thoroughly study each activities and suggest additional mitigation measures (if required) for improvement of environmental performance and discuss them in monthly meetings with the departmental HOD for implementation. The Manager Mines shall co-ordinate all related activities such as safety of mines, workers health, and health of surrounding community and prepare statistical records.

- Periodic monitoring of fugitive emissions and report any abnormalities for immediate corrective measures.Periodic monitoring of ambient air quality within the mines, and around the mines.
- Periodic monitoring of wastewater quality, water quality of the water reservoir, ground water quality and surface water quality.
- Periodic noise monitoring of the work zone and surrounding area.
- Green belt development, maintenance & development of other forms of greenery like lawns, gardens, etc. in the mines boundary, OB dump area, etc.Regular monitoring of the used oil and disposal to the authorized recycler approved by the Central Pollution Control Board /CECB. In addition to above the environment management department shall conduct environmental audit every year.

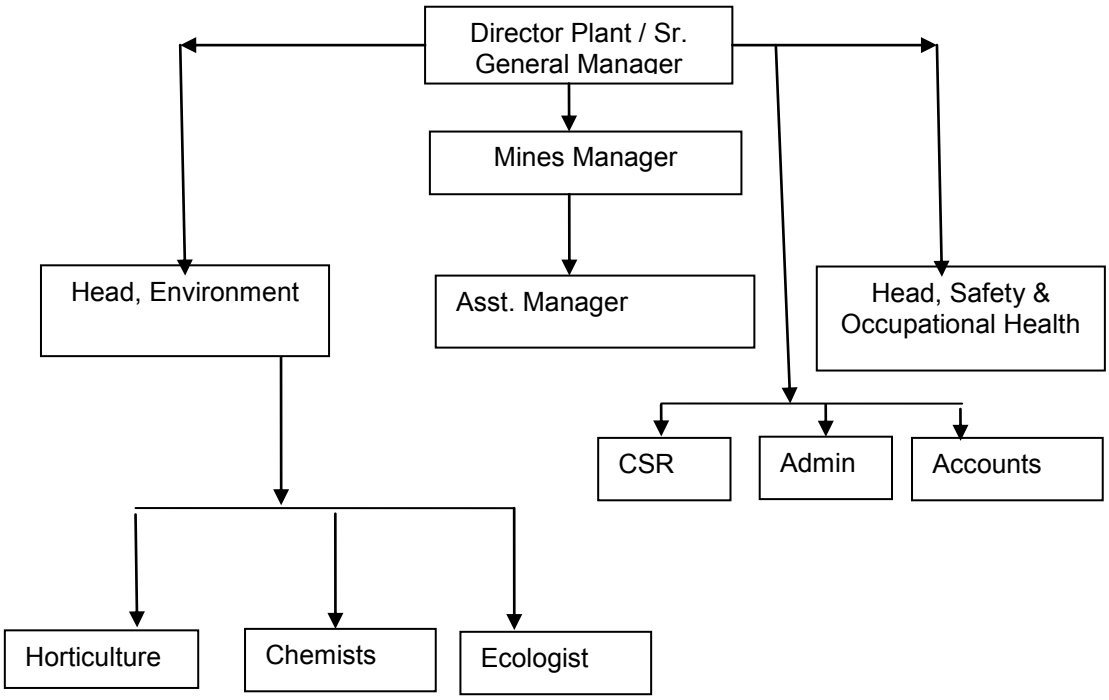


Figure 8.1 Institutional Structure of EMD

8.2 Institutionalized Management Structure

ACC shall ensure following action items to be complied throughout the life of the Project:

- Formulation of Environmental Health & Safety Policy and Periodic Updation
- Documenting the organization structure, roles and responsibilities for implementation and for functioning of Environmental Management System (EMS).
- Preparing Standard Operating Procedures, including data reporting formats
- Renewal of ISO 9001, 14001 and 18001 Certification
- Regular inspections, monitoring and auditing;
- Periodical review and issuing amendments;
- Reporting and communication (including internal and external reporting);
- Documentation and record keeping;

An effective system of management is a key technique for ensuring that all pollution prevention and control techniques, monitoring plan and risk mitigation measures are delivered reliably and on an integrated basis. ACC shall operate a formal Environmental Management System, certified EMS/ ISO 14001/ OHSAS18001 system for the proposed project. The salient features of Environmental Management System of ACC are listed below:

1. Effective operational and maintenance systems shall be employed on all aspects of the process whose failure could impact on the environment:
2. Documented procedures to control operations that may have an adverse impact on the environment
3. Define procedure for identifying, reviewing and prioritising items of plant for which a

preventative maintenance regime is appropriate

4. Documented procedure for monitoring
5. The maintenance system includes auditing of performance against requirements arising from the above and reporting the result of audits to top management.
6. The skills and competencies necessary for key posts shall be documented and records of training needs and training received for these post maintained.
7. The potential environmental risks posed by the work of contractors shall be assessed and instructions provided to contractors about protecting the environment while working on site.
8. Written procedures for handling, investigating, communicating and reporting actual or potential non-compliance with operating procedures.
9. Written procedures for handling, investigating, communicating and reporting environmental complaints and implementation of appropriate actions.
10. Written procedures for investigating incidents, (and near misses) including identifying suitable corrective action and following up
11. ACC shall conduct audits, annually, to check that all activities are carried out in conformity with the above requirements.
12. The company shall have demonstrable procedures (eg. written instructions) which incorporate environmental considerations into the following areas:
    - The control of process and engineering change on the installation;
    - Design, construction and review of new facilities and other capital projects
13. The company shall have a clear and logical system for keeping records of policies, roles and responsibilities, targets, procedures, results of audits, results of reviews.
14. ACC shall document the Standard Operating Procedures to bring in any deviation / violation of the environment norms as prescribed.

Environmental Policy
(as approved by the Directors Plant Jamul Cement Works)

ENVIRONMENTAL POLICY

In order to achieve overall improvement of Environment, we are committed to-

1. *Comply with all relevant legislative, regulatory and other requirements.*
2. *Conserve water, energy and natural resources*
3. *Minimize waste generation and re- cycle/ re- use the same*
4. *Ensure continual improvement in environmental performance.*
5. *Create environmental awareness among employees and communities at large.*

CORPORATE ENVIRONMENT POLICY

As an integral part of our business philosophy, ACC Limited is committed to contribute towards ensuring a clean and sustainable environment by continually improving our environmental performance

To achieve this goal, we wholeheartedly and proactively commit ourselves to:

- *Conduct all our operations in an environmentally responsible manner that is better than statutory environment compliances and applicable standards.*
- *Continuously assess our environmental impacts and measure and improve our environmental performance by adopting best practices for prevention and control of pollution.*
- *Make continuous efforts to increase the use of non carbonaceous raw material, renewable energy and fuels and co-processing of wastes to reduce our greenhouse gases (GHG) footprint as part of our Climate Change mitigation initiative.*
- *Make continuous efforts to reduce water intensity and fresh water usage by increased use of harvested and recycled water in our operations.*
- *Assess biodiversity quality in all our extraction sites and strive to create a positive impact.*
- *Invest in research and development of environmentally sustainable products which have low ecological foot print over their life cycle.*
- *Implement and continually improve the Environmental Management System across all our operations*
- *Adhere and report our environmental performance to all our stakeholders.*

This policy is communicated to all persons working for or on behalf of the organization and the same will be made available to public on request.

Training Requirement of Staff: Training systems, covering the following items, shall be in place for all staff of EC and other staff of various departments, which cover the following:

- Awareness of the regulatory implications of the Environmental Permits for the activity and their work activities;
- Awareness of all potential environmental effects from operation under normal and abnormal circumstances.
- Awareness of the need to report deviation from the Permit.
- Prevention of accidental emissions and action to be taken when accidental emissions occur.

The staff of the EMD shall be trained every year by arranging in house training programs by inviting experts or faculty members from internal / external source.

Periodic Review: ACC will annually review the EMP and identified management action plans to address any changes in the organisation, process or regulatory requirements.

Documentation and Record Keeping: The EMD will maintain following documents for effective implementation of the EMP:

- Master management system document;
- Legal Register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;

- Training records;
- Monitoring reports;
- Auditing reports; and
- Complaints register and issues attended/closed.

8.2 EMP for Air Pollution Control

Drilling, Blasting, Excavation, Loading and Transportation are the potential source of air pollution. Suggested mitigation measures are provided in following sections:

A. Prevention and Control of Fugitive emissions

I. During drilling operations

a) The drilling machines equipped with dust collector arrangement and wet drilling arrangement will be used to prevent the generation and spread of dust.

b) The personnel working on the drills will be being provided with dusk mask and other required Peronal Protective Equipments (PPE)

II. During blasting operation

a) Blasting will be well designed and to be blasted periodically rather than a couple of hastily unplanned blasts daily. All the explosives with detonators (NONEL) will be used within the blast hole and detonating fuse is not used for trunk line.

b) Blasting will be done during favourable atmospheric condition and less human activity time.

c) Use of delay detonators will also help in controlling ground vibration and noise.

d) Blasting will be done at midday/daytime.

e) Secondary blasting will be eliminated and hydraulic rock breaker will be used.

f) High-density primers in conjunction with ANFO with millisecond delay detonators will be used to minimize air blast and vibrations.

g) Avoiding blasting during high windy periods, night times and temperature inversion periods.

III. During loading operation

a) Optimum bucket size loading equipment will be used which reduces the number of buckets passes to fill the dumper by dropping material from height and thus have comparatively less dust generation.. The water sprinkling will be done over blasted muck pile for reducing dust generation during loading.

b) Skilled operators will operate the excavators.

c) Haul roads inside mines will be stabilised and water sprinkling using road tankers will be done periodically.

IV. During transportation of limestone

a) Asphalted road from NK Mine to JCW for transportation exists.

b) Trees will be planted on roadside from NK mines to JCW, wherever feasible.

a) Regular maintenance of the vehicles and machinery shall be carried out.

b) Dust generated due to traffic movement on haul road within the mine lease area will be reduced by water spraying at regular intervals.

V. Plantation work

a) In order to minimize dust pollution, 30 m wide and five tier greenbelt will be

developed from mines boundary to Nandini Khundini village.

b) Waste dumping sites will be vegetating by suitable plant species to prevent air pollution during stormy winds.

B. Prevention and Control of Gaseous Pollution

Vehicular exhaust and DG sets will generate gaseous pollutants like SO_2 and NO_2. Proper maintenance will improve the combustion and reduce gaseous emission.

8.3 EMP for Noise Pollution & Vibration Control

A. Noise Pollution Abatement and Control

Major noise sources in mine are operation of mine machineries and equipment, blasting and Traffic. Noise generation may be for an instant, intermittent or continuous periods, with low to high decibels.

To keep noise generation in control, latest sophisticated technology and equipment have been considered. Drills, loaders, dumpers etc. with larger capacities should be acquired to reduce the number of operational units at a time, thereby reducing the noise generating sources. The equipment systems will include cabins to ensure that the operators and other work persons, in and around the operating equipment, have comfortable work stations. To keep the ambient noise levels within the permissible limits the following measures should be adopted:

a) HEMM will be procured from reputed manufacturer and care will be taken to minimize generation of noise.
b) Controlled blasting will reduce noise generation.
c) Earmuffs will be provided to operators and other employees working in high noise zone.
d) Green belt will be developed to check the propagation of noise.
e) The practice of wet drilling will be carried out with the help of sharp drill bits. This will help in reducing noise generation during drilling.
f) Proper stemming of blast holes will be done.
g) Blasting will avoided in the morning and evening hours.
h) High density primers and millisecond delay detonators shall be used to restrict air blast, vibration and noise.
i) The noise pressure level and vibrations generated by blasting will be of very short duration, generally less than 0.5 second.
j) Speed of trucks entering or leaving the mine will be limited to moderate speed of 15 km/h to prevent undue noise from empty trucks

B. Ground Vibration Abatement and Control (Due to Blasting)

Sources of vibration due to mining activity in the area are anticipated due to operation of Heavy Earth Moving Machines like dozers, dumpers, drill machines and blasting. However, following precautions are taken for abatement of vibration due to present mining project. The factors affecting ground vibration include, geological structures, explosive charge per delay, blast design parameters, method of initiation, explosive type used etc.

a) Vibration due to Machines

Taking following measures minimizes vibrations due to machines:

- Proper maintenance, oiling and greasing of machines at regular intervals reduced generation of vibration due to machines.
- Machines will be operated by trained operators.

b) Ground Vibration due to Blasting

Depending on the type of structures and the dominant excitation frequency, the peak particle velocity (ppv) on the ground adjacent to the structures is not exceeding the values given below in the table as per the DGMS (Director General of Mines Safety) guidelines. Permissible standards of ground vibration due to blasting as per guidelines of Director General of Mines Safety (DGMS), are as follows:

Types of structure	Dominant Excitation Frequency, Hz		
A. Buildings/structures not belongs to the owner	< 8 Hz	8-25 Hz	>25 Hz
Domestic houses/ structures (kachaa Brick & cement)	5	10	15
Industrial Buildings (RRC & framed structures)	10	20	25
Objectives of historical importance & sensitive structures	2	5	10
B. Buildings belongings to owner with limited span of life			
Domestic houses/ structures (kachaa Brick & cement)	10	15	25
Industrial Buildings (RRC & framed structures)	15	25	50

*Source-DGMS Tech Circular No. 7 of 1997

To keep ground vibration due to blasting well within the prescribed limits, following measures shall be used.

- Peak particle velocity or ground vibrations for safety of nearby structures and residential buildings should be well within 12.5 mm/s·
- Short delay detonators should preferably be used in blasting rounds rather than detonating fuse as trunk line;
- Detonating fuse, if used, should be covered at least with 150 mm thick cover of sand or drill cuttings.
- Blasting should be carried out in the daytime, as during the night time the sound intensity becomes higher.
- Blasting should not be carried out when strong winds are blowing towards the inhabited areas.
- Each blast should be carefully planned, checked, and executed under the supervision of a responsible officer.
- Blasting data / observations should be recorded

8.5 EMP for Water Pollution

Water requirement for the mines is about 20 m^3/day, which will be source from the water accumulated in existing pits with in ML area.

Wastewater from Mines

The wastewater generation is likely to be generated from the workshop, floor washing and domestic uses which will be very less as the mine will operate in two shift morning and general. The wastewater will be led to pass through a bar screen followed by oil trap where oil content of wastewater will be recovered. From oil trap wastewater will pass through sedimentation tank followed by setteling tank. . The treated water will be used for green belt development.

The domestic and Toilet wastes shall be treated in septic tanks as no employ will be residing near mine. They will do up and down from Jamul cement works colony only 25 km away from ML area.

Water Management

Following measures will be adopted to mitigate the impact on the water resources:

- No surface or groundwater will be used during the mining operations. Only water that has been accumulated in abandoned/ mined out pit will be used.
- Overburden dump will be made and maintained to avoid any erosion.
- Garland drains will be constructed around the dump to carry wash off from the bunds. Gully checks will be made along the dump slope.
- Sedimentation pond will be constructed to which all drains carrying runoff water will be connected.
- This water will be harvested for utilization in plantation watering, spraying on the haulage roads and mineral and waste dumps.
- The overburden slopes will be stabilized with vegetation.
- Wastewater generated from workshop will be collected in a tank. Oil will be skimmed off, mixed with used oil and lubricants and given to authorized recyclers. Since the wastewater generation is intermittent (about 5-10 l/day), the tank will be left for evaporation. Wastewater from toilets and washrooms will be taken to septic tank and soak pit for disposal.

To prevent degradation and maintain the water quality during rainy season, adequate control measures should be adopted to check the mine run-off into the natural streams.

A catchment area treatment plan has been developed keeping in mind the results of the hydrology/ hydrogeology study as well as the climate data. As there are no perennial water sources running on or through the site, the mine water discharge is limited to the monsoon season only. To keep water from entering the mine during this period, a series of independent and un-linked garland drains will be developed along the mine's top bench, which will bend to guide the water to the nearest natural surface drain.

Rain water from overburden area and other mine surface shall be collected in the mined out pit inside the mining lease area. Water analysis of the rain water accumulated in mine pits shall be done periodically.

Used oil and spent lubricants from HEMM and other machinery shall be collected in drums and stored at earmarked place. When significant quantity of spent oil and lubricants are accumulated, then it will sold to CPCB/ CECB authorized recycler

8.6 EMP for Top Soil Conservation

Soil Conservation: There is no fertile top soil except lateritic soil which will be removed and stacked properly within the lease boundary. The stacking shall be used later as and where for plantation scheme. The soil shall be analyzed for pH, moisture, organic carbon, nitrogen, phosphorus, calcium, magnesium etc. According to the quality of soil, organic manure shall be added to increase the fertility of soil.

Land Reclamation: Reclamation of land will be carried out by landscaping, soil amelioration and re-vegetation. Whatever top soil is available will be used for tree plantation and also to spread over the backfilled area to enable afforestation / biological reclamation. The area does not fall in forest land therefore the programme of phased compensatory afforestation is not required. The reclaimed land will be put to productive uses such as agro-forestry and water body after reclamation.

Action Plan for preservation of buffer zone: Nandini Khundini mine is a contiguous mineral bearing core zone. The buffer zone comprises agriculture fields and barren land. Greenbelt will be developed along the mine boundary for preservation of buffer zone . CSR activities will be initiated by ACC in consultation with village elders / panchayats / block development officer NGO and regulatory authorities to compensate the villagers of any damage that have been caused due to mining and improving their quality of life.

8.7 EMP for Slope Stabilization and Mine Reclamation

The list of plants species has been considered from the angle of species combination, in conformity with local horticultural/ forestry conditions. While for tree saplings, pits of suitable dimensions (60 x 60-x 60 cm or 90 x 90 x 90 cm) will be made and filled with mixture containing fly ash, soil additives and organic manure. Watering regimes will depend upon the climatic conditions, though in initial stages regular watering – daily for grass and 2-3 times a week for trees will be considered.

Stabilization of mining benches and over burden: The area envisaged for mining of limestone in the next five years does not contain any form of overburden. The overburden will be removed and stacked along the periphery of the mining lease within 10 m distance from mine boundary. Stabilization of dumps benches will be done through afforestation. Afforestation of dump will be undertaken from first year itself.

Restoration of reclaimed mined out areas: The project proposal includes number of measures to restore the disturbed area and also improvement of the habitat. Under the afforestration plan it is proposed to develop a greenbelt around the mining Lease boundary.

The objectives of the restoration plan are:

- To reclaim the mined out areas by planting trees which are indigenous in nature
- To provide a green belt around the periphery of the mining area to combat the dispersal of dust in the adjoining areas.
- To protect the erosion of the soil.
- To conserve moisture for increasing ground water recharging.
- To restore the ecology of the area.
- To restore aesthetic beauty of the locality
- To meet the requirement of fodder, fuel and timber of the local community

8.8 Greenbelt Development Plan

A. Greenbelt between mines and human habitation / agriculture fields: 30 m wide thick green belt between mines boundary and Nandini Khundini village will be developed (NE side). 7.5 m wide greenbelt or more as per space available, shall be developed in rest of the mine boundary. The main aim of the plantation of the mined out area is to stabilize the area to protect it from erosion. The plantation will help to minimize the impact of residual fugitive dust emissions and also in mine noise attenuation. It will also improve the habitat for the local birds. Local community will also benefit from collection of its produce.

B. Along Road Side: Limestone from the Nanadini Khundini Mine to Jamul Cement Works Mine will be transported by Tippers through Jamul-Dhamda Road. Total distance from NK mine to JCW is approximately 24 km. Plantation shall be done along the Jamul- Dhamda road to control fugitive emission as well as noise (as per space available and in consultation with the road authorities).

C. **Development of Parks, Gardens:** Parks and gardens shall be developed around the mine pit by planting shrubs, herbs, grasses, hedges and small size trees.

Phase wise Greenbelt Development Plan (First 5-year plan)

	Area Description	**Proposed year wise Plantation**				
		2017-18	**2018-19**	**2019-20**	**2020-21**	**2021-22**
1	Mine boundary	3000	2000	1500	1500	2000
2	Nearby villages under CSR Activity	1000	700	1000	1000	500
	Total	**4000**	**2700**	**2500**	**2500**	**2500**

Protection and development of Greenbelt: Plants shall be protected by fencing till they attain a height which is above the grazing level. Pits for plantation shall be 1 feet X 1 feet and spacing shall be around 2.5 X 2.5 m. The pits shall be then filled with top soil and manure in

predetermined proportions. Farm yard manure, poultry manure, domestic refuse and straw can be used as organic manure. Saplings planted in the pits shall be watered liberally. The growing plants shall be cared for the first three years under favorable conditions of climate and drainage. Care shall be taken for nutrient supplement (healthy growth), plant protection, and absence of water stress (to maintain openness of stomatal apertures and epidermal structures) and exposure to normal atmospheric condition (free air flow).The list of plant species has been considered from the angle of species combination, in conformity with local horticulture/ forestry conditions. Watering regimes will depend upon the climatic conditions, though in initial stages regular watering- daily for grass and herbs/shrubs and 2-3 times a week for trees. Continuous monitoring of plant growth, immediate replacement of causalities, supplementation of nutrients, rescheduling of water regimes shall be given top priority by the EMD.

Plantation on areas like dump surface and soil stack shall be initially started by direct seeding synchronous with the onset of rains. This involves preparation of local site with regard to water harvesting, soil and water conservation measures, strip cultivation and weeding. It also gives the initial advantage of time saving by eliminating nursery, transport and planting. It also has the advantage of improving the form of the tree and its rooting pattern. Otherwise, the plantation would have been generally done using saplings grown in the nurseries.

Design and selection of plants for greenbelt: Plantation species considered as per following criteria;

- Adapted to the Geo-Climatic conditions of the area (Eastern Plateau);
- Mix of round and spreading canopies;
- Different heights ranging from 4m to 10m; and
- Preferably evergreen trees.

The 30 m wide greenbelt shall be designed in three tier system. In the first two inner rows facing the mine, flowering plants and herbs shall be planted in 10 m width each respectively. Shrubs shall be planted in next 10 m width. Trees shall be planted in the outer 15 m width. Adequate space shall be kept between the trees and spacing depends upon the shape of crown, conical crown requires less inter-spacing than oblong and round crowns.

As per CPCB Guidelines for Development of Greenbelt (1999-2000) and the typical agro-climatic zone, following plant species are selected for greenbelt development along the periphery of ML boundary. The listed trees are also suitable for planning in nearby villages (as park / garden) and also along the avenue roads:

Table 8.1 List of Species for Greenbelt Development and Restoration of Degraded Mine Land			
S.No	**Species**	**Grass/ Herb / Shrub /Tree**	**Benefits to the Local People**
1	*Acacia arabica*	Tree	· Tolerant, Fast growing in this part of CG · To reduce cholesterol levels and to help increase weight loss.
2	*Acacia nilotica*	Tree	· Tolerant, Fast growing in this part of CG · Used in preparing emulsions, tablets, pills etc.
3	*Aegle marmelos*	Tree	· Antidiuratic, antithetmintic, antipyretic, carminative tonic · Fruit used in chronic diarrhoea & dysentery
4	*Albizza lebbek*	Tree	· Tolerant, Fast growing in this part of CG · Anti-poisoning herb of Ayurveda. Its use is even indicated in snake bite poisoning
5	*Andropogonintermedius*	Grass	· Used as stored food for local livestock, and as a grazing plant by both livestock and ruminants
6	*Andropogonpumilus*	Grass	· Used in joint pain
7	*Anona squamosal*	Shrub/ Tree	· Tolerant, Fast growing in degraded habitat · Known as Custard fruit, · Seed oil used to kill lice
8	*Azadirachta indica*	Tree	· Tolerant, Fast growing in this part of CG · Oil extracted from seed as local stimulant, insecticide and antiseptic · Sedative, analgesic, epilepsy, hypertensive
9	*Bambusa arundinacea*	Grass	· Young shoots are consumed as food · used for construction and other such purposes
10	*Boerhavia diffusa*	Herbs/Shrub	· Taken in herbal medicine for pain relief and other uses.
11	*Bombax ceiba*	Tree	· Hot aquous extract of seed as moderate oxytoic
12	*Butea monosperma*	Tree	· Tolerant, Fast growing in this part of CG · Lac from Palas tree is used · Gum is astringent and used in treatment of diarrhoea and dysentery · Flower decoction given in painful urinatum
13	*Cassia fistula*	Tree	· Tolerant, Fast growing in this part of CG · Used for Laxative and treating fever
14	*Chenopodium album*	Herbs/Shrub	· Eaten as vegetables · Antipruritic properties
15	*Chlorophytum tuberosum*	Herbs/Shrub	· Roots are dried and used as a popular tonic and aphrodisiac in Ayurvedic medicine
16	*Curculigo orchioides*	Herbs/Shrub	· Used for rejuvenating and aphrodisiac
17	*Cymbopogon martini*	Grass	· Antiviral, Antiseptic, relieve inflammation and certain other symptoms of dehydration · Good for the skin and make it soft, moist, and looking young.
18	*Cynodon dactylon*		· Plant used as antifungal, diuretic, hypoglycemic, · · Rhizome is useful in gastro urinary disorders · Pollen extract is beneficial in asthma
19	*Dalbergia sissoo*	Tree	· Tolerant, Fast growing in this part of CG · Used for construction of furniture · For the treatment of obesity, vitiligo, fever, non healing wounds, ulcers, intestinal parasites
20	*Delonix regia*	Tree	· Fast growing, spreading, aesthetic
21	*Dendrocalamus strictus*	Grass	· Tolerant, Fast growing in this part of CG · Wood Used for light construction, furniture, musical instruments · Leaves are used as forage, and decoction of leaves and nodes and silicious matter is used in

			traditional medicine.
22	*Dichanthium annulatum*	Grass	· Forage for livestock
23	*Disopyros melanoxyum*	Tree	· Tolerant, Fast growing in this part of CG · Fruits are sold · Leaves used in making beedi · Green fruits used to treat uterine haemorrhage, dysentery, sorectroat
24	*Emblica offcinalis*	Tree	· Tolerant, Fast growing in this part of CG · Fruit powder coolent and laxative · Rich source of vitamin C
25	*Eragrostis tenella*	Grass	· Drought tolerant ornamental grass in gardens.
26	*Ficus benghalensis*	Tree	· Tolerant, Fast growing in this part of CG
27	*Ficus religiosa*	Tree	· Tolerant, Fast growing in this part of CG · Used for treating asthma, diabetes, diarrhea, epilepsy, gastric problems, inflammatory disorders, infectious and sexual disorders
28	*Indigofera pulchella*	Herbs/Shrub	· A decoction of the roots is used in the treatment of coughs. The root is dried, ground into a powder and applied externally in the treatment of pains in the chest.
29	*Mangifera indica*		· Eaten as fruit · Controls stomach pain, diarrhea, urine sugar
30	*Nyctanthes arbortristis*	Herbs/Shrub	· Used for sciatica, arthritis, fevers, and as a laxative
31	*Ocimum sanctum*	Herbs/Shrub	· Leaf juice used in curing cold, bronchitis · Flower decoction in dyspepsia
32	*Pogostemon benghalensis*	Herbs/Shrub	· Used traditionally as anticancer
33	*Pongamia pinnata*	Tree	· Tolerant, Fast growing, spreading evergreen · Seeds are externally used for skin diseases, leucoderma, rheumatism, · Powdered seeds are expectorant in bronchitis and whooping cough
34	*Sida cardifolia*	Herbs/Shrub	· Used to treat bronchial asthma, tuberculosis, colds, flu, swine flu, chills, lack of perspiration, headaches, nasal congestion, cough and wheezing, urinary infections, sore mouth, and fluid retention
35	*Solanum surattense*	Herbs / Shrub	· Useful in treating worms, cold, hoarseness of voice, fever, dysuria, enlargement of the liver, muscular pain, spleen and stone in the urinary bladder
36	*Syzygium cumini*	Tree	· Tolerant, Fast growing in this part of CG · Eaten as fruit · Stem bark is used to treat sore throat, bronchitis, ulcer, dysentery · Seed powder for diabetes
37	*Tamarindus indica*		· Tolerant, Fast growing in this part of CG · Leaves are used to reduce inflammatory swellings & ringworm · Fruit is tonic to heart and anti-helmintic
38	*Terminalia arjuna*	Tree	· Tolerant, Fast growing in this part of CG · Bark and fruit is used
39	*Vetiveria zizanioides*	Grass	· Hyperdisia, Burning, ulcer, Skin, Vomiting.
40	*Vitex negundo*	Herbs/Shrub	· Leaves are used in rheumatism · Dried leaves smoked for relief from headache
41	*Woodfordia fruticosa*	Herbs/Shrub	· Dried flowers are astringent and used in dysentery, affection of mucus membrane · Leaf juice used in conjunctivitis

8.9 Occupational Health and Safety Plan

Occupational Health & Safety (OHS) is a vital part of ACC's journey towards Sustainable Development. Safety Audits are being carried out in ACC since 1995 by BIS and since 2006 by HOLCIM pyramid system parallel to National Safety Council based on the 5 Star Auditing System of British Safety Council. There is a continuous effort to measure and improve Safety Management Systems to avoid accidents.Each ACC Plant has an Apex OH&S Committee headed by the Director Plant supported by Central and regional safety expert team. This committee oversees implementation of OH&S Policy in each unit. Every manufacturing unit has Professional Doctors and medical facilities for continuous monitoring and observation of workplace hygiene and occupational health.

The following are some OH&S initiatives at ACC:

OH&S brochures, signages, posters and mailers used extensively

Monthly Safety Gate Meetings held at all plants.

Safety Audit and Housekeeping Audits carried out annually

Safety Professionals meets twice a year to discuss and share knowledge on Safety Statistics and implementation of safety measures at each unit.

Safety Observation Tours (SOT) conducted weekly by all line managers
Safety committee meeting is conducted monthly chaired by Director Plant.

Incident investigations for all incidents, including near misses (with potential for injuries) are done by ACC and findings and recommendations are shared across the company

8.9.1 Occupational Health and Safety Policy

OH&S POLICY of ACC Limited (Jamul)

Jamul Cement Works, a unit of The ACC Limited, is manufacturing Portland Slag Cement with production capacity of 0.76 MTPA clinker & 1.58 MTPA cement and proposed capacity of 3.0 MTPA clinker and 1.5 MTPA cement. Its management recognizes that good Occupational Health & Safety (OH&S) performance is an integral part of efficient and profitable business management and it is & shall be our endeavour to conduct all activities in responsible manner, so as to avoid causing any undue risk to health & safety of employees, customers & others concerned with our operations.

OCCUPATIONAL HEALTH AND SAFETY POLICY

Jamul Cement Works, a production unit under ACC Limited, is committed to manage all its activities in a responsible manner so as to avoid causing any harm to all Employees, Contract Personnel & Visitors in terms of Occupational Health and Safety. To achieve this we are committed to:

1. Comply with all applicable legal and other requirements.
2. Drive continual improvement through HIRA for effectiveness of OH&S Management system.
3. Ensure understanding of OH&S to all employees.
4. Training and education of all employees and associates on OH&S.
5. Record and analyse all unsafe behaviour, conditions and incidents for Corrective and preventive action.

This policy is communicated to all persons working for or on behalf of the organization and same will be made available to public.

ACC is committed to implement comprehensive health programmes for its workforce. ACC have various facilities and policies in place for safeguarding our stakeholders for events related to serious diseases. ACC organized various awareness, counseling and risk control programmes and have partnered with stakeholders in the following ways:

- ACC Jamul Cment Works have an occupational health center which provides comprehensive preventive and promotive health care to employees and their dependents
- Financial help in case of illness either through the insurance coverage or extended help by the Company.
- Special training to ACC doctors at CLI - Mumbai..
- Various health management programs, educational programs such as National Family and Welfare (antenatal checkup, tubectomies and vasectomies), DOTS for Tuberculosis, HIV/AIDS awareness, Eye camps (IOL Implants), Universal program on immunization for children, multi-specialty camps for detection of major chronic diseases like cardiac, diabetes etc. , health awareness and first aid lectures.
- Other facilities includes free treatment (domiciliary and hospitalization) of employees and their family members at Plant hospital, medical reimbursements and periodical medical checkups, etc.

8.9.2 Details of occupational hazards: permissible exposure levels:

The Occupational Health related hazards identifiable in **Mining Activity** and their Permissible Exposure Levels (PEL) are as follows

	Description of Health Hazards	Permissible Exposure Levels TWA Conc, 8-h
1	Exposure to excessive dust resulting in respiratory diseases (Pneumoconiosis Silicosis*) Silica (Crystalline & quartz)	10 mg/m^3 (respirable dust) 30 mg/m^3 (in terms of total dust)
2	Noise induced hearing loss*	Level and duration of exposure 90 dBA – 8 hrs 92 dBA – 6 hrs 95 dBA – 4 hrs 100 dBA – 2 hrs

* List of Notifiable diseases (Schedule III of Factories Act)

Hazards notified under Factories Act with PEL (Schedule II) are given above.

8.9.3 Details of exposure specific health status evaluation of workers

Occupational Health and Safety Department is centrally located in the Jamul Cement Works of ACC Limited, under the control of Chief Executive of the Plant. GM heads the OHSD and manages the day to day functions of OHSD. Including Occupational Health, Fire and Safety of Cement Plant, Jamul Mine, Pathariya-I, Pathariya-II mines. The existing OHSD will be strengthened by recruiting experienced staff to take care of the Nandini Khundini mines. All

workers (permanent and contract workers) shall be covered under the OH plan of ACC. Experienced male nurse, having diploma in nursing / industrial health, assist the doctor.

The following Occupational Health Problems shall be examined by the OHC.

1 Stress and fatigure due to excessive exposure to heat

2 Skin problems (allergic contact dermatitis, chrome ulcer, lead poisoning, hyperpigmentation, warts, moles, et

3 Eye problems (colourblindness, cataract, loss of sight)

4 Ergonomic disorders (masculo-skeletal disorders, cumulative trauma disorders)

5 Psychosocial hazards (behavioral changes, aggression, hostility, depression, alcoholism, drug addiction, absenteesm, hypertension, peptic ulcer, diabetes, diabetes, heart disorders, etc

6. Full-fledged Occupational Health Department and Hospital exist in ACC-Jamul. The Hospital is equipped with all instruments and equipment as well as know how required for entry level and periodic medical examination of workers and executives.
7. Health check-up is being done once at entry level and thereafter every 5 years.
8. Environmental monitoring of each and every work place shall be conducted by Safety department staff every month. The findings shall be statistically analysed and discussed in Management Review meeting for taking corrective actions.
9. Engineering interventions shall be adopted to control the dust, noise in work environment. Relaxation facilities to workers shall be provided near the work area.
10. Good housekeeping will be done by employing a large team of dedicated workers. Housekeeping work shall be outsourced. Workshop & office shall be cleaned daily.
11. Personal protective devices shall be given to workers who are exposed to excessive heat, noise and dust. Job rotation schedule shall be maintained.
12. Enforcement of usage of Personal Protective Devices, Regular Work Environment Monitoring, having fixed Working hours, Shifts, Job Rotation Procedure (Rotation of employees in specific areas to avoid continuous exposure) shall be adopted.
13. ACC shall periodically impart training to workers through well-designed training modules, creating awareness among the workers through posters and leaflets. Training modules shall be developed for following subjects: Ergonomics, Occupational Eye Diseases, Occupational Noise Problems, Stress & Preventive Management, Work rotation and shift work, Preventive Management Techniques at Individual level, Fire safety, Electrical Safety, Prevention of Dust Exposure.
9. All safety and health codes prescribed by the Bureau of Indian Standards and recommended by Holcim shall be implemented.
10. Chest X-ray, Audiometry, Spirometry, ECG and Heart Check-up, Thyroid profile, Kidney Profile, Blood Test, Routine Urine Examination, ENT Checks, shall be carried out. Regular health check-ups of the exposed workers shall be carried out, as per schedule using the pre-designed format. The records shall be statistically analysed and discussed in Management Review meeting.

8.9.5 Personnel Protective Equipment

Following PPE shall be given to workers to reduce the exposure

- Industrial Safety helmets
- Crash helmets
- Face shield with replacement acrylic vision
- Zero power goggles with cut type filters on both sides and blue color glasses
- Welders equipment for eye and face protection
- Ear muffs
- Self-contained breathing apparatus
- Leather apron
- Safety belt / line man's safety belt
- Leather hand gloves
- Canvas cum leather hand gloves with leather palm
- Industrial safety shoes with steel toe
- Electrical safety shoes without steel toe and gum boots
- Protective clothing etc.

8.10 Rain Water Harvesting

Rainwater Harvesting and Artificial Recharge Methods: Nanadini Khundini mine is already excavated by Bhilai Steel Plant. At present there are many water bodies has been created within the ML area. ACC will maintain these water bodies as a rainwater harvesting reservoir to store rain and mine seepage water. Mine water, after making it free from suspended particles is pumped into the water reservoir and rainwater will be collected through natural slope. It is designed to store entire pumped out mine water in reservoirs thereby achieving zero discharge norm and will be judiciously used. The reservoirs not only act as water conservation units but also boost the recharge to ground water through the standing water column. Silting of area can be avoided with this action and water will be effectively utilized for horticulture and dust suppression and other mining purposes. Continuous water level monitoring and quality assessment will be done by ACC to evaluate change in ground water scenario of the area.

8.11 Budget for Environmental Management

The capital cost for environmental management of the proposed mine is estimated to be Rs.30 Lakhs. About Rs.10 Lakhs would be required as annual recurring expenses.

Table 8.2 Item-wise Cost of Pollution Control and EMP (in Rs. Lakhs)

Sr No.	Particulars	Capital Investment	Recurring cost per annum
1	Purchase of road side water sprinkling system (complete set with pipes, nozzles and pump)	10	2
2	Purchase of water tankers with rain gun (4 sets)	10	2
3	Septic Tanks and Soak Pits	1	0.5
4	Greenbelt development along mines boundary	2	2.5
5	Procurement of erosion control system for soil stack and OB dump	5	2
6	Misc expenses for EMP, Health & Safety	2	1
	Total	**30.0**	**10.0**

CHAPTER 9: SUMMARY AND CONCLUSION

ACC Limited is pioneer in cement manufacturing industry of India which got established in 1936. ACC established the cement plant at Jamul in Durg district, Chhattisgarh in 1965. The plant was named as Jamul Cement Works (JCW). Jamul Cement Works of ACC Limited started cement production in the year 1965 with an installed capacity of 0.25 MTPA of cement. The existing Clinker production capacity is 0.76 MTPA and Portland Slag Cement is 1.58 MTPA. It is now proposes to increase the clinker production of Jamul Cement works from 0.76 MTPA to 3.0 MTPA.

ACC has four three mining leases in Durg district, namely Jamul Cement Works Limestone Mine (Lease area 269.95 Ha), Pathariya Limestone Mine Lease-I (36.001 Ha), Pathariya Limestone Mine Lease-II (37.85 Ha) and Nandini Khundini Limestone mine (53.57 Ha). Nandini Khundini mine is yet to start operation.

Additional limestone required for producing 3.0 MTPA clinker at Jamul Cement Works would be partially meet from Jamul Limestone Mine, Pathariya Limestone Mine Lease-I & II and Nandini Khundini Limestone mine). To meet the additional requirement of limestone for clinker production at Jamul Cement Plant, the capacity expansion of Nandini Khundini Limestone Mine is proposed from 0.15 MTPA to 1.03 MTPA. Environmental Clearance to produce 0.15 MTPA has already being granted for Nandini Khundini Limestone Mine from MOEF vide letter no J-11015/237/2009-IA.II (M) dated 10th March 2011. Nandini Khundini mine is yet to start operation.

Nandini Khundini Limestone mining lease was held by Bhilai Steel Plant from 1971 to 1991. The lease was denotified vide Gazette Notification dated 9th June, 1992. The mining lease (53.57 ha) was freshly granted to ACC Limited by the Chhattisgarh Government vide their office letter no. F 3- 18/2004/12 on 5th February 2008.

The project falls under 1(a) Category 'A' of the Schedule of EIA Notification 14-9-2006. Terms of Reference (TOR) for EIA Study has been approved by Ministry of Environment & Forests vide letter No. J.11015/338/2013-IA.II (M), 9th January 2014. Public Hearing was conducted on 19-3-2015. The Final EIA report has been prepared after considering the comments and views obtained during the Public Hearing. Proposed capacity expansion of the mine will be done within the existing mine lease area of 53.57 ha. No extra land shall be acquired. No R & R is required for this project.

Location: Terrain of the area is flat. JCW is located at about 15 km south direction of mine (aerial distance). Proposed mine is connected with JCW by Jamul - Dhamda State Highway. Durg railway station (situated on Nagpur-Howrah Broad Gauge of SE railway) is located about 21 km from Nandini Khundini mine. The mine is well connected to NH-6, which passes through Bhilai town at about 20 km away. Nearest airport is at Raipur which is about 70 km from mine site.

There are no ecologically sensitive area and archaeologically important places within 10 km radius of the mine site. There is no protected or reserve forest present within the 10 km radius of the mine site (130 ha area in Nandini Khundini has been submitted for Notification as Protected Forest). Sheonath river and Amner river area the main surface water bodies present in the study area. Sheonath river is located about 3.5 km west of the mine site. Amner river is located about 6.5 km in southwest direction. Tndula canal and its distributries are other source of surface water. Tandula canal is located about 3.6 km in east direction.

Project Cost: Total project cost is approx. Rs. 15 crores.

Employment: Project will create the direct employment for 32 people. It would also generate indirect employment for 100 drivers for transporting limestone from mine to crusher site, at Jamul Limestone Mines.

Water Requirement: 20 kl/day water will be required for the project. This water requirement would be meet from existing rainwater harvesting pits located within the lease area. Ground water will not be utilized for the mining operation. Packaged drinking water will be provided to the workers.

Power Requirement: 2 lakh unit per year power will be required for the project which will be sourced from State Electricity Board.

Mining Process: Mechanized opencast mining method comprising shovel - tipper combination will be adopted. Drills, hydraulic rock breaker, hydraulic excavator and dumper trucks will be deployed. Non electric delay detonators type blasting will be applied. The boreholes will be 115 mm dia and 7-9 m depth. Spacing between two holes will be 3.0-5.5 m. Blasting will be done once a week. The height of bench will be kept 7 m and width of the working bench will be 20 m. The ultimate depth of mine will be 30 m from ground level and the ultimate pit slope will be 45 to 60^{o}. Overburden shall be stacked along the lease boundary. The height of the dump shall be 3 m. The mineral reserve is 43.74 million tons. About 6.5 million tons of overburden will be generated during the entire life of mining, which will be backfilled in voids. Technically the mining methodology is based on 'Zero Waste' concept. No explosive storage magazine, workshop, material storage shed, administrative building and diesel filling station will be established in Nandini-Khundini Mine. Facilities available at Patheriya-I limestone mine will be used in Nandini Khundini mine.

Description of Environment

Baseline data was generated during the period 1st March 2014 to 31st May 2014. 10 km area around the mines boundary was considered as study area. Data was generated as per the standard procedures of the Ministry of Environment & Forests and the Central Pollution Control Board.

Meteorological data on wind speed, wind direction, relative humidity and temperature was generated at Nandini Nagar. Baseline ambient air quality was measured at 8 locations in the core and buffer zone. Noise levels were measured at 8 locations. Surface water quality of 4 locations, groundwater quality of 8 locations and soil quality of 8 locations was collected and analyzed. Data on plants and animals present in the core and buffer zone was collected from the published literatures and checked during field survey.

Data on landuse, demography, occupation pattern, cropping pattern, infrastructure facilities were collected from District Statistics Handbook and village profile records.

The study area falls under Seismic Zone II. The limestone of this area is of lower Vindhyan age occurring as undulating terrain.

The predominant wind direction is from southwest and west direction. The average wind speed ranges from 0.5 to 8.8 m/s. Daily mean temperature varied from 19.8^{0}C to 44.6^{0}C. The relative humidity varied from 20-54%. The annual rainfall is 1288 mm.

Air Quality: $PM_{2.5}$, PM_{10}, SO_2, NO_2, benzene, ozone, ammonia, carbon monoxide as well as Benzo(a)pyrene, Silica, As, Ni and Pb in PM_{10} were monitored at eight locations in the study area. The locations were selected as per CPCB guidelines. Monitoring was done at upwind direction and various downwind directions of the project, including road side villages. The baseline air quality levels of all parameters are found to be within the National Ambient Air Quality Standards prescribed for residential and industrial area.

Noise Quality: Ambient noise levels were monitored at 8 locations in the study area. The baseline noise levels are well within the National Standards for residential area (Standards are 55 dBA-day time and 45 dBA-night time).

Water Quality: 4 surface water samples and 8 groundwater samples were collected from the study area for chemical and biological analysis. Surface water samples were collected from upstream and downstream point of Sheonath River, Amner River and Dhamda Dam. The surface water quality of river and dam meets the designated use criteria. The surface water is fit for irrigation and industrial use. The surface water quality is fit for drinking only after conventional treatment. Groundwater samples were collected from hand pumps of villages around the project site. The groundwater quality meets the standards prescribed by Bureau of Indian Standards (BIS 10500).

Soil Quality: 8 soil samples were collected from the study area and analyzed. The texture of soil is sandy loam. The organic matter, nitrogen, potassium and phosphorus content of the soil are moderate. The pH and conductivity of all the soil samples are within the acceptable range.

Sensitive Ecosystem: Within 10 km distance of the project site, no plant or animal species were found to be on the endangered list. No ecologically sensitive area like biosphere reserve, tiger reserve, elephant reserve, migratory corridors of wild elephant, wetland, national park, wildlife sanctuary and Forest are present within 10 km distance of the project site.

Socioeconomic Data: The proposed mine site is located in village Nandini Khundini, Dhamda Tehsil of District Durg in Chhattisgarh State. The 10 km area of the mine site falls in Dhamda and Durg tehsil, district Durg. There are 59 villages and Two Nagar Palika falls within the 10 km area of the mine site. According to 2011 census the total population of the study area is 114455 comprising 57257 male and 57198 female. Male female ratio of the study area is 999 female / 1000 male, which is much higher than the State and National average. Out of the total population about 18.7% is SC population and only 6.1% is ST population.

Water Environment: Rainwater accumulated in existing pits inside mine area will be used for dust suppression and for green belt development.

Mitigation Measures: The surface runoff generated during rainfall event will be diverted to mined out pits inside the mine premises. This will act as rainwater harvesting structure. Garland drains with sedimentation pits at appropriate intervals will be made around the overburden dump. Runoff from dump slopes will be passed through befell plates filters to arrest the silt before letting it to the pits. Gully along the slopes will be provided with (Baffle plates) to arrest the silt. The slope will be compacted routinely and soil will be spread over it and stabilized by planting hers and shrubs. This will prevent soil and silt erosion. Domestic wastewater will be treated in septic tanks and disposed in soak pits. All water accumulated inside the mine premises will be checked to avoid breeding of mosquitoes. The spent oil and lubricants from workshop, vehicles, etc will be given to authorized SPCB/CPCB recyclers/re-processors. There will be no discharge of wastewater outside the mine premises.

Air Environment: Dust is the main pollutant generated during various mining operations, including blasting, transportation on haul roads, loading and vehicular movement.

Mitigation Measures: Stable roads will be made inside the mining premises for movement of vehicles. Water sprinkling system (truck mounted) will be applied for dust suppression on haul roads. Regular maintenance of vehicles and equipment will be carried out. Wet drilling and controlled blasting (using latest NONEL technology) will be adopted. 15 to 30 m greenbelt will be developed on east side of the mine premises (towards Nandini Khundini village). Small herbs and shrubs like Bougainvillea, Kaner, Lantana, Adhusa, Ber, Custard apple, Casurina, Vitex negundo, etc. will be planted in the first 15 m. Thereafter trees like Shisham, Siris Gulmohar, Amaltas, Munga, Peepal, Jamun, Neem, Kadamb, Aam will be planted in next 15 m.

Noise Environment: Material handlings, movement of vehicle, blasting, loading and unloading activities are the main noise generating sources in the mine site.

Mitigation Measures: Material handling operations and movement of vehicles will be properly scheduled to minimize noise. Maintenance program for heavy vehicles will be routinely followed. Non-electric delay detonator will be used to minimize the ground vibrations. Workers working inside crusher house will be given ear plugs / ear muffs. Mining will be done only during day time. In this manner the noise level at the mine boundary will be below the national standard of 55 dBA during day time and 45 dBA during night.

Land Environment: Overburden will be stacked at the periphery of mining lease boundary along the south side to form bunds of 3 m height (7.5 m inside the mine boundary). The slope will be maintained at less than 60^{o}, with adequate number and size of steps / trenches made. The slopes will be compacted and spread with 8-10 cm thick soil cover and grass, legumes and small shrubs will be planted along the slopes. Recyclable materials will be sorted out and sold to local recyclers. Inert material will be reused as landfill. Organic and other green waste will be taken to compost pit. Use of plastic inside mine area will be strictly prohibited. Mined out area will be suitably reclaimed after extracting the limestone. Reclamation will be done by backfilling the overburden. Voids will be converted to water body and can be used based on local regulatory authorities at the end of mining.

For reducing adverse environmental impacts from other sources, following mitigation measures are recommended in the EIA report:

- Wet drilling will be practiced. The drilling machine will have inbuilt water sprinkling arrangement and dust extraction system.
- Controlled blasting technique will be followed. The site will be wetted before blasting. Blasting will be done around noon.
- Non-electric shock tube initiating system and Noiseless Trunkline Delay detonators and IKON (Digital Electronic System) will be used to keep the air blast levels to the lowest possible limits and minimize noise and vibration.
- Ground vibrations to be continuously monitored during blasting using Minimate Seismograph, through study of the peak particle velocity at different distances.
- Hydraulic rock breaker will be used to eliminate the use of secondary blasting.
- Combination of primary rock breaker and backhoe will be used for efficient collection and loading.
- Compaction, gradation and proper drainage will be provided for haul roads.
- Haul roads in mines will be stabilized. Vehicular speed in mines area will be restricted to 20 kmph.
- Depression area within the worked out site will be converted to water body. The water body will act as water reservoir.
- Plantation shall be done on both side of Jamul Dhamda road from Patheriya to Jamul cement Works.

Air quality dispersion modeling study was conducted and it proved that the ambient air and noise quality of the area will remain well within the national ambient air quality and noise standards. No wastewater will be generated during mining. No toxic chemicals or wastes will be handled in the mines. Diesel and Explosives will be stored as per approval obtained from Chief Controller of Explosives.

Exposure to dust and respiratory disorders, noise induced hearing loss, mechanical injury to body parts are the identified occupational hazards. The workers will be checked during employment and then regularly shall be checked for any clinical complaints and abnormal symptoms by the medical team of Jamul Cement Works. Workers will be given personal protective equipment like nose mask, ear plugs/muffs, safety boots, gloves, goggles, etc as well as clean drinking water and toilet facility. Drivers and their attendants will be given rest room facility, complete with toilet, bathroom and recreation facility. Canteen facility will be provided for all workers and drivers. Regular training and awareness programs will be conducted for the workers so that they are aware of the work hazards, vector borne diseases, HIV, etc and will develop the behavior of using protective equipment.

The proposed mining activity will have certain negative impact on the environment. With implementation of recommended mitigation measures and safeguards, the adverse effects will get reduced to acceptable level. The groundwater level at Nandini Khundini village (near mining site) is 4.6 m during pre-monsoon. Since mining will be done upto 30 m, groundwater table will be intercepted. Blasting and mining will lead to opening up of fractures and fissures thereby improving groundwater flow. Development of secondary porosity by cracks and joints will also enhance the transmissivity and specific yield of aquifer. Seepage water will accumulate in the mining pits. The accumulated water will be used for dust suppression system and irrigation. During rainy season the surplus accumulated water will be discharged into nearby nalla.

The mining activity will have beneficial impacts in terms of direct and indirect employment opportunities. Jamul Cement Works will introduce a number of community development measures, which would improve the quality of life of the people living in the area.

Risk Mitigation Measures: Explosion / fire in explosive van are the risks and accident hazards. All safety measures recommended by the IBM shall be implemented. Mobile vehicles and arrangement for the first aid is available at Pathariya Limestone Mine Lease - I site. An effective communication system comprising landline and mobile phones facilities will be made available at the mine site. Ground vibration measurements will be carried out and blasting will be done as per recommendation. The ground vibration will be maintained within limit, so as to ensure safety of surrounding buildings and houses of villagers. Blasting technology selected for this operation will ensure that flyrocks are kept to the minimum and blast waves are of lower magnitude. The water pits will be properly fenced and warning signals and signboards put at various places of reservoir at the end of mine life.

Environmental Management Plan (EMP)

EMP for effective management of environmental impacts due to the mining activity and ensuring overall protection of the surrounding environment through appropriate management procedures has been prepared. The capital cost for environmental management of the proposed mine is estimated to be Rs.30 Lakhs. This amount shall be used for procurement of Fugitive Dust Suppression systems like road side water sprinkling system and water tanker with rain gun and other facilities for suppressing the dust. Monitoring devices for ambient air, noise monitoring, and environment cell already exists. Occupational health and safety, energy development is an ongoing process and shall continue in future also. About Rs.10 Lakhs would be required as annual recurring expenses.

EMD will ensure that all pollution control devices function effectively. EMD will supervise disposal of spent oil and lubricants and used batteries to the authorized SPCB/CPCB vendors. Plantation will be started from day one and continue throughout the life of the project. Schemes for resource conservation, rainwater harvesting and social forestry development will be taken up. Regular environment, safety and health awareness programs for the workers will be conducted.

EMD will interact with the regulatory authorities, submit the monitoring reports and consent applications. The implementation of EMP would ensure that all elements of project comply with relevant environmental legislation throughout the mine life.

Environmental Monitoring Program

ACC Limited is operating Pathariya Lease-I & Pathariya Lease-II limestone mines located close to Nandini Khundini mine. The mines are administratively operated from a single point located at Pathariya Limestone Mine Lease-I. The infrastructure like administrative buildings, workshop, magazine, lubricant and diesel storage already exists inside the Pathariya-I mine, which are common for Pathariya Lease – I & II and Nandini Khundini Mine. Environment Management Department already exists and is adequate to perform the responsibilities of Nandini Khundini mine. EMD will be strengthened by recruiting skilled & experienced staff.

EMD will be responsible for the following functions:

Regular monitoring of –

1. Ambient air quality at upwind & downwind direction inside mine and at two nearest villages (Nandini Khundini and Pathariya) throughout the year.
2. Fugitive dust emission monitoring at 10 m downwind direction of the fugitive dust generation source.
3. Collect and analyse the ground water quality of mine site (seepage water), and all the surrounding villages. The depth of water will be checked every year during May and November.
4. Collect and anlayse the water quality of Amner, Sheonath river and village ponds, once during June and October.
5. Development and maintenance of greenbelt and greenery inside the mining lease area and between mines boundary and Nandini Khundini villages.

Project Benefits

Limestone mining will generate substantial revenue for the state of Chhattisgarh, through optimal utilization of natural resource and royalty. The project will boost the infrastructure development of the area.

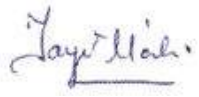
About 32 workers and 100 drivers will get employment in this project. Local people will be preferred for jobs, depending upon their skill and experience. Transport business, vehicle drivers and attendants, repairing workshops, grocery and retail stores, school, coaching centers, restaurants, self employed persons like tailors, carpenters, plumbers, electricians, etc will get indirect employment / livelihood opportunity from this project.

Rs.5 Lakhs per year has been earmarked for undertaking various community development activities. This money will be spent towards social development activities which include construction of community centers and schools, maintaining roads, rain shelters, providing drinking water facility to the nearby villages, making toilets in schools and for community, providing free medical camps, providing scholarships to bright students and sportsperson, etc. Income generating schemes will be implemented for upliftment of women and poor sections of the society, which includes vocational training for mushroom cultivation, pattal making, masala making and packaging, growing fruits and vegetables, development of fodder farms, etc.

CHAPTER 10: DISCLOSURE OF CONSULTANTS ENGAGED FOR EIA

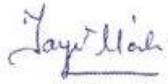
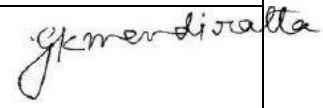
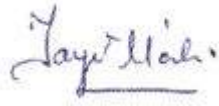
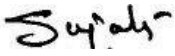
M/s ACC Limited engaged M/s EMTRC Consultants Private Limited, Delhi to conduct the EIA Study. EMTRC has its own laboratory for sampling and testing of air, water, noise and soil samples. The laboratory is recognized by MOEF (from 8-3-2013 to 7-3-2018). EMTRC Consultants Private Limited is accredited as EIA Consultant by NABET (Quality Council of India). The Accreditation includes Mining Sector (Category A). The profile of EMTRC is available in website www.emtrc.com. Dr. J.K.Moitra is the EIA coordinator for this EIA Study.

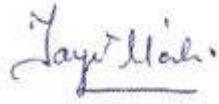
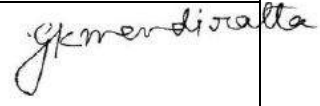
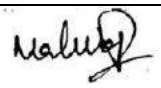
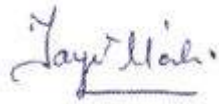
Declaration by Consultant contributing to the EIA: Nandini Khundini Limestone Mines of ACC Limited at village: Nandini Khundini, Tehsil: Dhamdha, Dist: Durg (Chhattisgarh).
I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.



EIA Coordinator:
Name: Dr. Jayanta Kumar Moitra
Period of involvement: October 2013 to August 2015
Contact information: 9810032481, emtrcjkm@gmail.com

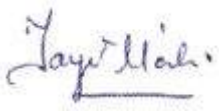
Functional Area Experts:

S.N	Functional Areas	Name of the Expert/s	Involvement (Period & Task**)	Signature
1	AP	Dr. J.K. Moitra	Visited site and written the sections on air pollution control management	
2	WP	Mr. G.K.Mendiratta	Visited site and written the sections on water pollution control management	
3	SHW	Dr. J.K. Moitra	Visited site and written the sections on solid wastes generation and management	
4	SE	Ms. Sujata Moitra	Visited site and written the sections on socio-economic scenario and CSR Plan	
5	EB	Ratnesh Kotiyal Dr. Vivek Dwivedi	Conducted field visits and did primary survey work at site, collected information about flora and fauna from Forest dept and checked during field visit (Dr. Vivek Dwivedi visited the site and revised the Ecology Chapter in Final EIA and also Revised the list of plant species for Greenbelt Development)	

6	HG	Mr. R.P Agrawal	Visited site and provided guidance on Hydrology aspects of the EIA Report.	
7	GEO	Mr. R.P.Agrawal	Visited site and provided guidance on Geological aspects of the EIA Report.	
8	SC	Ratnesh Kotiyal Dr. Vivek Dwivedi	Did soil sampling and analysis in Lab. Dr. Vivek Dwivedi reviewed the Section in Final EIA after Mr. R. Kotiyal left the Company)	
9	AQ	Dr. J.K. Moitra	Visited site, established the met station, written the sections on meteorology and did the impact predictions on air quality and traffic impact predictions	
10	NV	Mr. G.K.Mendiratta	Visited site and written the sections on noise pollution control and management	
11	LU	Ms. P. Malar Kodi	Visited site & written land use section Prepared land use maps, contours and drainage maps based on satellite imagery	
12	RH	Dr. J.K. Moitra	Written the section on Risk Analysis, Mitigation Measures and DMP	

Declaration by the Head of the Accredited Consultant Organization / authorized person

I, Dr. J.K.Moitra, hereby, confirm that the above mentioned experts prepared the EIA of Nandini Khundini Limestone Mines of ACC Limited at village: Nandini Khundini, Tehsil: Dhamdha, Dist: Durg (Chhattisgarh). I also confirm that the consultant organization shall be fully accountable for any misleading information mentioned in this statement.



Name: Dr. J.K.Moitra
Designation: Managing Director
Name of the EIA Consultant Organization: EMTRC Consultants Pvt. Ltd. Delhi
NABET Certificates No. & Issue Date: IA Certificate dated NABET/EIA/1013/008 dt 15-5-2010
ReAccreditation Certificate issue date 28-4-2014 valid till 11-12-2016.

ANNEXURE-1 Mining Lease Allotment Letter

पंजीकृत

छत्तीसगढ़ शासन
खनिज साधन विभाग
मंत्रालय,
दाऊ कल्याण सिंह भवन, रायपुर

क्रमांक एफ 3-18/2004/12 रायपुर, दिनांक

प्रति,

कलेक्टर,
जिला दुर्ग,
छत्तीसगढ़ ।

विषय- जिला दुर्ग के ग्राम नदिनी खुदनी के रकबा 53.57 हेक्टर क्षेत्र पर चूनापत्थर खनिज का खनिपट्टा आवेदन पत्र- मेसर्स ए.सी.सी. लि.।

सन्दर्भ- इस विभाग का समसंख्यक पत्र दिनांक 16.01.08

*****

मेसर्स ए. सी. सी. लिमिटेड द्वारा जिला दुर्ग तहसील धमधा के ग्राम नदिनी खुदनी के रकबा 54.40 हेक्टर क्षेत्र पर खनिज चूनापत्थर का खनिपट्टा स्वीकृति हेतु दिनांक 6.7.1992 को आवेदन पत्र प्रस्तुत किया गया, जिसे आपने शासन के निर्णय हेतु प्रेषित किया है ।

2/ मेसर्स ए. सी. सी. लिमिटेड द्वारा आवेदित क्षेत्र में से प्रतिबंधित क्षेत्र को छोड़ने के उपरांत तालिका के कालम न 4 में दर्शित क्षेत्र के लिए नीचे विवरण में दर्शित शर्तों पर खनिज चूनापत्थर का खनिपट्टा स्वीकृत करने का सैद्धांतिक निर्णय लिया गया था-

क्र	ग्राम का नाम/प.ह.नं	आवेदित रकबा (हेक्टर में) (लैंड डिटेल के अनुसार)	स्वीकृति हेतु उपलब्ध रकबा (हेक्टर में)
1	2	3	4
1	नदिनी खुदनी/29	54.40	53.57

2.1 खनि पट्टा क्षेत्र से प्राप्त होने वाले चूनापत्थर का उपयोग पूर्णत: कंपनी के वर्तमान में उत्पादनरत सीमेंट संयंत्र एवं सीमेंट संयंत्र के क्षमता विस्तार हेतु किया जाएगा एवं खनिपट्टे के क्षेत्र से उत्पादित चूनापत्थर का अन्यत्र विक्रय नहीं किया जाएगा।

2.2 यदि खनिपट्टा की स्वीकृति उपरान्त कंपनी द्वारा सीमेंट प्लान्ट के विस्तार हेतु प्रभावी कार्यवाही नहीं किया जाता है अथवा विलंब किया जाना पाया जाता है तो खनि पट्टेदार को 60 दिवस की अवधि देते हुए कारण बताओ नोटिस जारी किया जाकर स्पष्टीकरण प्राप्त किया जाएगा एवं प्राप्त स्पष्टीकरण संतोषप्रद नहीं पाए जाने पर राज्य शासन द्वारा खनि पट्टा निरस्त किया जा सकेगा।

2.3 यदि मायनिंग लीज की स्वीकृति के आदेश जारी हो जाने तथा उक्त आदेश के अनुसरण में मायनिंग लीज का अनुबंध निष्पादित हो जाने के बाद भी मायनिंग लीज की स्वीकृति के बारे में आवेदक द्वारा दी गई सहमति में चूक किए जाने के फलस्वरूप मायनिंग लीज निरस्त करने की स्थिति बनती है तो कंपनी द्वारा किए गए किसी व्यय की भरपाई हेतु राज्य शासन की कोई जिम्मेदारी नहीं होगी।

3/ आवेदक कंपनी ने उपर्युक्त शर्तों के संबंध में अपने पत्र दिनांक 17.01.08 द्वारा स्वैच्छिक सहमति दी है, जिसके परिप्रेक्ष्य में उन्हें इस विभाग के पत्र दिनांक 05.02.08 द्वारा आई बी एम से मायनिंग प्लान अनुमोदित कराकर प्रस्तुत करने हेतु लिखा गया था। आवेदक कंपनी द्वारा दिनांक 15.07.08 को आवेदन पत्र प्रस्तुत कर आई बी एम से अनुमोदित मायनिंग प्लान प्रस्तुत करने हेतु दिनांक 05.11.08 तक समय वृद्धि किये जाने का अनुरोध किया गया। आवेदक के निवेदन को स्वीकार करते हुए विभागीय पत्र दिनांक 11.08.08 द्वारा दिनांक 05.11.08 तक का समय दिया गया, इसी बीच आवेदक द्वारा दिनांक 07.08.08 को आई बी एम से अनुमोदित मायनिंग प्लान प्रस्तुत किया है।

4/ अतः राज्य शासन एतद्द्वारा मेसर्स ए. सी. सी. लिमिटेड के पक्ष में पैरा - 02 की तालिका के कालम नंबर– 02 में दर्शित ग्रामों के कालम नंबर 04 में दर्शित क्षेत्र (मानचित्र संलग्न) पर उपर्युक्त पैरा क्रमांक 2.1, 2.2, 2.3 एवं नीचे दिए गए विवरण/शर्तों के अनुसार उनके वर्तमान सीमेंट संयंत्र एवं उसके क्षमता विस्तार के लिए "कैप्टिव यूज" हेतु 30 (तीस) वर्ष की अवधि के लिए खनिज चूनापत्थर का खनिपट्टा स्वीकृत करता है :–

4.1 खनिपट्टा अनुबंध में सम्मिलित की जाने वाली शर्तें :

4.1.1. पैरा क्रमांक 2.1, 2.2, एवं 2.3 में उल्लेखित कंडिकायें/शर्तें ।

4.1.2 कंपनी इस हेतु सहमत है कि अनुबंध निष्पादन हो जाने के बाद भी मायनिंग लीज को निरस्त करने की स्थिति बनती है तो कंपनी द्वारा किए गए किसी व्यय की भरपाई हेतु राज्य शासन की कोई जिम्मेदारी नहीं होगी।

4.1.3. इंडियन ब्यूरो ऑफ माइंस द्वारा मायनिंग प्लान अनुमोदित करने हेतु अनुमादन आदेश में उल्लिखित शर्तें (संलग्न–ब) खनिपट्टा अनुबंध में जोड़ी जाए।

4.2 आवेदक को खान एवं खनिज (विकास एवं विनियमन) अधिनियम 1957, खनिज रियायत नियम 1960 एवं खनिज संरक्षण तथा विकास नियम, 1988 के प्रावधानों का पालन करना होगा।

4.3 खनिपट्टा की भूमि के लिए यदि वन संरक्षण अधिनियम, 1980 के प्रावधान लागू होते हों तो उसके लिये सक्षम प्राधिकारी से नियमानुसार अनुमति प्राप्त करने पर ही खनिपट्टा अनुबंध निष्पादित की जाएगी ।

4.4 खनिपट्टा क्षेत्र के निजी भूमि–स्वामियों से आवेदक द्वारा नियमानुसार सहमति/सरफेस राइट प्राप्त करने के उपरान्त ही उन्हें खनिपट्टा क्षेत्र पर भू–प्रवेश की अनुमति प्रदाय की जाए।

4.5 पर्यावरण संरक्षण अधिनियम, 1986 के अंतर्गत जारी एन्वायरमेंट इम्पैक्ट नोटिफिकेशन दिनांक 14.09.06 के तहत सक्षम प्राधिकारी से नियमानुसार अनुमति प्राप्त करने के उपरांत ही खनिपट्टा क्षेत्र पर कार्य प्रारंभ करने की अनुमति दी जाएगी ।

4.6 खनिपट्टा अनुबंध का निष्पादन एवं खनिपट्टा क्षेत्र में कार्य करने हेतु भू प्रवेश की अनुमति देने हेतु उपरोक्तानुसार उल्लिखित शर्तों का पालन सुनिश्चित किया जाए।

5/ यदि आवेदक को उपरोक्त शर्तें मान्य हो तो आवेदक कंपनी द्वारा रिजनल कंट्रोलर, इंडियन ब्यूरो ऑफ माइंस को फायनेंसियल इन्श्योरेंस प्रस्तुत कर दिये जाने की प्रमाणिक जानकारी प्राप्त होने के पश्चात

आवेदक से नियमानुसार जमानत की राशि जमा कराकर 6 माह के भीतर अनुबंध निष्पादन की कार्यवाही किया जाए एवं निष्पादित अनुबंध की एक प्रति इस विभाग को भिजवाई जाए ।

6/ अनुबंध निष्पादन के पूर्व यह भी सुनिश्चित कर लिया जाए कि आवेदक पर कोई खनिज राजस्व की राशि बकाया तो नही है ।

छत्तीसगढ़ के राजपाल के नाम से
तथा आदेशानुसार,

(संजय कनकने)
अवर सचिव
छत्तीसगढ़ शासन
खनिज साधन विभाग
रायपुर, दिनांक 16/09/09

पृ. कमांक एफ 2-18 / 2004 / 12

प्रतिलिपि –

1. संचालक भौमिकी तथा खनिकर्म, सोनाखान भवन, रिंगरोड, रायपुर ।
2. डायरेक्टर ऑफ माइंस सेफ्टी, सीपत रोड, साऊथ ईस्टर्न कालफील्डस लिमिटेड परिसर, बिलासपुर (छ.ग.)
3. क्षेत्रीय खान नियंत्रक, भारतीय खान ब्यूरो, सेकेण्ड फ्लोर ए ब्लॉक, इंदिरा भवन, सिविल लाईन, नागपुर (महाराष्ट्र)
4. सचिव, पर्यावरण संरक्षण मंडल, सिविल लाईन, रायपुर (छ.ग.)
5. मेसर्स ए सी सी लि. पो. आ. जामुल सीमेंट वर्क्स, जिला दुर्ग (छ.ग.)

की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित ।

16/9/09
अवर सचिव
छत्तीसगढ़ शासन
खनिज साधन विभाग

Annexure 2 : Mining Plan Approval from IBM

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES
MCCM CENTRAL ZONE

REGD POST

No. 314(3)/2012 -MCCM(CZ)/MS-45

6th Floor, "D" Block, Indira Bhawan
Civil Lines, Nagpur – 440001
Email : com.cz@ibm.gov.in
Telephone & Fax : (0712) 2565603
Dated 4th October 2013

To

M/s ACC Limited,
Nandini-Khundini Limestone Mines
Jamul Cement Works – 490024
District – Durg, Chhattisgarh

Sub: Approval of scheme of mining alongwith Progressive Mine Closure Plan of Nandini Khundini Limestone mine, over an area 53.57 hectares in Durg district of Chhattisgarh state, submitted by M/s ACC Limited under rule 12 of MCDR 1988.

Ref : 1. Your letter no. JML/IBM/SM-NK/Q-399 dated 29.11.2012.
2. This office letter of even no. dated 13.05.2013.
3. Your letter no. JML/SOM-NK/IBM/Q-48 dated 12.06.2013.

Sir,

In exercise of the powers conferred by sub rule (4) of rule 12 of Mineral Conservation and Development Rules 1988, I hereby **APPROVE** the Scheme of Mining including Progressive Mine Closure Plan of Nandini Khundini Limestone mines M/s ACC Limited over an area of 53.57 hectares, in Durg district of Chhattisgarh, submitted under rule 12 of MCDR, 1988. This approval is subject to the following conditions:-

i) This Scheme of Mining is approved without prejudice to any other laws applicable to the mine/area from time to time whether made by the Central Government, State Government or any other authority.

ii) It is clarified that this approval of the Scheme of Mining does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development & Regulation) Act, 1957 or the Mineral Concession Rule, 1960 and any other laws including the Forest (Conservation) Act, 1980, Environment (protection) Act 1986 and the rules made there under.

iii) It is further clarified that this approval of the Scheme of Mining is subject to the provision of Forest (Conservation) Act 1980, Forest Conservation Rule 1981 and other relevant statutes, order and guidelines as may be applicable to the lease area from time to time.

iv) It is further clarified that the approval of Scheme of Mining is subject to the provision of the Mines Act 1952 and Rules & Regulations made there under including submission of notice of opening, appointment of manager and other statutory officials as required by the Mines Act 1952.

v) The execution of Scheme of Mining shall be subjected to vacations of prohibitory orders / notices, if any.

vi) This approval for mining operations and associated activities is restricted to the mining lease area only. The mining lease area is as shown on the statutory plans under Rule 28 of Mineral Conservation and Development Rules 1988, by the Lessee/ROP/Applicant, and Indian Bureau of Mines has not undertaken verification of the mining lease boundary on the ground.

vii) If anything is found to be concealed as required by the Mines Act in the content of the Schei. ofmining and the proposals for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.

viii) The approval of scheme of mining is subject to the compliance of CCOM's Circular No. 2/2010 regarding Geo-referenced cadastral map within 6 months from the date of approval failing which the approval of the document shall be deemed to have been withdrawn with immediate effect.

ix) This approval is restricted in respect of proposal given in the document for the period from 2013-14(from the date of approval) to 2017-18 with validity upto 31.03.2018 subject to all other statutory clearances.

x) At any stage, if it is observed that the information furnished in the document are incorrect or misleading or wrong, the approval of the document shall be revoked with immediate effect.

xi) The department does not undertake any responsibility regarding correctness of the boundaries of the lease area shown on the ground with reference to lease map & other plans furnished by the applicant/lessee, as it is the responsibility of the State Government & lessee under Rule 33 of MCR, 1960.

xii) Yearly report as required under Rule 23E(2) of MCDR '88 setting forth the extent of protection and rehabilitation works carried out as envisaged in the approved progressive mine closure plan and if there is any deviations, reasons thereof shall be submitted before 1st July of every year to the Regional Office, IBM, Jabalpur.

xiii) The Scheme of Mining is approved without prejudice to any order or direction from the court of competent jurisdiction.

xiv) Your attention is invited to the Supreme Court interim order in W.P.(C) No.202 dated 12-12-96 for compliance. The approval of Scheme of Mining is, therefore, issued without prejudice to and is subject to the said directions of the Supreme Court as applicable.

xv) A copy of Environment Impact Assessment – Environment Management Plan (EIA-EMP) as approved by MOEF (Ministry of Environment & Forest) shall be submitted to IBM within a month of approval alongwith a copy of their approval letter.

xvi) The Financial Assurance submitted by you for Rs. 512750/- which is valid upto 31.03.2018 and next Financial Assurance shall be submitted on or before 31.03.2018.

xvii) The Scheme of Mining will be due for submission on 01.12.2017.

xviii) The Environmental Monitoring Cell established by the company shall continue monitoring ambient air quality, dust-fall rate, water quality, soil sample analysis and noise level measurements at various stations established for the purpose both in the core zone and buffer zone as per requirement of Environment Guidelines and keeping in view IBM's circular No. 3/92 & 2/93 season wise every year or by engaging the services of an Environmental Laboratory approved by MOEF/CPCB. The data so generated shall be maintained in a bound paged register kept for the purpose and the same shall be made available to the inspecting officer, on demand.

xix) If any comments are received from the State Govt. then the necessary action as per comments shall be taken immediately.

Yours faithfully,

Encl:- One copy of approved Scheme of Mining

s/d-

(Ranjan Sahai)
Controller of Mines (CZ)

EMTRC LAB

(EMTRC CONSULTANTS PRIVATE LIMITED)

F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

TEST REPORT

Date: 08-06-2014

Issued To	: EMTRC Consultants Pvt. Ltd. UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project	: ACC Nandini Khundini Limestone Mines (Production Capacity Enhancement) Village- Nandini Khundini, Tehsil- Dhamda District-Durg, Chattisgarh
Nature of Sampling	: Ground Water
Party Code No.	: ACC/70/01
Date of Sample Collection	: 11-03-2014
Sample Collected by	: Scientist of EMTRC

TEST RESULTS

	Parameters	Unit	Test Methods	Nadini Khundini	Ghikuria Village	Limit IS:10500
1	pH	-	APHA-4500	7.98	6.84	6.5 to 8.5
2	Conductivity	µmhos/cm	APHA-2510	1190	270	-
3	Turbidity	NTU	APHA-2030B	3	2	5
4	Total Dissolved Solids	mg/l	APHA-2540B	860	208	2000
5	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	280	130	600
6	Calcium as Ca	mg/l	APHA-4500B	80	40	200
7	Magnesium as Mg	mg/l	APHA-4500B	19.4	7.3	30
8	Sulphate	mg/l	APHA-4500B	58		400
9	Chlorides as Cl	mg/l	APHA-4500B	108	36	1000
10	Nitrates as NO_3	mg/l	APHA-4500	9.8	5.8	45
11	Fluoride as F	mg/l	APHA-4500D	0.86	0.82	1.5
12	Iron as Fe	mg/l	APHA-3111B	0.045	0.096	0.3
13	Copper as Cu	mg/l	APHA-3111B	<0.02	<0.02	1.5
14	Lead as Pb	mg/l	APHA-3111B	<0.01	<0.01	0.01
15	Manganese as Mn	mg/l	APHA-3111B	<0.05	<0.05	0.3
16	Zinc as Zn	mg/l	APHA-3111B	0.68	0.75	15
17	Chromium	mg/l	APHA-3111B	<0.005	<0.005	0.05
18	Nickel as Ni	mg/l	APHA-3111B	<0.01	<0.01	0.02
19	Oil & Grease	mg/l	APHA-5520D	Nil	Nil	0.03
20	Cadmium as Cd	mg/l	APHA-3111B	<0.001	<0.001	0.003
21	Mercury as Hg	mg/l	APHA-3111B	<0.001	<0.001	0.001
22	Arsenic as As	mg/l	APHA-3111B	<0.001	<0.001	0.05
23	Selenium as Se	mg/l	APHA-3111B	<0.01	<0.01	0.01
24	Total coliform	MPN/100 ml	APHA-9230B	Nil	Nil	Nil

Prepared by (Chemist) | **Checked by (Sr.Chemist)** | **Authorized Signatory (Government Analyst)**

EMTRC LAB

(EMTRC CONSULTANTS PRIVATE LIMITED)

F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

TEST REPORT

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ground Water
Party Code No. : ACC/70/02
Date of Sample Collection : 11-03-2014
Sample Collected by : Scientist of EMTRC

TEST RESULTS

	Parameters	Unit	Test Methods	Hardi Village	Pathariya ACC Mine Office	Limit IS:10500
1	pH	-	APHA-4500	7.42	7.84	6.5 to 8.5
2	Conductivity	µmhos/cm	APHA-2510	720	620	-
3	Turbidity	NTU	APHA-2030B	3	2	5
4	Total Dissolved Solids	mg/l	APHA-2540B	544	458	2000
5	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	230	260	600
6	Calcium as Ca	mg/l	APHA-4500B	56	72	200
7	Magnesium as Mg	mg/l	APHA-4500B	21.9	19.4	30
8	Sulphate	mg/l	APHA-4500B	88	13.8	400
9	Chlorides as Cl	mg/l	APHA-4500B	40	18	1000
10	Nitrates as NO_3	mg/l	APHA-4500	9.2	7.5	45
11	Fluoride as F	mg/l	APHA-4500D	0.78	0.68	1.5
12	Iron as Fe	mg/l	APHA-3111B	0.036	0.024	0.3
13	Copper as Cu	mg/l	APHA-3111B	<0.02	<0.02	1.5
14	Lead as Pb	mg/l	APHA-3111B	<0.01	<0.01	0.01
15	Manganese as Mn	mg/l	APHA-3111B	<0.05	<0.05	0.3
16	Zinc as Zn	mg/l	APHA-3111B	0.84	0.72	15
17	Chromium	mg/l	APHA-3111B	<0.005	<0.005	0.05
18	Nickel as Ni	mg/l	APHA-3111B	<0.01	<0.01	0.02
19	Oil & Grease	mg/l	APHA-5520D	Nil	Nil	0.03
20	Cadmium as Cd	mg/l	APHA-3111B	<0.001	<0.001	0.003
21	Mercury as Hg	mg/l	APHA-3111B	<0.001	<0.001	0.001
22	Arsenic as As	mg/l	APHA-3111B	<0.001	<0.001	0.05
23	Selenium as Se	mg/l	APHA-3111B	<0.01	<0.01	0.01
24	Total coliform	MPN/100 ml	APHA-9230B	Nil	Nil	Nil

Prepared by (Chemist) | **Checked by (Sr.Chemist)** | **Authorized Signatory (Government Analyst)**

Registered Office: P-501, Anupam Apartments East Arjun Nagar, Delhi 110032
Telefax: 011-22301172, 9810032481

EMTRC LAB

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Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

TEST REPORT

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ground Water
Party Code No. : ACC/70/03
Date of Sample Collection : 11-03-2014
Sample Collected by : Scientist of EMTRC

TEST RESULTS

	Parameters	Unit	Test Methods	Pathariya Village	Medasara Village	Limit IS:10500
1	pH	-	APHA-4500	7.74	7.44	6.5 to 8.5
2	Conductivity	µmhos/cm	APHA-2510	670	580	-
3	Turbidity	NTU	APHA-2030B	2	2	5
4	Total Dissolved Solids	mg/l	APHA-2540B	496	412	2000
5	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	280	240	600
6	Calcium as Ca	mg/l	APHA-4500B	80	76	200
7	Magnesium as Mg	mg/l	APHA-4500B	19.4	12.2	30
8	Sulphate	mg/l	APHA-4500B	22.8	21.5	400
9	Chlorides as Cl	mg/l	APHA-4500B	44	88	1000
10	Nitrates as NO_3	mg/l	APHA-4500	8.6	8.9	45
11	Fluoride as F	mg/l	APHA-4500D	0.72	0.76	1.5
12	Iron as Fe	mg/l	APHA-3111B	0.026	0.032	0.3
13	Copper as Cu	mg/l	APHA-3111B	<0.02	<0.02	1.5
14	Lead as Pb	mg/l	APHA-3111B	<0.01	<0.01	0.01
15	Manganese as Mn	mg/l	APHA-3111B	<0.05	<0.05	0.3
16	Zinc as Zn	mg/l	APHA-3111B	0.76	0.72	15
17	Chromium	mg/l	APHA-3111B	<0.005	<0.005	0.05
18	Nickel as Ni	mg/l	APHA-3111B	<0.01	<0.01	0.02
19	Oil & Grease	mg/l	APHA-5520D	Nil	Nil	0.03
20	Cadmium as Cd	mg/l	APHA-3111B	<0.001	<0.001	0.003
21	Mercury as Hg	mg/l	APHA-3111B	<0.001	<0.001	0.001
22	Arsenic as As	mg/l	APHA-3111B	<0.001	<0.001	0.05
23	Selenium as Se	mg/l	APHA-3111B	<0.01	<0.01	0.01
24	Total coliform	MPN/100 ml	APHA-9230B	Nil	Nil	Nil

Prepared by (Chemist) **Checked by (Sr.Chemist)** **Authorized Signatory (Government Analyst)**

EMTRC LAB

(EMTRC CONSULTANTS PRIVATE LIMITED)

F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ground Water
Party Code No. : ACC/70/04
Date of Sample Collection : 11-03-2014
Sample Collected by : Scientist of EMTRC

TEST RESULTS

	Parameters	Unit	Test Methods	Potia Village	Deorjhal Village	Limit IS:10500
1	pH	-	APHA-4500	7.60	7.95	6.5 to 8.5
2	Conductivity	µmhos/cm	APHA-2510	520	310	-
3	Turbidity	NTU	APHA-2030B	2	2	5
4	Total Dissolved Solids	mg/l	APHA-2540B	388	222	2000
5	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	220	120	600
6	Calcium as Ca	mg/l	APHA-4500B	72	32	200
7	Magnesium as Mg	mg/l	APHA-4500B	9.7	9.7	30
8	Sulphate	mg/l	APHA-4500B	9.8	6.8	400
9	Chlorides as Cl	mg/l	APHA-4500B	170	22	1000
10	Nitrates as NO_3	mg/l	APHA-4500	7.5	6.2	45
11	Fluoride as F	mg/l	APHA-4500D	0.72	0.66	1.5
12	Iron as Fe	mg/l	APHA-3111B	0.028	0.018	0.3
13	Copper as Cu	mg/l	APHA-3111B	<0.02	<0.02	1.5
14	Lead as Pb	mg/l	APHA-3111B	<0.01	<0.01	0.01
15	Manganese as Mn	mg/l	APHA-3111B	<0.05	<0.05	0.3
16	Zinc as Zn	mg/l	APHA-3111B	0.54	0.32	15
17	Chromium	mg/l	APHA-3111B	<0.005	<0.005	0.05
18	Nickel as Ni	mg/l	APHA-3111B	<0.01	<0.01	0.02
19	Oil & Grease	mg/l	APHA-5520D	Nil	Nil	0.03
20	Cadmium as Cd	mg/l	APHA-3111B	<0.001	<0.001	0.003
21	Mercury as Hg	mg/l	APHA-3111B	<0.001	<0.001	0.001
22	Arsenic as As	mg/l	APHA-3111B	<0.001	<0.001	0.05
23	Selenium as Se	mg/l	APHA-3111B	<0.01	<0.01	0.01
24	Total coliform	MPN/100 ml	APHA-9230B	Nil	Nil	Nil

Prepared by (Chemist) | **Checked by (Sr.Chemist)** | **Authorized Signatory (Government Analyst)**

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Surface Water
Party Code No. : ACC/70/05
Date of Sample Collection : 12-03-2014
Sample Collected by : Scientist of EMTRC

TEST RESULTS

	Parameters	Unit	Test Method	Shivnath River before confluence with Amner River	Shivnath River after confluence with Amner River
1	pH	-	APHA-4500	7.14	7.32
2	Conductivity	µmhos/cm	APHA-4500	370	420
3	Temperature	^{0}C	APHA-4500	27	27
4	Dissolved Oxygen	mg/l	APHA-4500C	4.8	4.5
5	Turbidity	NTU	APHA-2030B	3	4
6	Total Dissolved solids	mg/l	APHA-2540B	272	302
7	Suspended solids	mg/l	APHA-2540D	9	11
8	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	110	120
9	BOD	mg/l	APHA-5210-B	4.2	5.4
10	COD	mg/l	APHA-5220D	10	16
11	Chlorides as Cl	mg/l	APHA-4500B	22	28
12	Calcium as Ca	mg/l	APHA-3500B	20	20
13	Magnesium as Mg	mg/l	APHA-3500B	17	19.4
14	Flourides as F	mg/l	APHA-4500D	0.48	0.50
15	Iron as Fe	mg/l	APHA-3111B	0.016	0.018
16	Lead as Pb	mg/l	APHA-3111B	<0.01	<0.01
17	Copper as Cu	mg/l	APHA-3111B	<0.02	<0.02
18	Mercury as Hg	mg/l	APHA-3112	<0.001	<0.001
19	Nickel as Ni	mg/l	APHA-3111B	<0.01	<0.01
20	Zinc as Zn	mg/l	APHA-3111B	0.24	0.26
21	Chromium (Total as Cr)	mg/l	APHA-3111B	<0.005	<0.005
22	Arsenic as As	mg/l	APHA-3114	<0.001	<0.001
23	Manganese as Mn	mg/l	APHA-3111B	<0.05	<0.05
24	Cadmium as Cd	mg/l	APHA-3111B	<0.001	<0.001
25	Oil and grease	mg/l	APHA-4500D	<0.1	<0.1
26	Total Coliform	MPN/100 ml	APHA-9230	88	96

Prepared by (Chemist) | **Checked by (Sr.Chemist)** | **Authorized Signatory (Government Analyst)**

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.

Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh

Nature of Sampling : Surface Water
Party Code No. : ACC/70/06
Date of Sample Collection : 12-03-2014
Sample Collected by : Scientist of EMTRC

TEST RESULTS

	Parameters	Unit	Method	Amner River before confluence with Shivnath River	Dhamda Dam
1	pH	-	APHA-4500	7.29	7.36
2	Conductivity	µmhos/cm	APHA-4500	390	410
3	Temperature	°C	APHA-4500	27	27
4	Dissolved Oxygen	mg/l	APHA-4500C	4.6	4.2
5	Turbidity	NTU	APHA-2030B	5	4
6	Total Dissolved solids	mg/l	APHA-2540B	288	276
7	Suspended solids	mg/l	APHA-2540D	12	10
8	Total Hardness as $CaCO_3$	mg/l	APHA-2340C	130	110
9	BOD	mg/l	APHA-5210-B	5.2	5.9
10	COD	mg/l	APHA-5220D	14	18
11	Chlorides as Cl	mg/l	APHA-4500B	24	28
12	Calcium as Ca	mg/l	APHA-3500B	24	20
13	Magnesium as Mg	mg/l	APHA-3500B	17	14.6
14	Flourides as F	mg/l	APHA-4500D	0.46	0.38
15	Iron as Fe	mg/l	APHA-3111B	0.016	0.018
16	Lead as Pb	mg/l	APHA-3111B	<0.01	<0.01
17	Copper as Cu	mg/l	APHA-3111B	<0.02	<0.02
18	Mercury as Hg	mg/l	APHA-3112	<0.001	<0.001
19	Nickel as Ni	mg/l	APHA-3111B	<0.01	<0.01
20	Zinc as Zn	mg/l	APHA-3111B	0.24	0.28
21	Chromium (Total as Cr)	mg/l	APHA-3111B	<0.005	<0.005
22	Arsenic as As	mg/l	APHA-3114	<0.001	<0.001
23	Manganese as Mn	mg/l	APHA-3111B	<0.05	<0.05
24	Cadmium as Cd	mg/l	APHA-3111B	<0.001	<0.001
25	Oil and grease	mg/l	APHA-4500D	<0.1	<0.1
26	Total Coliform	MPN/100 ml	APHA-9230	92	98

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

Registered Office: P-501, Anupam Apartments East Arjun Nagar, Delhi 110032
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EMTRC LAB

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Soil Quality
Party Code No. : ACC/70/07
Date of Sample Collection : 12-03-2014
Sample Collected by : Scientist of EMTRC

SOIL QUALITY TEST RESULT

	Parameters	Nandini Khundini Village	Ghikuria Village	Hardi Village	Patharlya ACC Mine Office
1	Bulk Density; g/cm^3	1.23	1.27	1.21	1.26
2	Colour	Brown	Brown	Brown	Brown
3	Organic matter; %	0.64	0.71	0.61	0.67
4	pH	7.21	7.51	7.11	7.35
5	Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
6	Bicarbonate, %	0.044	0.056	0.03	0.039
7	Conductivity, µmhos/cm	90	120	78	98
8	Chlorides, %	0.0096	0.0142	0.0076	0.0118
9	Available Potassium as K, Kg/ha	171.5	191.4	157.1	182.3
10	Available Phosphorus as P, Kg/ha	37.1	45.6	32.8	41.3
11	Available Nitrogen as N, Kg/ha	110.6	153.5	143.5	146.2

Test Method: IARI

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Soil Quality
Party Code No. : ACC/70/08
Date of Sample Collection : 12-03-2014
Sample Collected by : Scientist of EMTRC

SOIL QUALITY TEST RESULT

	Parameters	Patharya Village	Medasara Village	Potia Village	Deorjhal Village
1	Bulk Density; g/cm³	1.37	1.33	1.36	1.29
2	Colour	Brown	Brown	Brown	Brown
3	Organic matter; %	0.74	0.52	0.69	0.46
4	pH	6.90	7.38	7.12	7.34
5	Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
6	Bicarbonate, %	0.0395	0.034	0.0372	0.018
7	Conductivity, µmhos/cm	110	92	110	88
8	Chlorides, %	0.0148	0.0131	0.0142	0.0121
9	Available Potassium as K, Kg/ha	168.1	152.8	166.2	145.6
10	Available Phosphorus as P, Kg/ha	34.9	32.1	35.6	32.4
11	Available Nitrogen as N, Kg/ha	122.6	142.7	154.1	149.5

Test Method: IARI

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/09
Monitoring Location : Pathariya-I, Mine Office
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters					
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_x µg/m³	O_3 µg/m³	NH_3 µg/m³
1	01-03-2014	78	45	6.4	16.8	20	22
2	02-03-2014	65	34	5.2	14.6	16	18
3	09-03-2014	72	41	6.0	12.8	15	14
4	10-03-2014	63	32	4.5	10.2	15	20
5	19-03-2014	78	45	6.8	15.6	22	24
6	20-03-2014	67	36	5.2	14.4	18	18
7	26-03-2014	69	38	5.6	13.2	19	24
8	27-03-2014	78	44	6.2	14.4	15	22
9	01-04-2014	75	42	5.8	11.6	16	20
10	02-04-2014	68	36	5.4	14.8	19	22
11	08-04-2014	74	41	5.8	10.6	17	20
12	09-04-2014	76	43	6.5	16.2	21	22
13	15-04-2014	60	29	4.5	12.8	19	18
14	16-04-2014	79	46	6.6	15.6	21	20
15	22-04-2014	76	44	6.2	13.4	18	18
16	23-04-2014	65	32	4.8	11.2	20	22
17	29-04-2014	74	42	5.6	16.6	22	20
18	30-04-2014	68	35	5.8	10.9	16	22
19	05-05-2014	63	30	4.5	12.2	15	20
20	06-05-2014	76	42	6.2	14.6	20	18
21	12-05-2014	70	37	5.6	16.8	17	22
22	13-05-2014	74	40	5.8	15.2	15	20
23	19-05-2014	78	45	6.5	16.6	20	24
24	20-05-2014	62	30	4.5	14.8	21	24
	Min	60	29	4.5	10.2	15	14
	Max	79	46	6.8	16.8	22	24
	Average	71	39	5.7	14.0	18	20

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

Registered Office: P-501, Anupam Apartments East Arjun Nagar, Delhi 110032
Telefax: 011-22301172, 9810032481

EMTRC LAB

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/10
Monitoring Location : Pathariya-I, Mine Office
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters						
		CO mg/m³	Benzene µg/m³	BaP ng/ m³	As ng/ m³	Ni ng/ m³	Pb µg/m³	Free Silica (µg/m³)
1	01-03-2014	0.14	0.3	0.09	0.23	2.1	0.19	8
2	02-03-2014	0.16	0.4	0.11	0.28	2.6	0.07	9
3	09-03-2014	0.13	0.6	0.15	0.36	1.9	0.11	9
4	10-03-2014	0.17	0.5	0.12	0.24	1.5	0.16	8
5	19-03-2014	0.19	0.6	0.09	0.42	1.2	0.09	9
6	20-03-2014	0.15	0.4	0.16	0.31	1.7	0.12	8
7	26-03-2014	0.13	0.6	0.13	0.29	2.3	0.18	7
8	27-03-2014	0.14	0.3	0.14	0.37	1.9	0.13	8
9	01-04-2014	0.13	0.6	0.12	0.28	1.1	0.08	7
10	02-04-2014	0.14	0.6	0.11	0.31	1.6	0.11	8
11	08-04-2014	0.13	0.3	0.16	0.29	1.3	0.18	7
12	09-04-2014	0.13	0.6	0.13	0.35	1.9	0.11	7
13	15-04-2014	0.15	0.6	0.11	0.41	1.6	0.09	9
14	16-04-2014	0.14	0.2	0.09	0.39	2.4	0.11	8
15	22-04-2014	0.15	0.6	0.16	0.28	1.8	0.15	9
16	23-04-2014	0.13	0.2	0.1	0.34	1.5	0.12	7
17	29-04-2014	0.14	0.5	0.11	0.28	1.6	0.09	8
18	30-04-2014	0.13	0.5	0.13	0.37	1.9	0.18	7
19	05-05-2014	0.15	0.4	0.09	0.34	2.1	0.09	9
20	06-05-2014	0.13	0.3	0.15	0.37	1.8	0.15	8
21	12-05-2014	0.15	0.6	0.14	0.31	2	0.13	9
22	13-05-2014	0.14	0.5	0.11	0.33	1.8	0.11	8
23	19-05-2014	0.13	0.6	0.09	0.29	1.9	0.19	7
24	20-05-2014	0.19	0.5	0.14	0.32	2.3	0.2	9
	Min	0.13	0.2	0.09	0.23	1.1	0.07	7
	Max	0.19	0.6	0.16	0.42	2.6	0.2	9
	Average	0.14	0.5	0.12	0.32	1.8	0.13	8

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/11
Monitoring Location : Nandani Khundini Mines
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters					
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_x µg/m³	O_3 µg/m³	NH_3 µg/m³
1	03-03-2014	70	36	5.2	14.5	21	14
2	04-03-2014	67	30	4.2	9.8	16	10
3	11-03-2014	68	32	4.8	14.2	18	12
4	12-03-2014	69	32	5.0	11.8	19	12
5	21-03-2014	68	30	5.0	9.6	17	11
6	22-03-2014	65	32	4.8	11.8	18	12
7	29-03-2014	60	27	4.0	10.7	16	10
8	29-03-2014	68	33	5.4	9.2	20	10
9	03-04-2014	72	35	5.8	14.8	18	12
10	04-04-2014	65	29	4.6	10.6	16	10
11	10-04-2014	70	33	5.8	14.2	16	12
12	11-04-2014	65	30	4.8	14.2	22	10
13	17-04-2014	64	29	4.2	9.4	19	12
14	18-04-2014	62	26	4.0	11.6	18	8
15	24-04-2014	72	34	5.8	10.6	20	12
16	25-04-2014	73	34	5.8	13.2	21	13
17	01-05-2014	64	26	4.5	10.8	19	8
18	02-05-2014	70	34	5.4	12.4	22	14
19	08-05-2014	67	32	4.8	10.2	14	10
20	09-05-2014	68	33	4.8	9.5	17	11
21	14-05-2014	70	34	5.6	12.8	21	9
22	15-05-2014	60	26	4.0	10.2	15	10
23	21-05-2014	58	25	4.0	9.2	16	8
24	22-05-2014	60	26	4.0	9.6	16	8
	Min	58	25	4	9.2	14	8
	Max	73	36	5.8	14.8	22	14
	Average	66	31	4.9	11.5	18	11

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

EMTRC LAB

(EMTRC CONSULTANTS PRIVATE LIMITED)

F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/12
Monitoring Location : Nandani Khundini Mines
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters						
		CO mg/m^3	Benzene µg/m^3	BaP ng/ m^3	As ng/ m^3	Ni ng/ m^3	Pb µg/m^3	Free Silica (µg/m^3)
1	03-03-2014	0.15	0.3	0.1	0.21	1.2	0.08	6
2	04-03-2014	0.13	0.5	0.05	0.19	0.7	0.13	4
3	11-03-2014	0.13	0.4	0.07	0.31	1.6	0.11	3
4	12-03-2014	0.16	0.5	0.12	0.24	0.9	0.09	6
5	21-03-2014	0.13	0.3	0.09	0.35	1.6	0.1	4
6	22-03-2014	0.13	0.6	0.14	0.19	1.2	0.07	5
7	28-03-2014	0.17	0.4	0.07	0.19	1.7	0.18	6
8	29-03-2014	0.13	0.5	0.09	0.21	1.8	0.06	4
9	03-04-2014	0.15	0.6	0.1	0.36	1.9	0.11	5
10	04-04-2014	0.16	0.4	0.06	0.32	1.1	0.12	6
11	10-04-2014	0.13	0.6	0.09	0.19	0.9	0.08	4
12	11-04-2014	0.19	0.5	0.1	0.27	1.5	0.11	7
13	17-04-2014	0.13	0.5	0.13	0.34	1.6	0.16	4
14	18-04-2014	0.15	0.4	0.06	0.31	1.4	0.12	6
15	24-04-2014	0.13	0.5	0.05	0.29	1.9	0.08	4
16	25-04-2014	0.14	0.6	0.11	0.18	1	0.14	5
17	01-05-2014	0.16	0.4	0.07	0.23	1.3	0.12	7
18	02-05-2014	0.13	0.5	0.1	0.23	0.8	0.06	4
19	08-05-2014	0.14	0.3	0.05	0.28	0.9	0.13	6
20	09-05-2014	0.13	0.6	0.08	0.32	1.2	0.12	5
21	14-05-2014	0.13	0.2	0.12	0.31	1.6	0.13	4
22	15-05-2014	0.13	0.4	0.06	0.29	1.3	0.15	4
23	21-05-2014	0.14	0.6	0.05	0.27	0.7	0.12	5
24	22-05-2014	0.15	0.6	0.08	0.19	1.4	0.13	6
	Min	0.13	0.2	0.05	0.19	0.7	0.06	3
	Max	0.19	0.6	0.14	0.36	1.9	0.18	7
	Average	0.14	0.5	0.08	0.26	1.3	0.11	5

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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EMTRC LAB

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghaziabad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/13
Monitoring Location : Hardi Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters					
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	O_3 µg/m³	NH_3 µg/m³
1	01-03-2014	65	30	6.0	11.5	18	14
2	02-03-2014	56	24	4.2	10.2	14	12
3	09-03-2014	57	25	4.9	10.9	16	18
4	10-03-2014	59	25	4.6	10.2	14	16
5	19-03-2014	62	27	5.4	11.2	14	16
6	20-03-2014	56	23	4.1	9.8	18	18
7	26-03-2014	58	24	4.9	11.2	12	12
8	27-03-2014	56	23	4.5	9.8	15	14
9	01-04-2014	57	24	5.0	10.2	16	12
10	02-04-2014	60	25	4.0	9.0	20	16
11	08-04-2014	66	29	4.8	14.3	18	14
12	09-04-2014	61	28	4.2	9.8	12	18
13	15-04-2014	63	28	4.4	10.6	12	12
14	16-04-2014	62	28	5.2	12.0	16	14
15	22-04-2014	59	25	4.5	9.8	15	18
16	23-04-2014	64	28	4.8	11.2	14	18
17	29-04-2014	56	23	4.1	9.2	12	14
18	30-04-2014	58	25	4.6	9.8	14	16
19	05-05-2014	62	27	5.2	11.2	16	12
20	06-05-2014	60	24	4.8	9.8	12	18
21	12-05-2014	65	28	5.8	11.2	18	12
22	13-05-2014	58	26	4.8	10.8	18	12
23	19-05-2014	64	29	5.2	10.8	16	18
24	20-05-2014	57	24	4.0	9.0	18	14
	Min	56	23	4	9	12	12
	Max	66	30	6	14.3	20	18
	Average	60	26	4.8	10.6	15	15

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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EMTRC LAB

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghaziabad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/14
Monitoring Location : Hardi Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters						
		CO mg/m³	Benzene µg/m³	BaP ng/ m³	As ng/ m³	Ni ng/ m³	Pb µg/m³	Free Silica (µg/m³)
1	01-03-2014	0.12	0.3	0.02	0.26	0.5	0.12	6
2	02-03-2014	0.11	0.5	0.08	0.21	1.1	0.06	5
3	09-03-2014	0.13	0.2	0.05	0.18	0.8	0.09	8
4	10-03-2014	0.12	0.4	0.04	0.13	1	0.11	6
5	19-03-2014	0.12	0.4	0.06	0.19	1.2	0.04	5
6	20-03-2014	0.11	0.2	0.02	0.12	1.1	0.06	4
7	26-03-2014	0.13	0.3	0.06	0.21	1	0.05	7
8	27-03-2014	0.11	0.4	0.02	0.2	0.5	0.04	5
9	01-04-2014	0.13	0.1	0.03	0.13	0.6	0.14	8
10	02-04-2014	0.11	0.5	0.05	0.15	0.9	0.05	5
11	08-04-2014	0.11	0.3	0.07	0.19	1.2	0.08	5
12	09-04-2014	0.12	0.2	0.1	0.13	0.5	0.1	6
13	15-04-2014	0.13	0.2	0.09	0.21	0.8	0.06	8
14	16-04-2014	0.12	0.1	0.09	0.22	0.4	0.11	6
15	22-04-2014	0.12	0.2	0.05	0.12	0.6	0.07	6
16	23-04-2014	0.11	0.3	0.04	0.18	0.8	0.12	5
17	29-04-2014	0.13	0.5	0.08	0.16	0.6	0.11	7
18	30-04-2014	0.13	0.3	0.05	0.22	0.9	0.05	8
19	05-05-2014	0.11	0.3	0.1	0.14	1.2	0.14	5
20	06-05-2014	0.12	0.1	0.07	0.16	0.8	0.06	6
21	12-05-2014	0.11	0.4	0.02	0.2	0.4	0.04	5
22	13-05-2014	0.13	0.2	0.09	0.15	0.6	0.12	7
23	19-05-2014	0.11	0.3	0.04	0.22	0.7	0.05	5
24	20-05-2014	0.12	0.5	0.06	0.18	1.1	0.13	6
	Min	0.11	0.1	0.02	0.12	0.4	0.04	4
	Max	0.13	0.5	0.1	0.26	1.2	0.14	8
	Average	0.12	0.3	0.06	0.18	0.8	0.08	6

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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EMTRC LAB

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/15
Monitoring Location : Girhola Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters					
		PM_{10} $\mu g/m^3$	$PM_{2.5}$ $\mu g/m^3$	SO_2 $\mu g/m^3$	NO_2 $\mu g/m^3$	O_3 $\mu g/m^3$	NH_3 $\mu g/m^3$
1	03-03-2014	68	30	5.4	13.9	20	20
2	04-03-2014	60	24	4.9	10.5	14	18
3	11-03-2014	64	26	5.2	10.2	16	16
4	12-03-2014	58	24	4.5	9.5	15	18
5	21-03-2014	65	27	4.8	9.9	16	20
6	22-03-2014	58	24	4.6	10.6	17	22
7	28-03-2014	68	30	5.2	11.8	19	14
8	29-03-2014	70	32	5.8	12.2	20	18
9	03-04-2014	68	28	5.2	10.6	18	22
10	04-04-2014	54	22	4.0	9.0	15	20
11	10-04-2014	62	24	5.6	12.2	18	18
12	11-04-2014	64	25	5.8	11.8	16	14
13	17-04-2014	68	30	5.2	10.8	17	20
14	18-04-2014	60	23	4.2	13.6	15	22
15	24-04-2014	62	24	4.8	11.8	16	14
16	25-04-2014	58	22	4.5	9.4	14	20
17	01-05-2014	64	25	4.8	12.2	16	14
18	02-05-2014	66	28	5.2	13.8	19	16
19	08-05-2014	68	29	5.5	11.2	18	14
20	09-05-2014	56	23	4.0	10.0	14	18
21	14-05-2014	64	26	4.6	10.2	16	20
22	15-05-2014	58	23	4.0	9.8	14	14
23	21-05-2014	68	30	5.4	12.6	17	20
24	22-05-2014	62	24	4.8	9.2	16	22
	Min	54	22	4	9	14	14
	Max	70	32	5.8	13.8	20	22
	Average	63	26	4.9	11.1	17	18

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

EMTRC LAB

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/16
Monitoring Location : Girhola Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters						
		CO mg/m³	Benzene µg/m³	BaP ng/ m³	As ng/ m³	Ni ng/ m³	Pb µg/m³	Free Silica (µg/m³)
1	03-03-2014	0.14	0.4	0.13	0.22	0.6	0.16	4
2	04-03-2014	0.13	0.6	0.04	0.24	0.9	0.13	3
3	11-03-2014	0.17	0.3	0.06	0.22	1.2	0.11	7
4	12-03-2014	0.15	0.4	0.08	0.24	0.8	0.1	5
5	21-03-2014	0.14	0.5	0.05	0.2	1.4	0.13	4
6	22-03-2014	0.16	0.6	0.09	0.22	0.8	0.09	6
7	28-03-2014	0.13	0.4	0.04	0.24	0.6	0.13	4
8	29-03-2014	0.14	0.3	0.06	0.18	1.1	0.16	5
9	03-04-2014	0.17	0.5	0.11	0.22	1.3	0.08	7
10	04-04-2014	0.13	0.6	0.1	0.22	0.8	0.15	4
11	10-04-2014	0.15	0.4	0.05	0.18	0.7	0.13	6
12	11-04-2014	0.14	0.5	0.12	0.22	1.4	0.14	5
13	17-04-2014	0.16	0.3	0.1	0.24	1.1	0.06	6
14	18-04-2014	0.13	0.4	0.06	0.28	1.3	0.15	4
15	24-04-2014	0.14	0.3	0.12	0.22	1.4	0.12	5
16	25-04-2014	0.15	0.6	0.05	0.18	0.9	0.1	6
17	01-05-2014	0.13	0.5	0.11	0.24	1.2	0.08	4
18	02-05-2014	0.16	0.4	0.04	0.24	0.8	0.11	6
19	08-05-2014	0.13	0.6	0.08	0.22	1.3	0.13	4
20	09-05-2014	0.14	0.3	0.06	0.26	1.1	0.1	5
21	14-05-2014	0.13	0.6	0.07	0.22	1.3	0.16	4
22	15-05-2014	0.15	0.4	0.1	0.23	0.8	0.1	5
23	21-05-2014	0.17	0.5	0.09	0.24	0.6	0.07	7
24	22-05-2014	0.13	0.3	0.04	0.22	1.1	0.13	4
	Min	0.13	0.3	0.04	0.18	0.6	0.06	3
	Max	0.17	0.6	0.13	0.28	1.4	0.16	7
	Average	0.15	0.4	0.08	0.22	1.0	0.12	5

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

Registered Office: P-501, Anupam Apartments East Arjun Nagar, Delhi 110032
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EMTRC LAB

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghaziabad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/17
Monitoring Location : Ahiwara Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters					
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_x µg/m³	O_3 µg/m³	NH_3 µg/m³
1	01-03-2014	64	29	4.8	12.8	20	22
2	02-03-2014	68	33	5.2	13.5	16	20
3	09-03-2014	62	26	4.5	10.6	15	24
4	10-03-2014	76	38	7.2	18.2	22	18
5	19-03-2014	72	35	6.5	12.8	18	30
6	20-03-2014	66	30	4.8	10.2	16	22
7	26-03-2014	64	29	4.5	10.6	15	26
8	27-03-2014	68	30	5.8	12.8	16	26
9	01-04-2014	66	28	5.2	9.8	18	22
10	02-04-2014	75	38	7.5	17.6	16	24
11	08-04-2014	62	26	4.5	12.2	15	18
12	09-04-2014	74	35	6.2	15.2	20	24
13	15-04-2014	60	26	4.2	9.8	15	28
14	16-04-2014	68	32	5.4	16.6	18	22
15	22-04-2014	69	34	5.6	17.2	19	24
16	23-04-2014	68	34	5.2	14.6	15	26
17	29-04-2014	76	40	7.2	16.8	20	28
18	30-04-2014	68	33	5.2	15.0	19	20
19	05-05-2014	64	29	4.6	12.8	16	24
20	06-05-2014	62	26	4.8	14.4	16	24
21	12-05-2014	65	30	5.2	12.2	16	26
22	13-05-2014	72	34	6.4	16.8	18	22
23	19-05-2014	68	32	5.6	11.2	16	26
24	20-05-2014	66	30	5.2	11.6	15	22
	Min	60	26	4.2	9.8	15	18
	Max	76	40	7.5	18.2	22	30
	Average	68	32	5.5	13.6	17	24

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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EMTRC LAB

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghaziabad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/18
Monitoring Location : Ahiwara Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters						
		CO mg/m^3	Benzene µg/m^3	BaP ng/ m^3	As ng/ m^3	Ni ng/ m^3	Pb µg/m^3	Free Silica (µg/m^3)
1	01-03-2014	0.27	0.8	0.21	0.42	2.3	0.13	6
2	02-03-2014	0.19	0.7	0.19	0.34	2.1	0.16	5
3	09-03-2014	0.25	0.8	0.23	0.4	2.7	0.19	6
4	10-03-2014	0.19	0.6	0.21	0.26	2.4	0.21	5
5	19-03-2014	0.31	0.9	0.21	0.34	3.1	0.22	8
6	20-03-2014	0.28	0.7	0.23	0.41	2.6	0.16	6
7	26-03-2014	0.24	0.6	0.22	0.28	2	0.14	7
8	27-03-2014	0.16	0.8	0.25	0.39	2.6	0.16	5
9	01-04-2014	0.19	0.9	0.23	0.4	3.5	0.25	5
10	02-04-2014	0.27	0.7	0.26	0.39	1.7	0.21	6
11	08-04-2014	0.18	0.9	0.24	0.34	2.8	0.25	4
12	09-04-2014	0.26	0.9	0.21	0.36	3.1	0.22	7
13	15-04-2014	0.31	0.7	0.21	0.33	3.9	0.26	8
14	16-04-2014	0.3	0.6	0.23	0.28	2.6	0.23	6
15	22-04-2014	0.19	0.9	0.17	0.42	3.9	0.21	5
16	23-04-2014	0.25	0.8	0.20	0.34	3.8	0.16	6
17	29-04-2014	0.29	0.7	0.16	0.43	3.7	0.17	7
18	30-04-2014	0.16	0.6	0.19	0.35	3.3	0.19	5
19	05-05-2014	0.23	0.7	0.23	0.39	3.1	0.22	6
20	06-05-2014	0.3	0.9	0.21	0.41	2.4	0.26	7
21	12-05-2014	0.36	0.6	0.26	0.26	3.6	0.13	8
22	13-05-2014	0.18	0.8	0.18	0.29	2.1	0.15	5
23	19-05-2014	0.24	0.9	0.22	0.33	1.9	0.16	6
24	20-05-2014	0.19	0.7	0.22	0.41	2.8	0.21	5
	Min	0.16	0.6	0.16	0.26	1.7	0.13	4
	Max	0.36	0.9	0.26	0.43	3.9	0.26	8
	Average	0.24	0.8	0.22	0.36	2.8	0.19	6

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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(EMTRC CONSULTANTS PRIVATE LIMITED)

F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/19
Monitoring Location : Potia Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters					
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_x µg/m³	O_3 µg/m³	NH_3 µg/m³
1	01-03-2014	68	30	4.5	11.8	16	20
2	02-03-2014	58	25	4.4	9.0	14	18
3	09-03-2014	62	28	4.9	11.6	15	16
4	10-03-2014	58	23	4.0	9.0	14	23
5	19-03-2014	60	24	4.8	9.4	16	20
6	20-03-2014	66	26	4.8	13.2	14	22
7	26-03-2014	58	23	4.0	9.6	12	16
8	27-03-2014	68	30	4.4	13.8	20	16
9	01-04-2014	59	24	4.5	9.2	14	22
10	02-04-2014	60	24	4.5	10.6	16	20
11	08-04-2014	62	26	4.8	10.2	12	16
12	09-04-2014	65	28	5.4	11.2	18	23
13	15-04-2014	63	25	5.2	10.8	16	20
14	16-04-2014	68	29	4.8	10.6	19	18
15	22-04-2014	66	26	4.5	9.8	15	16
16	23-04-2014	58	22	4.2	9.2	14	20
17	29-04-2014	66	24	4.9	10.8	15	18
18	30-04-2014	60	23	5.2	11.6	15	18
19	05-05-2014	68	30	5.6	13.2	20	20
20	06-05-2014	64	26	5.2	10.5	15	22
21	12-05-2014	68	28	5.8	12.8	16	23
22	13-05-2014	64	25	4.8	10.6	14	22
23	19-05-2014	62	24	4.5	10.2	12	20
24	20-05-2014	60	23	4.0	9.0	14	16
	Min	58	22	4	9	12	16
	Max	68	30	5.8	13.8	20	23
	Average	63	26	4.8	10.8	15	19

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghaziabad (UP)-201009

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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/20
Monitoring Location : Potia Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters						
		CO mg/m³	Benzene µg/m³	BaP ng/ m³	As ng/ m³	Ni ng/ m³	Pb µg/m³	Free Silica (µg/m³)
1	01-03-2014	0.13	0.4	0.06	0.28	1.2	0.1	4
2	02-03-2014	0.13	0.6	0.03	0.23	0.4	0.06	4
3	09-03-2014	0.15	0.5	0.14	0.15	1.4	0.09	5
4	10-03-2014	0.1	0.4	0.16	0.19	0.9	0.11	2
5	19-03-2014	0.13	0.3	0.1	0.21	1	0.06	5
6	20-03-2014	0.12	0.3	0.12	0.16	0.8	0.08	4
7	26-03-2014	0.1	0.5	0.08	0.26	0.4	0.04	2
8	27-03-2014	0.13	0.4	0.12	0.24	1.2	0.11	4
9	01-04-2014	0.15	0.3	0.06	0.13	0.6	0.06	6
10	02-04-2014	0.11	0.3	0.03	0.25	0.8	0.05	2
11	09-04-2014	0.12	0.4	0.12	0.18	0.5	0.04	5
12	09-04-2014	0.15	0.5	0.11	0.26	0.7	0.1	6
13	15-04-2014	0.14	0.6	0.08	0.24	0.8	0.07	4
14	16-04-2014	0.13	0.5	0.06	0.22	0.7	0.06	4
15	22-04-2014	0.14	0.3	0.05	0.16	1.3	0.11	5
16	23-04-2014	0.11	0.6	0.11	0.22	0.4	0.09	2
17	29-04-2014	0.14	0.6	0.13	0.28	0.9	0.13	5
18	30-04-2014	0.13	0.4	0.08	0.21	1.2	0.11	4
19	05-05-2014	0.15	0.3	0.13	0.2	1.4	0.05	5
20	06-05-2014	0.12	0.3	0.06	0.26	0.8	0.14	4
21	12-05-2014	0.1	0.4	0.14	0.21	0.4	0.08	2
22	13-05-2014	0.13	0.4	0.11	0.18	0.6	0.07	4
23	19-05-2014	0.15	0.5	0.07	0.21	1.1	0.13	5
24	20-05-2014	0.13	0.6	0.13	0.16	0.8	0.06	3
	Min	0.1	0.3	0.03	0.13	0.4	0.04	2
	Max	0.15	0.6	0.16	0.28	1.4	0.14	6
	Average	0.13	0.4	0.10	0.21	0.8	0.07	4

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
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Recognized by Ministry of Environment & Forests, GOI
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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/21
Monitoring Location : Medasara Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters					
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_x µg/m³	O_3 µg/m³	NH_3 µg/m³
1	01-03-2014	70	34	5.6	15.8	18	18
2	02-03-2014	66	32	4.8	12.8	20	20
3	09-03-2014	74	35	6.2	16.2	20	18
4	10-03-2014	68	33	5.8	12.2	18	18
5	19-03-2014	72	35	6.2	14.8	16	20
6	20-03-2014	68	32	5.8	13.2	14	15
7	26-03-2014	66	30	5.2	10.8	12	18
8	27-03-2014	76	37	7.4	16.8	18	18
9	01-04-2014	66	30	4.2	10.2	14	15
10	02-04-2014	72	34	6.5	14.6	16	18
11	08-04-2014	70	33	4.8	11.2	12	16
12	09-04-2014	66	28	4.5	10.6	18	15
13	15-04-2014	64	28	4.8	10.8	16	20
14	16-04-2014	68	30	5.2	10.6	12	18
15	22-04-2014	76	36	6.2	13.2	14	18
16	23-04-2014	72	34	6.6	15.6	18	16
17	29-04-2014	68	31	5.2	13.8	14	15
18	30-04-2014	64	26	4.8	10.6	12	18
19	05-05-2014	68	32	5.2	13.8	10	20
20	06-05-2014	62	26	4.5	9.4	14	15
21	12-05-2014	74	34	5.8	13.8	16	18
22	13-05-2014	62	28	5.8	14.2	16	20
23	19-05-2014	68	32	4.6	11.2	14	20
24	20-05-2014	70	34	5.2	14.8	16	16
	Min	62	26	4.2	9.4	10	15
	Max	76	37	7.4	16.8	20	20
	Average	69	32	5.5	13.0	15	18

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
Vide Notification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/22
Monitoring Location : Medasara Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters						
		CO mg/m³	Benzene µg/m³	BaP ng/ m³	As ng/ m³	Ni ng/ m³	Pb µg/m³	Free Silica (µg/m³)
1	01-03-2014	0.14	0.6	0.16	0.29	1.5	0.12	6
2	02-03-2014	0.12	0.4	0.14	0.23	0.6	0.06	5
3	09-03-2014	0.13	0.7	0.12	0.34	1.2	0.08	6
4	10-03-2014	0.16	0.5	0.11	0.22	1.3	0.16	8
5	19-03-2014	0.13	0.6	0.17	0.23	1	0.14	6
6	20-03-2014	0.12	0.5	0.16	0.31	0.7	0.05	5
7	26-03-2014	0.14	0.5	0.11	0.24	0.9	0.18	6
8	27-03-2014	0.15	0.4	0.15	0.32	1.2	0.06	7
9	01-04-2014	0.13	0.6	0.09	0.27	1.4	0.11	6
10	02-04-2014	0.16	0.7	0.1	0.19	1.1	0.13	8
11	08-04-2014	0.13	0.5	0.17	0.2	1.4	0.2	6
12	09-04-2014	0.12	0.4	0.09	0.27	0.8	0.19	4
13	15-04-2014	0.15	0.4	0.11	0.29	1.3	0.07	7
14	16-04-2014	0.13	0.5	0.09	0.31	1.6	0.12	6
15	22-04-2014	0.15	0.5	0.12	0.29	0.9	0.05	7
16	23-04-2014	0.12	0.7	0.15	0.24	1.2	0.07	4
17	29-04-2014	0.13	0.4	0.11	0.32	0.8	0.2	6
18	30-04-2014	0.14	0.5	0.16	0.23	1.4	0.08	6
19	05-05-2014	0.16	0.7	0.14	0.21	0.6	0.13	7
20	06-05-2014	0.13	0.6	0.11	0.35	1.5	0.12	6
21	12-05-2014	0.12	0.6	0.09	0.31	0.7	0.13	4
22	13-05-2014	0.15	0.4	0.09	0.2	1.1	0.05	6
23	19-05-2014	0.16	0.5	0.13	0.21	0.9	0.12	7
24	20-05-2014	0.13	0.6	0.09	0.27	1.3	0.09	5
	Min	0.12	0.4	0.09	0.19	0.6	0.05	4
	Max	0.16	0.7	0.17	0.35	1.6	0.2	8
	Average	0.14	0.5	0.12	0.26	1.1	0.11	6

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

Registered Office: P-501, Anupam Apartments East Arjun Nagar, Delhi 110032
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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

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Vide Nofification No S.O.592 (E) 08.03.2013 to 07.03.2018

----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/23
Monitoring Location : Deorjhal Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters					
		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	O_3 µg/m³	NH_3 µg/m³
1	01-03-2014	64	28	4.8	11.8	12	10
2	02-03-2014	70	32	5.4	13.2	14	12
3	09-03-2014	66	29	4.6	10.6	14	14
4	10-03-2014	60	26	4.2	9.6	18	11
5	19-03-2014	68	31	5.4	13.8	16	10
6	20-03-2014	64	28	4.6	11.2	14	10
7	26-03-2014	60	24	4.0	10.6	12	14
8	27-03-2014	72	34	5.8	14.2	18	10
9	01-04-2014	66	28	4.5	11.5	14	12
10	02-04-2014	68	30	5.2	13.6	16	12
11	08-04-2014	64	27	4.2	9.8	12	14
12	09-04-2014	70	33	5.8	11.2	18	10
13	15-04-2014	64	25	4.6	10.6	16	11
14	16-04-2014	74	35	5.6	10.8	12	10
15	22-04-2014	66	28	4.8	10.2	14	12
16	23-04-2014	69	32	5.4	9.6	18	10
17	29-04-2014	72	34	5.8	11.8	10	12
18	30-04-2014	66	29	4.6	10	12	14
19	05-05-2014	68	32	4.8	10.8	10	14
20	06-05-2014	62	24	4.2	9.4	14	10
21	12-05-2014	68	31	4.8	9.8	16	10
22	13-05-2014	62	24	4.2	9.2	16	14
23	19-05-2014	68	32	4.5	11.2	18	12
24	20-05-2014	64	26	4.2	9.2	14	10
	Min	60	24	4	9.2	10	10
	Max	74	35	5.8	14.2	18	14
	Average	67	29	4.8	11	14	12

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

Registered Office: P-501, Anupam Apartments East Arjun Nagar, Delhi 110032
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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Ambient Air Quality Monitoring
Party Code No. : ACC/70/24
Monitoring Location : Deorjhal Village
Sample Collected by : Scientist of EMTRC

TEST RESULTS

Sr. No	Date	Parameters						
		CO mg/m³	Benzene µg/m³	BaP ng/ m³	As ng/ m³	Ni ng/ m³	Pb µg/m³	Free Silica (µg/m³)
1	03-03-2014	0.12	0.2	0.02	0.24	1.2	0.1	5
2	04-03-2014	0.11	0.4	0.05	0.18	0.4	0.06	6
3	11-03-2014	0.13	0.2	0.05	0.15	1.4	0.09	7
4	12-03-2014	0.12	0.4	0.04	0.18	0.9	0.11	6
5	21-03-2014	0.12	0.4	0.06	0.13	1	0.06	5
6	22-03-2014	0.11	0.2	0.02	0.15	0.8	0.08	8
7	28-03-2014	0.13	0.3	0.06	0.16	0.4	0.04	6
8	29-03-2014	0.11	0.4	0.02	0.28	1.2	0.11	6
9	03-04-2014	0.13	0.1	0.03	0.13	0.6	0.06	7
10	04-04-2014	0.11	0.4	0.05	0.13	0.8	0.05	5
11	10-04-2014	0.11	0.3	0.06	0.22	0.5	0.04	7
12	11-04-2014	0.12	0.2	0.06	0.21	0.7	0.1	6
13	17-04-2014	0.13	0.2	0.04	0.17	0.8	0.07	5
14	18-04-2014	0.12	0.1	0.06	0.28	0.7	0.06	6
15	24-04-2014	0.12	0.2	0.05	0.21	1.3	0.11	7
16	25-04-2014	0.11	0.3	0.04	0.14	0.4	0.09	5
17	01-05-2014	0.13	0.4	0.04	0.2	0.9	0.13	7
18	02-05-2014	0.13	0.3	0.05	0.16	1.2	0.11	5
19	08-05-2014	0.11	0.3	0.1	0.19	1.4	0.05	6
20	09-05-2014	0.12	0.1	0.07	0.21	0.8	0.14	5
21	14-05-2014	0.11	0.4	0.02	0.15	0.4	0.08	6
22	15-05-2014	0.13	0.2	0.05	0.17	0.6	0.07	5
23	21-05-2014	0.11	0.3	0.04	0.13	1.1	0.13	5
24	22-05-2014	0.12	0.4	0.06	0.22	0.8	0.06	7
	Min	0.11	0.1	0.02	0.13	0.4	0.04	5
	Max	0.13	0.4	0.1	0.28	1.4	0.14	8
	Average	0.12	0.3	0.05	0.18	0.8	0.08	6

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

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F-66, Road No.2, Phase-I, UPSIDC Industrial Area
Masuri Gulawathi Road, Ghazibad (UP)-201009

Recognized by Ministry of Environment & Forests, GOI
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----------TEST REPORT----------

Date: 08-06-2014

Issued To : EMTRC Consultants Pvt. Ltd.
UM-113A, 113, Ansal Plaza, Vaishali, Ghaziabad.
Name of Project : ACC Nandini Khundini Limestone Mines
(Production Capacity Enhancement)
Village- Nandini Khundini, Tehsil- Dhamda
District-Durg, Chattisgarh
Nature of Sampling : Noise Quality Monitoring
Party Code No. : ACC/70/25
Date of Monitoring : 17.04.2014 to 24.04.2014
Sample Collected by : Scientist of EMTRC

Ambient Noise Level

Location Name	Category	Day time Leq dB(A)	Standard Day time Leq dB(A)	Night time Leq dB(A)	Standard Night time Leq dB(A)
Pathariya-I, Mine Office	Near Mining Zone	58.6	75.0	49.8	65.0
Nandani Khundini Mine	Core Zone	47.2	55.0	41.4	45.0
Hardi Village	Residential	49.6	55.0	42.6	45.0
Girhola Village	Residential	48.8	55.0	41.8	45.0
Ahiwara Village	Residential	48.2	55.0	41.6	45.0
Potia Village	Residential	50.2	55.0	42.4	45.0
Medasara Village	Residential	51.4	55.0	42.6	45.0
Deorjhal Village	Residential	51.4	55.0	42.6	45.0

Prepared by (Chemist) | Checked by (Sr.Chemist) | Authorized Signatory (Government Analyst)

ANNEXURE-4 MODELING INPUT & OUTPUT DATA

```
   CO STARTING
      TITLEONE NKM LIMESTONE MINES
      TITLETWO TSP EMISSIONS
      MODELOPT DFAULT CONC RURAL
      AVERTIME 24 PERIOD
      POLLUTID TSP
      TERRHGTS FLAT
      RUNORNOT RUN
    CO FINISHED

    SO STARTING
    ** HAULR1 HAUL ROAD
    ** TLOAD1 TRUCK LOADING LIMESTONE
    ** DRILLING1
       LOCATION HAULR1 VOLUME 00. 1000.
       LOCATION TLOAD1 VOLUME 00. 300.
       LOCATION DRILLING VOLUME 200. 500.
       SRCPARAM HAULR1 4.3 1.0 1000.0 2.0
       SRCPARAM TLOAD1 0.3 5.0 2.0 1.1
       SRCPARAM DRILLING1 0.068 1.0 465.0 1.2
       SRCGROUP ALL
    SO FINISHED

    RE STARTING
       GRIDCART GRID1 STA
                      XYINC -2500.0 21 250.0 -2500.0 21 250.0
                GRID1 END
    RE FINISHED

    ME STARTING
       INPUTFIL C:\NKM\NKM.MET



    ANEMHGHT 10.0
    SURFDATA 111 2014 XXX
    UAIRDATA 111 2014 XXX
    WDROTATE 180
ME FINISHED

OU STARTING
    RECTABLE 24 FIRST
    MAXTABLE 24 10
    PLOTFILE 24 ALL FIRST C:\NKM\NKMP.PLT
OU FINISHED


 *** Message Summary For ISCST3 Model Setup ***

 ---------- Summary of Total Messages --------

A Total of           0 Fatal Error Message(s)
A Total of           2 Warning Message(s)
A Total of           0 Informational Message(s)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
SO W320    18 VPARM :Source Parameter May Be Out-of-Range for Parameter  SYINIT
SO W320    20 VPARM :Source Parameter May Be Out-of-Range for Parameter  SYINIT

**********************************
*** SETUP Finishes Successfully ***
**********************************
```

```
*** ISCST3 - VERSION 95250 ***     *** NKM LIMESTONE MINES
***         09/13/14
                                    *** TSP EMISSIONS
***         16:15:35

PAGE  22
 **MODELOPTs: CONC                          RURAL  FLAT           DFAULT

                                 *** THE MAXIMUM   10  24-HR AVERAGE CONCENTRATION   VALUES FOR
SOURCE GROUP:  ALL       ***
                                    INCLUDING SOURCE(S):    HAULR1  , TLOAD1  , DRILLING,

                                        ** CONC OF TSP       IN MICROGRAMS/M**3
**

 RANK       CONC     (YYMMDDHH) AT       RECEPTOR (XR,YR) OF TYPE    RANK       CONC     (YYMMDDHH)
AT       RECEPTOR (XR,YR) OF TYPE
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - -
   1.       9.10800 (14030124) AT (.00, 500.00)   GC   6. 5.05279 (14030124) AT (500.00,  500.00)
GC
   2.       9.00477 (14030124) AT (250.00,-250.00 GC   7. 4.71788 (14030124) AT (750.00,  -
250.00)GC
   3.       7.97449 (14030124) AT (   .00,750.00) GC   8. 4.70999 (14030124) AT (1000.00, -500.00)
GC
   4.       7.13401 (14030124) AT (250.00,500.00) GC   9. 4.54593 (14030124) AT (750.00,      .00)
GC
   5.       5.82636 (14030124) AT (500.00,500.00) GC   10.4.51537 (14030124) AT (750.00,  -
1500.00)GC

  *** RECEPTOR TYPES:  GC = GRIDCART
                       GP = GRIDPOLR
                       DC = DISCCART
                       DP = DISCPOLR
                       BD = BOUNDARY


   *** ISCST3 - VERSION 95250 ***     *** NKM LIMESTONE MINES
  ***         09/13/14
                                     *** TSP EMISSIONS
  ***         16:15:35

  PAGE  23
   **MODELOPTs: CONC                         RURAL  FLAT           DFAULT

                                          *** THE SUMMARY OF MAXIMUM PERIOD (    24 HRS) RESULTS
  ***


                                        ** CONC OF TSP       IN MICROGRAMS/M**3
  **


  NETWORK
   GROUP ID                        AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZFLAG)    OF
  TYPE  GRID-ID
   - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  - - - - - - - - - - - -

   ALL      1ST HIGHEST VALUE IS      9.10800 AT (    .00, 500.00,    .00,       .00)  GC   GRID1
            2ND HIGHEST VALUE IS      9.00477 AT (250.00, -250.00,   .00,       .00)  GC   GRID1


    *** RECEPTOR TYPES:  GC = GRIDCART
                         GP = GRIDPOLR
                         DC = DISCCART
                         DP = DISCPOLR
                         BD = BOUNDARY
```

```
  *** ISCST3 - VERSION 95250 ***     *** NKM LIMESTONE MINES
***         09/13/14
                                     *** TSP EMISSIONS
***         16:15:35

PAGE  24
 **MODELOPTs: CONC                        RURAL  FLAT           DFAULT

                                               *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                          ** CONC OF TSP       IN MICROGRAMS/M**3
**

                                                                  DATE
NETWORK
 GROUP ID                              AVERAGE CONC      (YYMMDDHH)             RECEPTOR  (XR, YR,
ZELEV, ZFLAG)     OF TYPE  GRID-ID
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - -

 ALL      HIGH  1ST HIGH VALUE IS      9.10800  ON 14030124: AT ( .00,    500.00,    .00,    .00)
GC   GRID1


  *** RECEPTOR TYPES:  GC = GRIDCART
                       GP = GRIDPOLR
                       DC = DISCCART
                       DP = DISCPOLR
                       BD = BOUNDARY



    *** ISCST3 - VERSION 95250 ***     *** NKM LIMESTONE MINES
   ***         09/13/14
                                       *** TSP EMISSIONS
   ***         16:15:35

   PAGE  25

   **MODELOPTs: CONC                        RURAL  FLAT           DFAULT


    *** Message Summary: ISCST3 Model Execution ***

     ---------- Summary of Total Messages --------

    A Total of           0 Fatal Error Message(s)
    A Total of           2 Warning Message(s)
    A Total of           6 Informational Message(s)


       ******** FATAL ERROR MESSAGES ********
                  ***  NONE  ***


       ********   WARNING MESSAGES   ********
    SO W320    18 VPARM :Source Parameter May Be Out-of-Range for Parameter  SYINIT
    SO W320    20 VPARM :Source Parameter May Be Out-of-Range for Parameter  SYINIT

       ************************************
       *** ISCST3 Finishes Successfully ***
       ************************************
```

Met Data

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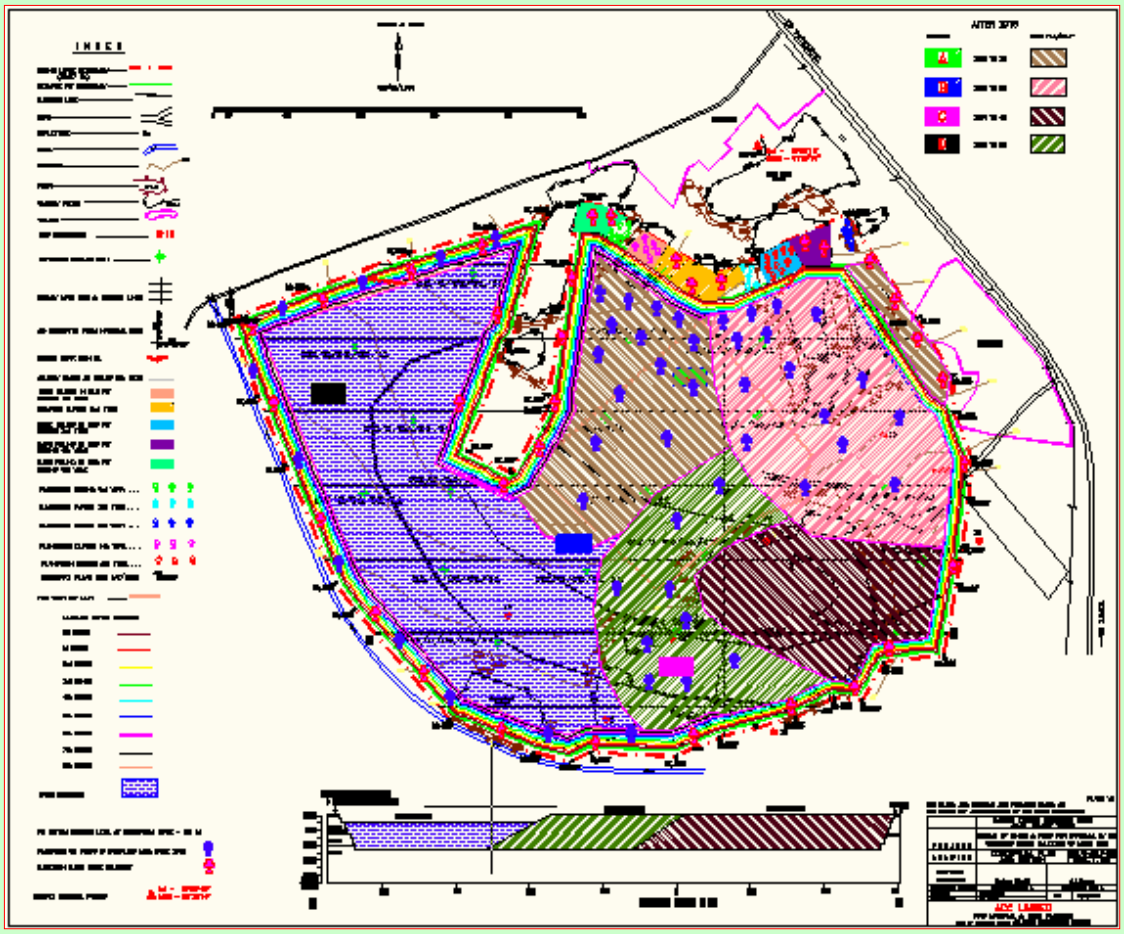
             111 2014  111 2014
  14030101 180.0      0.50   293.0 6    00.
  14030102 202.5      0.50   293.0 6    00.
  14030103 180.5      0.80   293.0 6    00.
  14030104 270.5      0.50   293.0 6    00.
  14030105 202.0      1.50   293.5 6    50.
  14030106 292.5      1.50   294.0 6    50.
  14030107 222.0      2.90   295.0 2    50.
  14030108 180.0      2.20   296.5 2    50.
  14030109 202.0      3.50   298.0 2   200.
  14030110 224.0      2.20   299.0 2   500.
  14030111 315.5      2.10   300.0 2   700.
  14030112 270.0      2.60   301.3 2   900.
  14030113 247.5      3.20   303.0 2  1000.
  14030114 202.0      3.40   305.0 2  1100.
  14030115 224.5      3.50   305.0 2  1100.
  14030116 247.0      3.00   304.2 2   800.
  14030117 202.0      2.10   303.0 2   600.
  14030118 292.0      2.20   300.8 3   500.
  14030119 247.5      2.40   298.0 6   200.
  14030120 180.0      2.00   296.0 6   100.
  14030121 336.0      1.00   295.0 6    50.
  14030122 202.0      0.50   294.0 6    50.
  14030123  45.0      0.50   293.0 6    00.
  14030124  22.5      0.50   293.0 6    00.
```

Annexure 5
Hydrogeology Report

HYDROGEOLOGY REPORT ON GROUNDWATER AVAILABILITY , RAINWATER HARVESTING AND ARTIFICIAL RECHARGE, MEASURES FOR GROUNDWATER RECHARGE IN NANDINI KHUNDINI LIMESTONE MINE AREA, DISTRICT DURG, CHHATTISGARH.



EMTRC Consultants Private Limited

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EMTRC Consultants Accredited by NABET / QCI (Mining-Category A)

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AUGUST 2015

CONTENTS

LSIT OF ANNEXURES

EXECUTIVE SUMMARY

Nandini Khundini limestone mines has a mineable reserve of 43.74 million tons of cement grade limestone; as such the life of this mine based on enhanced mining is around 45 years. The deepest level to which the mine activity would be carried out is 60 meter below ground level. The mining area at Nandini Khundini is separated from Pathariya-I by 950 m and Patharia-II by 450 m. Mining lease of 53.57 hectares area was granted by the MP State Government in the year 1971 to Bhilai Steel Plant and was denotified later. This mining lease was granted to ACC by Chhattisgarh Government in the year 2008.

Mining is proposed to be carried out by opencast method of mining by Shovel Tipper combination and is mechanised. The limestone from the mine will be transported to the limestone crusher located in the Jamul mines at a distance of about 20 km. Transportation of ore and other materials will be done using tippers. The Nandini mine is located north latitude 21° 23' 20.6" & east longitude of 81° 23' 16". The mine is connected by Bhilai and Durg by asphalt roads. Durg railway station is located about 20 km from Nandini. The mines is connected to important cities & towns by a network of National & State Highways. The National Highway No.6 from Mumbai to Kolkata passes through Bhilai - Durg. The mine site is at a distance of approximately 28 km from Bhilai, the nearest town. The nearest airport is at Raipur about 70 km from the mine site. Nandini mine is well connected with Jamul Township, Bhilai, Durg and Dhamdha by road. The cement plant site at Jamul is about 22 km in south direction of the mine site.

Water is required for mining operations mainly for sprinkling on haulage roads and at faces for suppression of dust and plantation. Water is also required for washing and servicing utilities for equipment. Water requirement for the mines is 20 m^3/day (dust suppression and plantation). Mine water harvested in rainy reason will be used. The drinking water requirement of the workers will be met by water supply tankers. Ground water will not be drawn for mining operations.

The investigated area is characterized geomorphologically by peniplain of carbonate and argillaceous rocks. The general elevation varies from 270 to 294 m amsl. The area is having gentle contour separation. Geologically the entire study area is mainly occupied by Chandi limestone of Raipur Group of Mesoproterozoic age. Chhattisgarh Supergroup comprises of un-metamorphosed, structurally undisturbed marine sedimentary rocks and is equivalent to lower Vindhyan rocks and Kurnul rocks of North and South India respectively. Hydrogeologically the rocks of the study area are grouped into hard rock category as the secondary porosity in these rocks much dominated over primary porosity. The ground water occurrence in these limestone are mainly restricted in weathered part and cavernous and fractured zone in unconfined to semi-confined condition.

The ground water level in core zone varies from 1.5 to 20.8 mbgl in Post monsoon (i.e November 2014) and between 2.0 and 23.33 mbgl in pre monsoon (May/June 2014). The ground water level near the mine remains within 23.33 m in pre monsoon and within 11.2 m in post monsoon period. The Chandi limestones are considered one of the best aquifer in this region. These thickly stratified carbonates are having prolific development of cavernous zone below weathered top layer. The caverns are dominant in upper 90 m zone, mainly filled with residual clays. However cavernous are found up to 150 m depth in these limestone. The drill time discharge for these limestones varies from seepage to as high as 20 lps excluding massive area. The average discharge remains between 2 and 7 lps for a moderate drawdown of 10-25 m. The transmissivity of these limestone ranges from 1 to 250 m^2/day with moderate storativity

0.003 to 0.000025. This aquifer is being tapped for irrigation purpose. Ground water development in the area is moderate to good. It is estimated to be 68.05% of the available resource potential and hence the area falls under the safe category.

Ground water development in the three blocks coming under study area (core and buffer zone) is reported to be above 75% in Durg and Dhamdha blocks and these blocks fall under Semi-Critical Category and 66% (Safe) for Berla block. Out of total irrigated area in the study area, the contribution of ground water irrigation is about 2900 ha. As the ground water development in the study area is about to touch the semi-critical category, more emphasis is given towards groundwater conservation.

There will not be any additional impact on land use. There are no natural watercourses within the mining lease area. The lease area is almost flat with a gentle slope towards West. The rainwater from the entire leasehold area flows East to West and reaches Shivnath river. The nallahs outside the ML area remains dry in all seasons except in rainy season. Some of the accumulated water in the working pit, due to rains or otherwise will be pumped out to temporarily abandoned pits, which has been converted into water reservoir. During the non-monsoon and monsoon seasons, the water harvested in the mine pits will be used mainly for plantation and dust control. Some water will be also released into the surface drainage channels and as a consequence some increase in flow quantities may be noticed during monsoon. As there is no toxic substance being discharged, there is no adverse effect on the water regime.

The radius of influence of dewatering from the mine in summer is found to be not more than 200-300 m in calcareous rock formation of the area. As there are no extraction structures within 300 m radius of mine and the aquifer is having moderate hydraulic parameters, impact on ground water of the area will be limited in extent.

As per the requirement groundwater modeling has been initiated for the core zone area taking the watershed as boundary to keep watch on the impact of dewatering from mine out area. The water table in the study area is as low as 1 m below ground level during monsoon period and about 23.33 m below ground in summer season as recorded in nearby wells as well as excavated pits. As per the water level data of the observation wells existing in neighboring villages there is negligible fall in water table or change in quantity. Farmers are taking wheat and sugarcane, gram and vegetables in the surrounding villages of Kerali, Kanharpui, Basni, Khapri, Dhaur, Kokri, Samoda, , Rawledih and Nandori**.**

Moreover, rainwater harvesting through abundant mine pits is recharging about 303 ha.m of water every year. This will further reduce the impact of dewatering and provide source of continuous recharge. As per the information of the farmers of Pathariya and Sohgaon villages the sustainability of theirs abstraction structures has increase because of the recharge of the ground water by this reservoir. There is no change in surface or ground water quality however rainwater harvesting has dilution effect on the ground water of the surrounding area to the mine lease. Comparison with baseline data and that of government agencies also shows the same. The fractures created due to mining activity in the local rocks will also enhance the natural recharge in the area.

Constant monitoring of ground water levels and quality is proposed during coming years. It can be concluded that mine expansion activities within the mine lease area will not have any deleterious effect on the ground water regime of the area.

1.0 INTRODUCTION

The mining area at Nandini Khundini separated from Pathariya-I by a meager distance of 950 m and Patharia-II by 450 m.A mining lease of 53.57 hectares area was granted by the State Government in the year 1971 to Bhilai Steel plant and was denotified and granted to ACC in the year 2008. The Nandini Khundini has a mineable reserve of 43.74 million tonnes of cement grade limestone (UNFC111 Reserves); as such the life of these mine based on enhanced mining is around 45 years. The deepest level to which the mine activity would be carried out is 60 m below the ground level of 284m amsl. The mining is being carried out by opencast method of mining by Shovel Tipper combination and is mechanised. The limestone from these mines are transported to the limestone crusher located in the cement plant area at a distance of about 25 km. Transportation of ore and other materials is done by using tippers/trucks.

Water is required for mining operations/establishment mainly for sprinkling on haulage roads and at faces for suppression of dust and plantation. Water is also required for washing and servicing utilities for equipment. Water requirement for the existing mines is about 12 m^3/day. Mine water harvested in rainy reason will be used

For obtaining environmental clearance for the enhanced limestone production capacity of the mine Hydrogeological Report has been prepared. The objective of this report is to review the present ground water regime and resources and to assess the impact of dewatering due to present and additional limestone mining, if any, and to suggest corrective measures as required and maximize the benefits. Field studies were carried out in core area comprising existing mines as well as in the buffer zone falling within 10 km radius from Nandini Khundini and Pathariya Limestone Mines (Lease I & Lease II). Dug wells and hand pumps/Bore wells were inventoried at different locations and observation wells network was established for carrying out periodic monitoring of water levels in the future. Water samples were collected from different types of ground water abstraction structures occurring in varied geological and hydrogeological environs and also from mine area and surface water bodies.

Local and Regional Geology, topography, drainage pattern, land use and cropping pattern were studied in the field. Data was also collected from State and Central Govt. offices to correlate with field information and for precise assessment of ground water resources of the area. Efforts are made to calculate the ground water resources (as on 2013) for the buffer zone based on 1997 norms of GEC. Ground water modeling has been initiated for the core zone and surrounding 5 km area of mines to predict the impact of dewatering from mines as well as by rain water harvesting and artificial recharge to ground water work undertaken in the area.

1.1 LOCATION

Jamul Cement Works started its production in the year 1965 with an installed capacity of 2.5 lakh tonnes of cement per annum. At present clinkerisation is done in three kilns having capacity of 2300 tonnes/day (TPD) in order to manufacture 6.33 LTA clinker. At present, capacity of the plant is 15.80 LTA of slag cement. NandiniKhundini Limestone Mining Lease area are located in Dhamdha tehsil of Durg district of Chhattisgarh covering an area of 53.57 hectares of mining lease (ML), under the village areas of NandiniKhundini tehsil Dhamdha and is located at north latitude 21° 23' 20.6" & east longitude of 81° 23' 16". The location of the mine lease area is given in **Fig 1.1.**

The Nandini-Khundini mine is connected by Bhilai and Durg by all-weather roads. Village is at about 20 km, NE of Durg Railway station (situated on Nagpur - Howrah Broad Gauge of South Eastern Central Railway). It is well connected to important cities & towns by a network of National & State Highways. The National Highway No. 6 from Mumbai to Kolkata passes through Bhilai area. The mine site is at a distance of approximately 28 km from Bhilai, the nearest town. The nearest airport is at Raipur about 70

km from the mine site. The mine is well connected with Jamul township, Bhilai, Durg and Dhamdha by road. The cement plant site at Jamul is about 20 km in south direction of the mine site and well connected with communication facilities like telephone, fax, wireless and e mail.

The study area in the Dhamdha tehsil of durg district of Chhattisgarh is bound on the north by Saja, on the east by Berla tehsils of the Durg district and on the west by Rajnandgaon district as shown in **Fig 1.2.** The buffer zone covering 10 km radius area demarcated for the present study falls in Durg tehsil (5200 ha) Dhamdha tehsil (25300 ha) and Berla tehsil (900 ha) of Durg district. The buffer zone is bounded between north latitudes 21°09'38" to 21°20'21" and east longitudes 81°16'21" to 81°27'55".

1.2 DEMOGRAPHY

Out of the total population of ~90000 within buffer zone of Nandini Khundini Limestone Mine 36% is urban, and 64% comprise of rural population. Most of the urban population is residing in Dhamdha and Ahiwara (Nagar Palika). Of the total population, males : females is 50:50. 18% of the total population belongs to the scheduled caste and only 7% to the scheduled tribe. Most of the rural population is engaged in the agricultural related work

.

1.3 LAND USE PATTERN OF MINING LEASE

The mining lease area does not fall under forestland and is completely barren land devoid of vegetation and plants.The entire lease of both the lease areas fall in non-forest area. The mining lease area comprises of wasteland with sparsely vegetated and nonagricultural land. There are no ecological sensitive areas and archeological important places within buffer zone (10 km radius). The present land use pattern of the lease area is given in **Table 1.1.**

Table-1.1: Land use Pattern of Mining Lease Area

Sr.No.	Land use	Area (hectares)
1	Present broken area-Pit	11.48
2	Reservoir	14.8
3	Green belt area: (hectares)	3.01
4	Dump and back filled: (hectares)	1.79
5	Undisturbed area	
	Total	**53.57**

1.4 AGRICULTURE

Agriculture is the main occupation of local population and maximum area is utilized for this.The villages don't have sufficient irrigation facilities and most of the crop cultivation is by rain fed farming. Agriculture season begins in the month of June with onset of SW monsoon.Paddy is the predominant crop and maize and jowar are other dry crops grown. October & November are the harvesting months for paddy. Wheat, sugarcane, pulses and vegetables are the second crop grown in the area, wherever the irrigation facilities are available. Vegetables are also extensively grown in the vicinity of the cities, townships and flourishing villages. Main staple food of the area is rice and wheat.

1.5 IRRIGATION

The irrigated area in buffer zone is 2900 hectares i.e, which constitutes only 9.20% of the total study area. Electric supply from the Chhattisgarh State Electricity Board is available for both domestic and agricultural purposes but supply through rural feeder is very erratic. Ground water irrigation by dug wells and bore wells in Kerali, Kanharpui, Basni, Khapri, Dhaur, Kokri, Samoda,Rawledih and Nandori villages is visible. In Maharajpur, Sanesarar and Basni villages the irrigation through the river is also observed. The agricultural land of Raweldih, Sohagaon, Ghikuriya, Gihola and Boregaon villages is also irrigated through the canal, but this canal irrigation is available only in Khariff season.Most of the irrigated area comes under paddy crop in khariff season. The cash crop such as sugarcane and vegetables are being grown by

the farmers through ground water irrigation from bore wells/dugwells and rivers. Un-irrigated area forms about 91 per cent of the total crop area as the area receives good quantity of rainfall (~ 1200 mm) mostly evenly distributed during monsoon, paddy is cultivated utilizing rainwater effectively. Jowar, maize and vegetables are also sown. Within the vicinity of urban area, the vegetables are grown as cash crops.

1.6 INDUSTRIES

No major or medium industry is present within the buffer zone of the mine lease area. Pathariya Limestone mines (Lease I & II) of the ACC and several crushers are located within the buffer zone.

1.7 PHYSIOGRAPHY

The present mine lease area and study area falls on the plain/rolling terrain and the site elevation is uniform at around 280 m above Mean Sea Level (MSL). The slopes of the area are gentle in gradient. There are no natural watercourses within mining lease area. The both the lease areas are almost flat with a gentle slope towards West. The rainwater from the entire leasehold area flows east to west and reaches Shivnath river through a natural nallahs flowing in South West direction. The nallahs remains dry in all seasons except in rainy season. The Shivnath river is flowing at a distance of 3.6 kms from western boundary of the mine. River Amner joins Shivnath river in the buffer zone. Shahgaon minor irrigation canal runs almost parallel to the eastern boundary of the mine and distance of canal from lease boundary varies from 50 m to 80 m. This canal is earthen canal with earthen embankments on two sides. The Pathariya village is the nearest human settlement, which lies in the North-West at a distance of 1.5 km from the northern tips. At places outcrops of limestone is also observed.

The present study area falls between Amner, Shivnath and Kharun rivers. In fact, a gently grazing lowly elevated ground apparently separates the Shivnath watershed in the west from that of the Kharun in the east. Here the gradient is so gentle that the altitudes in the Pathariya from a part of the Shivnath basin proper falls from 305 to 265 m in a northwesterly run of just 10 km.

1.8 HYDROMETEOROLOGY

The climate of Durg district in general and the Durg-Bhilai-Jamul area in particular is characterized by a hot summer and a well-distributed rainfall during the southwestern monsoon season extending from June to October. The area has 4 well-defined seasons in a year. The winter season commences from early December and continues up to the end of February, Summer season extends from March to early June, rainy season generally from mid-June to September and the post-monsoon season from October to November. Maximum temperature in summer goes up to 46°C in the month of April/ May and the mean minimum temperature goes down to 11 to 12°C in the month of December/January. Climate of the area as a whole is semi–arid.

Monsoon generally breaks in the second week of June. Average annual rainfall in the area varies from 1200 to 1600 mm and the relative humidity is usually between 50 to 80%. The Relative Humidity is between 60 to 80%, 50 to 85% and 30 to 50% during post monsoon, winter and summer seasons. Winds are light to moderate in summer and winter seasons whereas, it's speed increases towards the end of the summer and becomes moderate to heavy in monsoon season. Monsoon in the area comes from south-westerly winds. Wind speed ranges between 5 to 15 km / hr.

The Meteorological data recorded at Indian Meteorological Department (IMD), for the years between 1935 and 2004 for Raipur meteorological stations was studied for climatic normal of the area. Raipur is located about 40 km east. An automatic recording weather station is also installed at sufficient height in Jamul Cement Works for recording hourly wind speed, direction, maximum and minimum temperature, relative humidity and daily rainfall. The salient features of the meteorological data of the surrounding area are given in **Table 1.2** and long-term trend of the rainfall analysis for the Raipur is given in **Table 1.3.**

Table 1.2: Salient Features of the Meteorological Data, IMD Raipur							
Month	Mean monthly rainfall (mm)	Mean monthly temperature		Mean monthly relativity humidity (%)	Mean monthly wind velocity (km/hr)	Mean Monthly Evapo-transpira-tion (mm)	number of rainy days
		Max °C	Min °C				
January	26.2	27.4	10.2	49.9	5.3	32	3
February	19.1	30.8	14.3	39.8	6.1	44	2
March	26.7	35.2	20.8	32.4	6.9	54	2
April	13.1	39.4	25.3	30.2	8.4	91	2
May	24.5	45	28.2	31.6	10.7	116	2
June	205.9	37.1	26.4	65.0	12.1	68	11
July	392	35.8	23.9	86.1	11.8	37	19
August	358.8	30.1	23.9	87.3	10.4	37	19
September	221.2	31.1	23.8	75.6	7.4	36	12
October	57.3	31.2	26.6	64.2	6	39	5
November	17.8	29.2	16.1	53.5	4.1	35	2
December	3.4	27.1	13.1	52.3	4.4	30	3

Table 1.3: Long Term Rainfall Distribution in Bhilai and Raipur

Rain Guage station	Rainfall data period availability	Average rainfall in mm	Highest rainfall in mm (Year)	Lowest rainfall in mm (Year)	Number of Rainy days	Standard deviation average in mm	Coefficient of variation	Average annual monsoonal rainfall in %
Raipur	1935-2004 (70 yrs)	1219	2175 (1947)	649 (1979)	60-65	307	25	89%

1.8.1 Rainfall

Study of the rainfall data reveals the following

- The long term average of last five decade worked out to be 1064 and 1219 mm for Raipur. This has been considered as the normal rainfall for long term analysis. **(Annexure II)**
- The rainy season in the area extends from mid June to September. The rainfall is the highest in July and August that is about 350 mm. The average rainfall of the area is about 250 mm per month for rainy season.
- Themeantotalrainfall during the monsoon period has been recorded as 89% of the mean total rainfall for the whole year.
- The average number of rainy days varies from 60-65 in the monsoon.
- The rainfall is not spread throughout the year since nearly 89 % occurs during June to October period
- The probability of occurrence of drought is 1 in every 3.5 years.
- There is no significant change in the rainfall pattern over the previous five decade
- Maximum rainfall recorded till date was 64 mm in 30 min (in the night of 18th Aug- 83- between 10.45 PM & 11.15 PM). The monsoon is not a period of continuous rainfall. Heavy rainfall activity in various parts of the Mahanadi Basin is due to the passage of low-pressure region. Depressions formed in Bay of Bengal at a frequency of 2 to 3 per month cause excessive rainfall of about 100- 200 mm per day along the trough. Thus there is spatial distribution of rainfall over

the Chhattisgarh plain. The trend analysis is shown in **Fig. 1.4** where there is a declined in rainfall at Raipur.

- The Rainfall data for the period of 1994 and 2014 for the Jamul Cement Works shows that the average annual rainfall is 1458.73 mm, **Fig. 1.5**, out of which about 85% of the total rainfall occur during the monsoon period i.e 1240mm**.**

1.9 RAW MATERIAL REQUIREMENT FOR JAMUL CEMENT PLANT

In order to meet the additional lime stone demand for the proposed expansion activity of cement plant (4.33 MTPA), ACC Jamul Cement Works proposes to increase the production in the existing 'Nandini Limestone Mine' within the existing mining lease area. The Mining Plan and Scheme of Mining has been beenapproved by Indian Bureau of Mines under MCDR 2015. The limestone from Nandini-Khundini mines will be blended in 40:60 ratio with the sub-grade limestone from Jamul mines.

Table-1.4: Raw Material Requirement

	Mineral	Existing Plant (1.58 MTPA)	After Expansion (4.33 MTPA)
1	Limestone	1.21	3.0
2	Gypsum	0.079	0.216
3	Coal	0.15	0.413
4	Slag	0.758	2.07

1.10 LIMESTONE QUALITY

Table-1.5: Average Quality of Limestone

Composition	Quality, %
SiO_2	9.93 - 10.07
Al_2O_3	2.85 - 2.96
Fe_2O_3	1.63 – 1.65
CaO	45.20 – 45.42
MgO	2.15 – 2.30
LOI	37.20 – 39.08

1.11WATER SUPPLY AND REQUIREMENT

Water is required for mining operations mainly for sprinkling on haulage roads and at faces for suppression of dust. Water will not be required for washing and servicing utilities because it will be done in Pathariya-I Mine. Water requirement for the proposed mines is 20 m^3/day. Mine water harvested in rainy reason will be used for the purpose of water spraying & plantation. The drinking water requirement of the mines workers will be supplied by tankers.

Table 1.6: Mine's Water requirement

Domestic	4 KL / Day
Sprinkling for dust suppression	10 KL / Day
Plantation	6 KL / Day
Total water consumption = 20 KL/Day	

2.0 GEOMORPHOLOGY AND GEOLOGY

The Durg district of Chhattisgarh state in general and the Dhamdha, Durg, and Berla blocks in particular are occupied by sedimentary rocks of Proterozoic age. The study area is having undulating plain, product of mature topography and drainage pattern.

2.1 GEOMORPHOLOGY

Morphologically the entire study area (both core and buffer zone) comes under penepalin of carbonate and argillaceous rocks. The general elevation varies from 270 to 294 m amsl. The area is having gentle contour separation. The surface water divide of Kharunriver and Seonath river run NNE-SSW between Pandritarai and Bagdumar forming a bit elevated area. The entire study area falls under Mahanadi basin and Seonath sub basin.

2.1.1 Drainage

Seonath River is the main drainage in the study area. The Amner river and Seonath rive are perennial rivers. All other nala joining Seonath and Kharunriver are seasonal nalas. The Seonath River flows south to north in the western part of study area. The core area falls under Seonath catchments having general slope SE to NE direction. The drainage is sub annular to dendritic in pattern where the drainage density is moderate**.**

2.1.2 Lineament

The area having prominent sets of Joints which can be classified into two perfect and three imperfect sets as shown in the Figure. The drainage follow the joint pattern and the lineament formed their off. The frequency of occurrence of NW-SE lineaments is highest found in the area.

2.2 GEOLOGY

Geologically the entire study area is mainly occupied by Chandi limestone of Raipur Group of Mesoproterozoic age.

2.2.1 Regional Geology

Chhattisgarh Supergroup comprises of un-metamorphosed, structurally undisturbed marine sedimentary rocks that are equivalent to lower Vindhyan rocks and Kurnul rocks of North and South India respectively. The Chrono-stratigraphic sequence established for the region by Geoscientists is presented in **Table 2.1**. The rocks of Chhattisgarh Supergroup is deposited in two main basin namely Hirri sub basin and Baradwar sub basin. In Hirrisubbasin the formations of Raipur Group are well established and developed in comparison to Baradwar sub basin. The Raipur Group is un-conformably laying over the basal arenaceousChandarpur Group.

2.2.2 Local Geology

The entire study area comes under the Hirri sub basin of Chhattisgarh basin. The rocks of Chandi and Tarenga Formations are exposed in the area. Isolated laterite patches are developed over Chandi Formation.

2.2.2.1 Chandi Formation

The Chandi Formation is mainly comprises of limestone, which is stromatolitic and karstic in nature. At places the limestone grades to dolomite. Occasional intercalation of shale to limestone in vertical and horizontal direction as facies variation is seen in these limestone. Based on the colour and availability of stromatolitic species and limestone- dolomite ratio, these limestone are further subdivided into three Carbonate member and a shale-sandstone member namely Niwari- Pendri- Nipania and Deodongarh member (Table-2.1). These limestones are horizontally bedded structurally undisturbed non-metamorphic

rocks. These stratified limestones are thick to medium bedded and jointed. Two to three set vertical to inclined joints are common. The stromatolitic structures found in these limestones are primitive bun shape to most advance branched and branched with bridge type. These limestones are purple to grey in colour, micritic in grain size, hard and compact. The Chandi limestone is being mined at several places in the state for cement manufacturing and other industrial purpose. In the study area Chandi limestone is being exploited for cement Industry by ACC, for steel manufacturing by BSP and for road and building material by several small pit holders. Maximum part of the study areas is occupied by Chandi limestone (**Fig2.2**.)

2.2.2.2 Tarenga Formation

Tarenga Formation occupies a small northern part of the study area. The Tarenga Formation mainly comprises of argillaceous dolomite and shale. These are bedded and laminated shale- dolomites. Purple to pink in colour. The Argillaceous dolomites are silt size hard and compact.

Table 2.1 Stratigraphic sequence in the Study Area, Durg district, Chhattisgarh

AGE		GROUP/FORMATION			LITHOLOGY
Recent to Sub Recent		Alluvium	Sand, clay , gravel		
Unconformity					
Meso-Proterozoic	**Chhattisgarh Supergroup**	Intrusive	Dyke		Basic intrusive
		Raipur Group	Maniari Formation		Gypsum shale
			Hirri Formation		Dolomite
			Tarenga Formation		Argillaceous dolomite and shale
			Chandi Formation	Deodongarh Member	Ferruginous sandstone and shale
				Nipania Member	Stromatolitic karstic limestone, dolomite and intercalated shale
				Pendri Member	
				Niwari Member	
			Gunderdehi Formation		Purple calcareous shale
			Charmuria Formation		Grey flaggy limestone and purple shale
		Chandarpur Group	Orthoquartzitic to sub- arkosic sandstone with shale and basal conglomerate		
Non Conformity					
Proterozoic to Archaean		Basement Crystalline			Granite, Granitic gneiss and mica Schist with vein quartz and pegmatite

2.2.2.3 Laterite

Small isolated blanket covers of Laterites occur above Chandi limestone in the study area. The maximum thickness of these lateritic covers is more thne10 m. Well-developed lithomergic clay can be seen in some of the quarry section and dug wells. The laterite cover area is generally forming uplands.

2.2.3 Geology of mine area

The limestone in mine area is massive and fine-grained .The colour varies from chocolate to purple. This limestone varies in composition laterally as well as vertically. This variation is due to the irregular occurrence of intercalated bands of calcareous shale, argillaceous limestone throughout the formation. The occurrences of high magnesium shales as intercalations within the limestone are seen. The shale is usually purple in colour and can be easily distinguished from the limestone by their typical earthy appearance. The quality variation is so extensive that even in any 10 m length of cores all the different types ranging from a high-grade limestone to low calcium-bearing shale can be seen. Based on borehole data, four lithological units are recognized within the calcareous horizon of the mining lease. These are a) Limestone b) Shaly Limestone, c)Magnesium Limestone and d)Dolomitic Limestone. Out of these

four litho units, shaly limestone and magnesium limestone taken together define a marker bed with an average thickness of about 5 m around 244 -234 m. R.L. The occurrence of magnesium limestone however, is irregular as to its thickness, quality and disposition. No regular bands of magnesium limestone as such can be recognized.

3.0 HYDROGEOLOGY

The detailed hydrogeological investigations are carried out in the common buffer zone comprising 314 sq.km area of Pathariya and Nandini-Khundini mines covering 25villages falling in Dhamdha, Berla and Durg blocks of Durg district of Chhattisgarh. Based on this detailed study, well inventory and available literature the hydrogeological conditions of the area are worked out. Hydrogeologically the rocks of the study area are grouped into hard rock category as the secondary porosity in these rocks much dominated over primary porosity.

3.1 Chandi Limestone

This unit covers the maximum part of the study area, including the entire core zone and most part of buffer zone. The ground water occurrence in these limestone are mainly restricted in weathered part and cavernous and fractured zone in unconfined to semi-confined condition. Total 50 dug wells and hand pumps/BW were monitored in these limestone where the ground water level varies from 0.75 to 23.55 m bgl in pre monsoon (i.e. May 2014). The depth to water table map prepared for pre and post monsoon period is shown in **Fig**. 3.1 & 3.2 and water level fluctuation is presented in **Fig 3.3.**The ground water level near the Nandini mine core zone remain within 24 m in pre-monsoon. The monitoring data of close vicinity of mine is given in **Table 3.1**

Table 3.1 Silent features of Inventory wells around core zone

SN.	Pathariya Location	Type	DTW May, 2014 mbgl	DTW Nov, 2014 mbgl	EC (May,2014)
1	Near Primary school Pathariya-I	HP	23.33	20.8	850
2	Pathariya-II	DW	19.69	8.7	
3	Pathariya-II	HP	17.96	11.2	620
4	Nandinikhundini	DW	2.0	1.5	
5	Nandinikhundini	BW	4.63	1.54	1190

Table 3.2 Silent features of Inventory wells in the study area

Formation	Type	Depth (m)	Dia (m)	GW level mbgl	GW level mbgl	EC µs/cm
				May2014 Pre monsoon	Nov 2014 Post monsoon	(May,2014)
Chandi Limestone	DW (18)	4.4-25	1.67-7.0	0.75-19.69	0.24-8.7	310-1630
	HP (32)	60-120	125-150mm	2.89-23.55	1.3-20.8	

The limestones are considered one of the best aquifer in this region. These thickly stratified carbonates are having prolific development of cavernous zone below weathered top layer. The caverns are dominant in upper 90 m zone, mainly filled with residual clays. However cavernous are found up to 150 m depth in these limestone. The drill time discharge for these limestones varies from seepage to as high as 20 lps. excluding massive area the average discharge remain between 2 and 7 lps for a moderate drawdown of 10-25 m. The transmissivity of these limestone ranges from 1 to 450 m^2/day with moderate storativity of

0.003 to 0.000025. This aquifer is being tapped for irrigation purpose in the area and having good ground water development. In the core zone of Pathariya mine no ground water abstraction structure exits.

3.2 Tarenga Shales

These shale covers only a very small northern part of the buffer zone. These shale- argillaceous dolomites are also having unconfined to semi confined aquifer with good potential.

3.3 Laterites

Laterites of the area forms small isolated aquifer of unconfined nature. These mainly occupied the physiographic highs in the plain area. These are having shallow water table with flow fluctuations. These aquifer is tapped by dug wells and having restricted potential and isolated behavior.

3.4 Ground Water Flow Regime

The ground water flow in the study area broadly follows the surface drainage. The ground water in Seonath watershed flows towards Seonathriver and in Kharun watershed it flows towards Kharun river forming a ground water divide nearly similar to surface water divide. Steep gradient in groundwater contour can be observed along Pathariya mine section is an indication of dewatering however it does not persist long. Interestingly a ground water plateau is being seen in Nandini abundant mine area representing sluggish movement of ground water in this part. This may be due to the huge rain water harvesting carried out in the abundant mine pit in the area **(Fig 3.4).** To further investigate the behavior of groundwater dynamics in detail in the core zone and its surroundings, groundwater modeling was done.

3.5 Long term water trend

The long term ground water trend obtained from the systematic monitoring of ground water level by state agency in the nearby permanent observation stations at Dhamdha show falling trend in Pre and Post monsoon water level. The Dhamdha block has been categorized as semi-critical in the latest GW Resource estimation, made jointly by State and Central agency. However the falling trend in both pre and post monsoon level is subject of concern(**Fig 3.5**), but it cannot be said that the mining operation alone is responsible for the declining trend. In any case it clearly represents the enhanced draft in the region during the decade when data of last five year considered shows reversed in trend this may be due to the conservation practice in the area. To overcome the situation efforts are to be made to arrest or slow down the rate of decline in the water level in the area.

3.6 Determination of Aquifer Performance

To determine the aquifer performance and its character pumping test has been conducted within the buffer zone of mining area. The detailed of which is appended as annexure. The karstic Chandi limestones at shallow depth possess conduit porosity. However dry wells are not uncommon in the terrain. Available literature show the transmissivity of Chandi limestone varies from 1 to 450m^2/day but largely remains below 100m^2/day. The specific yield has been estimated 0.03 to 0.04. The semi-confined aquifer is having storetivity in the range of 0.003 to 0.000025. These data were used to calibrate the proposed groundwater model of the area.

4.0 HYDROCHEMISTRY

Factors affecting the quality of ground water are permeability, chemical composition of the aquifer material and the length of time the water remains in contact with the aquifer material. Quality of water is being continuously monitored to maintain clean and safe water resources in its surroundings. 28 Ground water samples are collected from existing dug wells and bore wells nearer the mine premises and adjoining villages. Surface water samples were also collected from nearby streams for examining the physico-chemical and bacteriological parameters to assess the existing water quality of the study area. The samples were analyzed for various parameters and compared with the standards for drinking water quality as per IS: 10500 and IS: 2296 applicable for ground and surface water respectively. Few of the Location of water sampling sites are tabulated in **Table 4.1**.

Table 4.1: Water Sampling Locations

Station Code	Name of the Station	Distance w.r.t. PetheriyaMine site (km)	Direction w.r.t. Mine Site	Source
Ground water				
1	NandiniKundini Village	Lease-I: 2 Lease II: 2.5	NE	Borewell
2	Pathariya Village	Lease-I: 1.5 Lease II: 1.5	W	Borewell
3	Bagdumar Village	Lease-I: 7.5 Lease II: 9.0	S	Borewell
4	Damdha Village	Lease-I: 7.5 Lease II: 8.5	NW	Borewell
5	Nankatti Village	Lease-I: 8.0 Lease II: 7.0	SW	Borewell
6	Ahiwara Village	Lease-I: 7.5 Lease II: 8.0	NE	Borewell
7	Medesara Village	Lease-I: 3 Lease II: 2	SW	Borewell
Surface water				
SW1	Pathariya ML-I Discharge	--	--	Mine pit
SW2	Pathariya ML-II Discharge	--	--	Mine pit
SW3	Shivnath river	1.5	W	River

The detailed chemical analysis of samples is carried out in laboratory to obtain the chemical composition of these waters. The analytical results are presented in **Annexure.**A perusal of analytical data shows that the water samples, SW1 and SW2 are collected from Mines Discharge of Patheriya I and II, which is found slightly alkaline. Presence of copper and zinc is also observed though it is very much within limits. Most of the parameters are within the limit of designated use of water quality as per IS: 2296 Class C limits. The coliforms are also found to be within the limits. The water quality analysis indicates that the water is fit for designated use with precaution. Sampling done at Shivnath river shows that all the parameters are within the limit of designated use of water quality as per IS: 2296 Class C limits.The ground water is found hard at few locations hard having hardness in the range of 360-430 mg/l while at other locations it is within limit. The calcium content is found high in the range of 76-116. The chloride level at all locations is observed within limit TDS level exceeds marginally (530-1210) in few location being carbonate terrain. All of the heavy metal contents are found to be well below permissible limit in all the samples. Iron is found within limit in all sample. All samples show absence of total coliforms, which denotes the hygienic conditions surrounding the sampling locations. Overall the physico-chemical and

biological analysis revealed that the water is fit for drinking as per IS: 10500, Drinking Water Standards. Groundwater present in the phreatic aquifer is mainly alkaline in nature, where pH values ranges from 7.08 to 7.98. The electrical conductivity (EC) ranges between 310 to 1630 μs/cm at 25°C, which show the EC and pH ranges are within the desirable limits. The mine pit water (abandoned) having lowest EC of 172 μs/cm at 25°c in summer clearly show conserved of surplus run off. The nearest DW of abandon mine pit (where rain water harvesting is done) has EC value 335 μs/cm at 25°C. This is also indicating recharge in the surrounding area due to Rainwater Harvesting being done in the work out area within mine lease which is supported by the flattening of ground water contour near cone zone. The surface and sub-surface and mine discharge water of the lease area and in its vicinity are fresh and potable with all chemical constituents well within the permissible limits and fit for domestic, agriculture and industrial uses. All the parameters of these waters are in conformity with the limits stipulated by Bureau Of Indian Standards (BIS) for drinking use (IS:10500).There is no toxic element present in limestone & overburden. In order to minimize adverse effect of mining on water quality, various measures, such as, proper drainage arrangements for surface run-off water, preparation of bunds for arresting back water inrush in to working places, constructions of settling tanks in mine drains for settling of fines/sediments have been taken. Arrangement for periodical cleaning of settling tank has also been considered. In view of all the protective measures taken the quality of surface water is not likely to change in time and space.

5.0 GROUND WATER ASSESSMENT

In the context of present hydrogeological studies for Nandini mines, ground water assessment of the study area constituting mine lease and buffer zone is carried out applying GEC 1997 norms. The data collected from field were correlated with those prescribed in the GEC 1997 methodology and applied for prescribed and accurate assessment of ground water potential of the area. The computations of ground water resources of the three blocks under which the study area falls are given below in **Table 5.1**.

Table 5.1: Ground Water Resources of Berla, Dhamdha and Durg Blocks of Durg district

	Block	Net Annual Ground Water Avail-ability in ham	Existing Ground Water Draft for Irrigation In ham	Existing Gross Ground Water Draft for Domestic &Industrial water supply in ham	Existing Gross Ground Water Draft for all uses in ham	Allocation for domestic & Industrial Requirement supply upto next 25 years in ham	Net Ground Water availability for future irrigation Development in ham	Stage of ground water development %/category
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
2004	Berla	7297.41	3949.14	626.9	4576.04	883.83	2466.43	62.71 Safe
2009	Berla	6950.47	4284.35	326	4610.35	388.63	2277.49	66.33 Safe
2004	Dhamdha	8969.76	6008.5	776.78	6785.28	1095.28	1866.13	75.65 Semi-critical
2009	Dhamdha	10148.76	7145.01	624.44	7769.45	655.72	2348.03	76.56 Semi-critical
2004	Durg	4024.68	2941.71	439.74	3381.45	619.96	463.02	84.02 Semi-critical
2009	Durg	6299.33	4700.95	453.25	5154.20	586.25	1012.13	81.82 Semi-critical

Source: Report on Dynamic Ground Water Resources of Chhattisgarh,CGWB, Raipur

5.1 Ground water assessment for the Buffer Zone

Ground water estimation of buffer zone covering 10 km from the mines has been carried out based on latest (1997) GEC Methodology using various input data, applying different factors and formulae. Data/information collected from various state and central agencies and directly from village level during the course of field survey had been utilized for the evaluation of ground water resources in the buffer zone.Both Rainfall Infiltration and water Table Fluctuation Methods have been applied. When these methods were compared for rainfall recharge during monsoon period it was found that the percentage deviation was less than – 9.83% and accordingly for the final computation of ground water recharge, rainfall infiltration method was adopted.

Table 5.2: General Details for Ground Water Resources Estimation

Name of Administrative Blocks : Durg, Dhamdha and Berla, DistDurg, Chhattisgarh
a) Ground Water Assessment year : 2014-15
b) Total study area : 31400 ha
c) Hilly area : No
d) Area suitable for recharge :31400 ha
e) Command Area : 4710 ha
f) Non Command Area :26690 ha

g) Poor Ground water quality area : Nil
h) Normal Monsoon rainfall (1994-2013) :1239.9 mm
i) Normal Non-monsoon rainfall (1994-2013) : 213.6 mm
j) Monsoon rainfall during 2013 :1731.70 mm
k) Non-monsoon rainfall during 2013-14 :132.60 mm

I. Recharge by Rainfall Infiltration Method

Table 5.3: Normal Monsoon Rainfall Recharge by Infiltration Method

Formation	**Area suitable for recharge (ha)**	**Normal rainfall in m.**		**RF Infiltration Factor**	**Normal Rainfall Recharge (ham)**	
		Monsoon	Non monsoon		Monsoon	Non monsoon
Shale & Laterite	3600	1.2399	0.2136	0.03	133.91	23.07
Limestone	27800	1.2399	0.2136	0.065	2240.5	385.98
Total	**31400**	1.2399	0.2136		**2374.41**	**409.05**
				Grand Total	**2783.46**	

II. Recharge by Water Table Fluctuation Method

Table 5.4: Recharge By Water Table Fluctuation Method

S.No.	Formation	Area (ha)	Specific yield	WTF (m)	Change in storage (ha.m)
1.	**Shale & Laterite**	3600	0.01	4.8	172.8
2.	**Limestone**	27800	0.015	7.25	3023.25
				Grand Total	3196.05

Recharge Due to Monsoon Rainfall

Monsoon Rainfall Recharge =∠ S + Dgw – (Rgw + Rt + Rc + Rsw),Where
∠ S = Change in Storage due to fluctuation:
Dgw = Gross Ground Water Draft
Rgw = Return Seepage from Ground Water Irrigation (monsoon)
Rt= Recharge due to reservoirs, open storage tanks, mine pits
Rc = Recharge due to canal seepage
Rsw = Return seepage from surface water application
Monsoon Rainfall Recharge = 3196.05+ 1841.65 – 783 –82.27- 657.62 = 3514.8 ham
Normalisation for Normal Monsoon Rainfall (MRF Rc) is calculated as:
MRF R_c (Normal Monsoon RF/ Monsoon RF during the year)
MRF R_c = 3514.8 (1.2399/1.731) = 2516.60ham

Table 5.5: Recharge from other Conservation Structures

S. No	Name of water conservation structure	Storage capacity (ha.m)	Factor	Seepage (ha.m/day)	Recharge (ha.m)	
					Monsoon (100 days)	**Non monsoon (265 days)**
1.	**Rain water harvesting in abandoned quarries**	**818**	**0.0006**	**0.4908**	**49.08**	**130.06**
					Grand Total	179.14 ham

Table 5.6: Recharge from the Canal

S. no.	Name of canal Segment	Length of canal in metres	Wetted area in miliion square meters	Canal Seepage in ha m/ day	Numbars of days the canal segment is in operation during		Recharge from canal segment in hectare metres during	
					Monsoon	non monsoon	Monsoon	non monsoon
1	Minor (lined)	23500	0.1551	0.12408	60	0	7.4448	0
2	distributaries (unlined)	61150	0.3118	1.2472	60	0	74.832	0
						Total	**82.27**	

Canal seepage factor has been taken as 0.8 ha.m (20% of 4 ha.m for lined canal in normal soil)

Table 5.7: Return Flow from Surface Water Irrigation

Crop		Canal Irrigation Water applied in command area in (ha.m)	DTW in m bgl	Return flow factor for the command area as a whole	Return Seepage to GW (ham)	
Monsoon	**Non-monsoon**				**Monsoon**	Non monsoon
Paddy Jowar Maize & others	The Canal water is not applied	1399.2 *	<10	0.46	657.62	Nil
					Grand total	657.62 ham

*Design discharge is 5.0 m3/sec and canal runs for 60 days. At 60% efficiency the total water applied for irrigation is computed as 1399.2 ha.m

Table 5.8: Recharge from Ground Water Irrigation

Crop					**Return Seepage to GW (ha.m)**	
Monsoon	Non- monsoon	Gross GW Draft (ha.m)	DTW in mbgl	Seepage Factor	Monsoon	Non monsoon
Paddy, Jowar and Maize	Wheat Chillies and vegetables	1740 (monsoon) 1015 (non monsoon)	5-18	0.45 0.15	783	 152.25
					Grand total	935.25ham

Table 5.9: Recharge from village Tanks and Ponds

S. No	Total number of tanks/ ponds	Av. Water spread area in ha.		No. of days water available		Recharge @ 1.4 mm/day in ham	
		Monsoon	Non monsoon	Monsoon	Non Monsoon	Monsoon	Non Monsoon
1	109	425	210	100	265	59.5	77.9
						Grand Total	137.4 ham

Table 5.10: Current Gross Ground Water Draft for Irrigation

Area irrigated by Ground Water (ha)	Crop water requirement (m.)		Name of crop		Gross ground water draft (ha.m)	
	Monsoon	Non monsoon	Monsoon	Non monsoon	Monsoon	Non monsoon
2900	0.60	0.35	Paddy Jawar& Maize	Cotton, Wheat Chillies, Vegetables	1740	1015
					Grand Total	2755

Table 5.11: Ground Water Draft for Domestic Supply

S. No	Population from 2011 Census	Water requirement PC/DD in lts	**No. of days**		Gross ground water draft in ham	
			Monsoon	Non monsoon	Monsoon	Non monsoon
1.	Present population 90000	70	90	275	80.95	247.37
	Projected 128503				Total 328.32 ham	

Table 5.12: Gross Ground Water Draft from Mine Discharge

Discharge from	Unit Draft (ha.m/ day)		No. of days		Gross GW Draft (ha.m)	
Working Mine	Monsoon	Non monsoon	Monsoon	Non monsoon	Monsoon	Non monsoon
Lease area I & II and others mines	0.230	0.075	90	275	20.70	20.625
				Grand Total		41.325 ham

Table 5.13 Gross Ground Water Draft from Nearby Industrial Unit

Draft from ground water	**Unit Draft (ham/ day) during monsoon**	**Unit Draft (ham/ day) during Non monsoon**	**Gross Draft Ham**
	Nil	Nil	Nil
No big industrial unit is located in the buffer zone of Patheriya/ NK Mines.			

Table 5.14 Total Annual Replenishable Resource Potential

	2014
Rainfall Infiltration Factor Method	**ha.m**
Recharge from normal monsoon rainfall	2374.41
Recharge during monsoon from other sources	1689.47
Recharge from normal non monsoon rainfall	409.05
Recharge during non-monsoon from other sources	**360.21**
Annual normal recharge	4833.14
Water Table Fluctuation Method	
Recharge due to monsoon rainfall	2344.40

Deviation from Infiltration Method *	**< - 9.83%**
0.8 times the rainfall infiltration has to be taken as PD is less than –20% when the fluctuation method is applied	1899.53
Monsoon recharge from other sources	1689.47
Non-monsoon rainfall recharge	409.05
Non-monsoon recharge from other sources	360.21
Total Annual Recharge	4358.26
*** As the percentage deviation between R_{WTF} method and R_{RIF} is less than -20%, the Ground WaterResources has been computed applying rainfall infiltration method (As par the norm of GEC 1997).**	
Total Annual Recharge (Rainfall infiltration Method)	4833.14
Unaccounted Annual Natural Discharge @ 5%	241.66
Net Annual Ground water availability	4591.48
Current Annual Gross Annual Ground Water Draft for all uses	**3124.65**
Current Gross Annual Ground Water Draft for irrigation.	**2755**
Annual Ground water allocation for domestic & industrial water supply upto year 2031	328.32
Present Population upto 2011 in the study area-90000	
Growth rate for 2001-2011 is 17%	
Projected population2031- 128503	
Per capita consumption/day- 70 litres	
Net Annual Ground Water availability for future irrigation use.	4263.16
Whether the water table fluctuation method was applied	Yes
How was specific yield value obtained	Norm
Stage of Ground Water Development	68.05
Categorization for future Ground Water Development	**SAFE**

6.0 IMPACT ASSESSMENT AND GROUND WATER MODELLING

The adverse effects of mining activity are site specific and may be negligible to severe, depending upon the location. This needs to be assessed and corrected from time to time to maintain safe and pollution free environment. Excavation of huge quantity of earth and rocks result in environmental degradation and alters the natural course of surface water bodies, ground water regime, topography and drainage, water quality and land use. It is very essential and mandatory to assess the impact on these water bodies and requires adequate control measures to minimize/ prevent/ overcome any adverse effects, and preserve resources in and around the mine lease area. Impact on water resources due to proposed mining of limestone in Nandini mine is summarized in the following paragraphs along with suitable management plans.

6.1 IMPACT ON TOPOGRAPHY AND DRAINAGE

There will not be any impact on land use because developmental and mining activities will be carried out in existing ML area of Nandini limestone mines. The present limestone deposit falls on the plain/undulating terrain and the site elevation remains at around 280 m RL. The slopes of the area are gentle in gradient. The limestone mining would marginally affect the overall view of the area, but will grossly modify the area of leasehold topography at the end of mining. Long term impact on topography and drainage can be well appreciated by comparing present and historical Google images (Fig 6.1). The perusal of images below (2003 and 2014) from near vicinity of mine shows only visible change within ML area.

In fact, a gently elevated ground apparently separates the Shivnath watershed from that of the Kharun in the east. There are no natural water courses within both the mining lease areas. The both the lease areas are almost flat with a gentle slope towards West. The rainwater from the entire leasehold area flows East to West and reaches Shivnath river (3.0 km) through a natural nallahs flowing in South West direction. The nallahs remains dry in all seasons except in rainy season. The mining lease boundary at Pathariya mines (Lease-I & II)and Nandini mine has been surrounded by a stabilized bunds. Rainwater in the lease areas flows towards the sump, from where it will be dewatered by a 50 H.P. electric/diesel pump. The size of the sump is 15 m x 15 m. At the ground level the pumped out water is channeled through a tank 100 m x 50 m in size, which allows the sediments to settle. The water neither contains any toxic substances nor it affects natural drainage channels. During the non-monsoon and monsoon seasons, the water harvested in the mine pit is used mainly for afforestation and dust control. The villagers use certain quantity of this water for domestic and irrigation purposes. Some water will be also released into the surface drainage channels and as a consequence some increase in flow quantities may be noticed during mining operation during monsoon. This pumped out water reaches back to the ground water body. Thus there is constant replenishment of the ground water & the ground water table is not disturbed. As there is no toxic substance being discharged, hence there is no adverse effect on the water quality regime.

6.2 IMPACT ON GROUND WATER

Open cast mining activity leads to the creation of a large void in the earth, which hinders smooth sub-surface flow of ground water. Dewatering seepages of ground water in the mine is essential to facilitate mineral extraction. The probable effects on ground water reservoir of the area need to be assessed and corrective measures have to be initiated.

Movement of ground water depends on hydraulic characteristics of aquifer. The Pathariya-Nandini areas and their surroundings are underlain by karstic limestones and sometime overlain by thin-bedded shale. These rock formations are poor in primary porosity and permeability but have secondary porosity. The hydraulic conductivity and storativity values are moderate for these limestones. The radius of influence of

dewatering from the mine in summer is found to be not more than 400-500 m in calcareous rock formation of the area. As there are no extraction structures within 300 m radius of mine and the aquifer is having moderate hydraulic parameters, impact on ground water of the area will be limited in extent. However to have a detailed and comprehensive study of the impact of dewatering at present and its projected quantity in future groundwater modeling study has been initiated targeting the core area and its surrounding watershed.

The mining activity involves excavation of earth and blasting of massive rocks. In the process artificial structural disturbances are created in the bed rock leading to the development of secondary porosity by way of cracks and joints. These fractures in adjoining rock formations will enhance the transmissivity and specific yield of the aquifer. Further, the left out mine pits e.g. Nandiniold mine pit act as recharge structure for the area. Ground water contour (GWC) map superimposed on the google image mapreflects formation of groundwater plateau surrounding Nandiniold mine pit area clearly indicating recharge, whereas the steeper gradient of GWC along the Pathariya-I may indicating impact of dewatering, however the extent of which is limited.

The water table is as low as 5 m below ground level during monsoon period and about 23 m below ground in summer season as recorded in surrounding areas. As per the water level data of the observation wells existing in neighboring villages Pathariya mines there is limited impact on water table in nearest vicinity and marginal change in quantity. Farmers are taking wheat and cash sugarcane, gram and vegetables in the surrounding villages of Kerali, Kanharpui, Basni, Khapri, Dhaur, Kokri, Samoda, , Rawledih and Nandori**.** The water accumulated in the pits of the Patariya I and II has stabilized the ground water table. Even if enhancement of recharge results in the concomitant decrease of surface run off, it is not a matter of any concern, because ultimately, the percolated water will emerge again to the surface in the form of base flow or well withdrawal. The quantum of water not entering the surface discharge will supplement the ground water resource, which can be considered beneficial to the area.

6.3 IMPACT ON SURFACE & GROUND WATER QUALITY

Large-scale input and output of water from the ground water reservoir may result in change of chemical quality of the water. Water samples are periodically collected from different sources and analysed. Review of the data indicates that there is no change in surface or ground water quality however rainwater harvesting has dilution effect on the ground water of the surrounding area to the mine lease. Comparison with baseline data and that of government agencies also shows the same. Ground water pollution can take place only if the overburden and / or mineral contain harmful chemical substances. Limestone constitutes inert and chemically non-reactive constituents and does not contain any harmful ingredients that could leach down to the water table. Steady water quality condition reflects that over burden or waste rock dumps do not contain leaching substances. In fact chemical quality of water is expected to improve due to regular recycling of water through mining, rainwater harvesting and artificial recharge measures.

6.4 MINING PLAN AND DEWATERING SCHEDULE

As per the survey carried out in June 2014 the present depth of Patheriya mine in the ML-I and ML-II area is 27 m and 18 m respectively. The present and proposed dewatering is worked out accordingly (This is done for demonstration purpose, because more or less same scenario will occur in Nandini Khundini mines).

Period	Mining area	Pathariya–I	Pathariya -II
Past 2004-05	Surface RL	274 m amsl	281 m amsl
	Lowest RL	248 m amsl	267 m amsl
	Depth	26m	14m
	Pit size	20.10ha	6.73ha
	Quantum of dewatering	410 m^3/day	242 m^3/day
		150000m^3/y	125000m^3/y
	Groundwater level	264 m amsl	273 m amsl
	(pre monsoon)		
	Groundwater level	271 m amsl	282m amsl
	(post monsoon)		
Present 2013-14	Surface RL	274 m amsl	281 m amsl
	Lowest RL	247 m amsl	263 m amsl
	Depth	27m	18m
	Pit size	23.30ha	10.53ha
	Quantum of dewatering	296 m^3/day	262 m^3/day
		106572m^3/y	94260m^3/y
	Groundwater level	260 m amsl	277 m amsl
	(pre monsoon)		
	Groundwater level	266 m amsl	280m amsl
	(post monsoon)		
Ultimate (Proposed)	Surface RL	274 m amsl	247 m amsl
	Lowest RL	194 m amsl	194 m amsl
	Depth	80m	53m
	Pit size	30.27ha	22.70ha
	Quantum of dewatering	Proposed determination by modeling	Proposed determination by modeling
	Groundwater level		

6.4.1 ESTABLISHMENT OF PIEZOMETERS TO MONITOR GROUNDWATER

It is proposed as per the mandatory requirement to establish two new piezometers in the premise of Pathariya mine office. The proposed piezometers will be of 100mm radius each and 60m and 100m in depth to monitor the immediate effect of mining and groundwater recharge through recharge pit to the shallow and deeper aquifers. The depth of piezometers has decided based on the present and proposed ultimate mine depth. The design of proposed piezometers will be as per the **Fig 6.3**. The 60m deep

piezometer will have only protective casing to required length of 6 to 18m and the 100m deep piezometers will be cased down to 60m depth, the remaining part of the piezometers will remain uncased. Monthly monitoring of water level of the piezometers is proposed. The piezometers will only be used for groundwater level monitoring and no pump at any stage will be installed in these piezometers. Annual sampling and analysis of groundwater from nearest abstraction structure is proposed for groundwater quality monitoring.

6.5 GROUND WATER FLOW MODELLING

Objective

Ground water flow modelling was attempted with an objective to quantify the different input output stresses. The calibrated model was also aimed at predicting water level conditions in scenario of increased dewatering from the mines. For this purpose, a steady state calibration with a present day dataset was attempted.

Governing Differential Equation and Modelling Algorithm

A model that simulates groundwater flow is the simplified representation of the subsurface aquifer system, which may be used to predict aquifer response to various input/output stresses. Groundwater flow in three dimensions in a porous medium of constant density can be expressed by the following partial differential equation (Rushton and Redshaw, 1979):

$$\frac{\delta}{\delta x}\left(K_{xx}\frac{\delta}{\delta x}\right)+\frac{\delta}{\delta y}\left(K_{yy}\frac{\delta}{\delta y}\right)+\frac{\delta}{\delta z}\left(K_{zz}\frac{\delta}{\delta z}\right)=S_s\frac{\delta}{\delta t}\pm W \quad \text{.....(1)}$$

Where

KxxKyyKzz	the hydraulic conductivity along x, y, and z coordinates that are assumed to be parallel to the major axes of hydraulic conductivity (LT-1)
H	Potentiometric head (L)
W	volumetric flux per unit volume and represents' sources and/or sinks of water (TI)
Ss	the specific storage of the porous material (L-1)
T	time (T)

Equation (1) describes groundwater flow under non-equilibrium conditions in a heterogeneous and anisotropic medium, provided the principal axes of hydraulic conductivity are aligned with the x-y cartesian co-ordinate axes. The groundwater flow equation, together with the specification of flow and/or initial head conditions at the boundaries, constitutes a mathematical representation of the aquifer system. Numerical methods are used in general to solve the groundwater flow equation. The computer software MODFLOW developed by McDonald and Harbaugh (1988) was used to simulate groundwater flow in the present study.

Conceptual Model, Model Domain and Grid Design and Boundary Conditions

Within the buffer zone of the mines, a watershed was demarcated considering the local drainage. The watershed with the river on the western side was chosen as the model domain. The watershed boundary or the water divide was considered as a no flow (flux=0) boundary. On the western side, the model domain was bounded by the river. Total area of the model domain covering the mines thus works out to be 202 Km2. A single layer 3-D model was developed. The layer thickness was restricted to 100m considering the usual ground water exploitation scenario in the area. A grid of 1KmX1Km was taken for modelling purpose. A finer grid of 300mX300m was taken for the mine area.

Input Parameters
The model was set up for a steady state database for which the conditions for the month of May were considered appropriate. Strongly Implicit Procedure (SIP) was taken as the solver for the modelling purpose. Major Input parameters are as follows. Sample input screens are shown in Figure.

1. Model Domain
2. Boundary conditions
3. River parameters including river stage and conductivities
4. Aquifer conductivities Kx, Ky, Kz
5. Storage properties of the aquifers – Ss and Sy
6. Layer thicknesses
7. Recharge from rainfall
8. Ground water draft for various purposes
9. Mine dewatering
10. Though flows (inflow/outflow) to/from the model area

Model Calibration

Steady State

Model was calibrated using a trial and error calibration method. The premonsoon conditions were taken as steady state conditions. Considering the premonsoon conditions, the model was calibrated for steady-state. Root Mean Squared (RMS) residual was taken as a measure of calibration and the calibration was considered satisfactory with RMS residuals as 4.91m **(Fig. 6.7)**. Model Outputs in form of zone budget are given in **Fig.6.8.**

Transient

In the transient run, recharge, draft and other stresses were input as per the field conditions. Similar to the steady state calibration, the transient calibration was also done using a trial and error approach. Two sets of water level data are available for the study area (pre and post monsoon).Considering these water level observations, transient calibration were based on matching calculated and observed hydrographs. Results of transient calibrations are shown in **Fig.6.9.**

Predictions

With increasing mine development, mine dewatering will go on increasing and this will impact ground water scenario in the future. Simultaneously groundwater draft and recharge conditions, which are independent of the mining activities in the area will also change. However, the objective of this predictions using the model is to assess the impact of mine dewatering only, keeping the other conditions constant. The calibrated model was used for predicting water table conditions in an extreme scenario where the mine dewatering is doubled. It was observed that the impact is only local and that to only within a few hundred metres of the mine pit there could be drawdown of less than 1 metre even during the lean period. (**Fig.6.10 and 6.11**) With increasing data availability the models can be further refined and validated improving the predictions.

7.0 IMPACT MANAGEMENT PLAN

Suitable measures by way of rainwater harvesting and green belt development around the mine lease area has beedproposed for implementation to offset the adverse effects. The measures are mentioned below. The entire quantity of water generated from mine dewatering will be harvested into the abandoned mine pits after needful de-siltation.

7.1 RAINWATER HARVESTING AND ARTIFICIAL RECHARGE METHODS

Mining activity involves pumping of either seepages or groundwater to facilitate mineral extraction, which can be replenished by enhancing the ground water recharge through artificial methods like construction of check dams, percolation tanks, surface spreading basins, pits, contour bounding, sub- surface dykes, etc.

ACC, being a prestigious company, is equally concerned about environment and already has taken many a step for improvement of the local environment around the mines. JCW has already taken up the construction of many water harvesting structures in its mine lease area. Equally concerned about environment, the JCW is also developing many of these structures at every feasible point to further boost the recharge conditions in view of its proposed expansion plans. Two water reservoirs, in the abandoned pits of Nandini Khundini, measuring 30.3 ha x 10 m store about 303 ham of rain water. This water will be judiciously used in the proposed mining operation. The pits not only act as water conservation units but also boost the recharge to ground water through the standing water column. As per the information obtained from the farmers of Pathariya, Nandini-Khundini and Sahgaon villages, the sustainability of theirs abstraction structures has increased because of the recharge of ground water by these water filled pits.

The total requirement of the mine will be catered by utilization of the water from these reservoirs. No other ground water withdrawal structure shall be made in Nandini Khundini mines. The existing recharge structures will help in maintaining a well-balanced ground water regime in and around Pathariya-Nandini villages.

Garland drains will be developed all along the peripheries of the mine and waste rock dumps to prevent storm water from catchment area coming in contact with freshly excavated areas. All the mine seepage water from the proposed mine will be stored in water harvesting tank (existing abandoned pits). The seepage water will be pumped from mine after all suspended particles are settled at the bottom in the mine sump. Pumping of water will be carried from middle of the water column. Silting of area will be avoided with this action and water will be effectively utilized for horticulture and dust suppression and other mining purposes and the balance water will be discharged to the abandoned pits. Continuous water level monitoring and quality assessment will be carried out to evaluate change in ground water scenario of the area and effective measures will be initiated immediately to combat the imbalance.

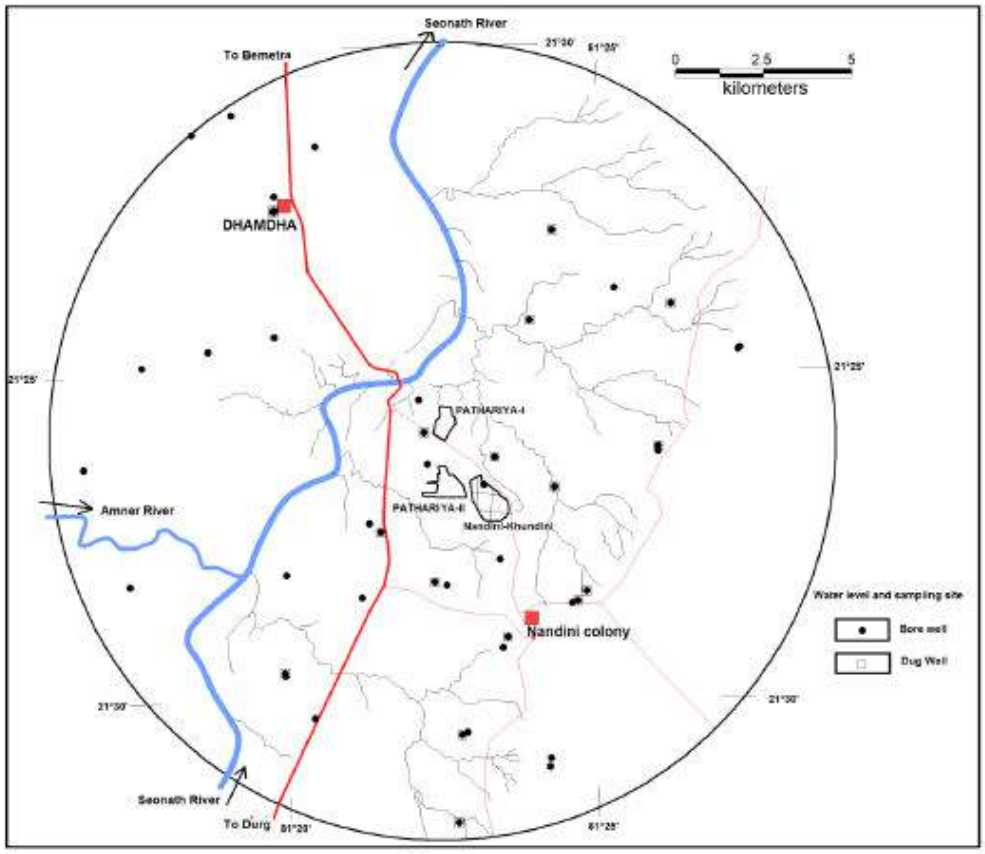


Fig 1.1: The location Map of the Nandini-Khundini Mine and 10km radius buffer zone. Note the drainage, road and groundwater level and quality sampling sites same as for Pathariya mine.

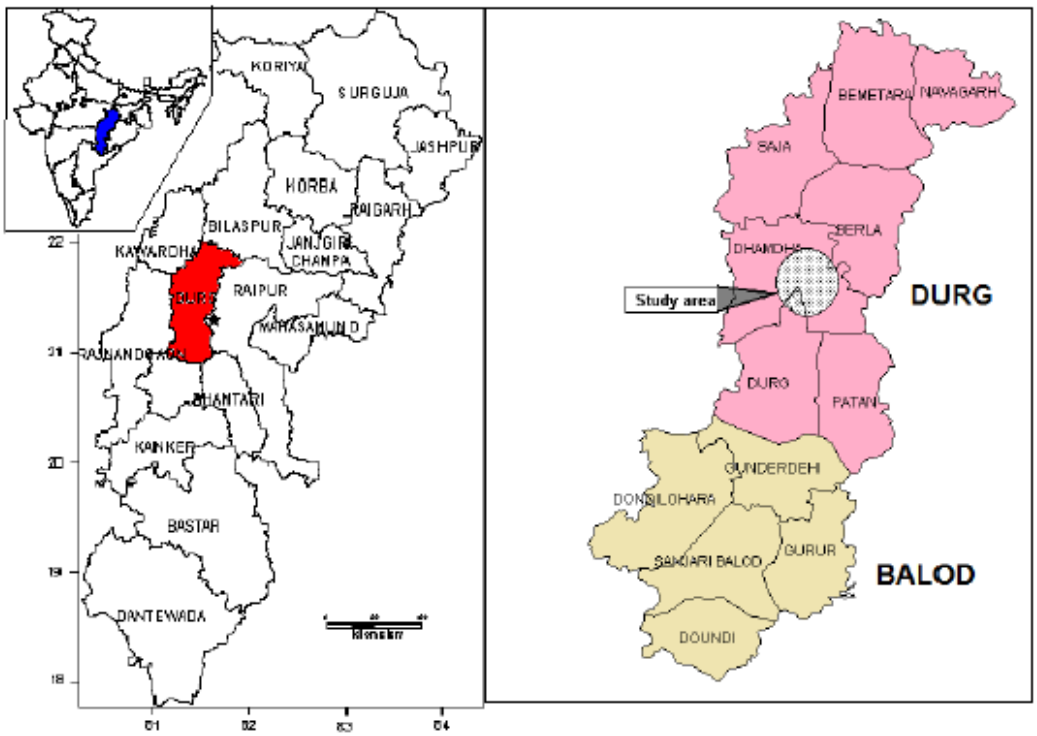


Fig 1.2: Administrative Boundary of Study Area

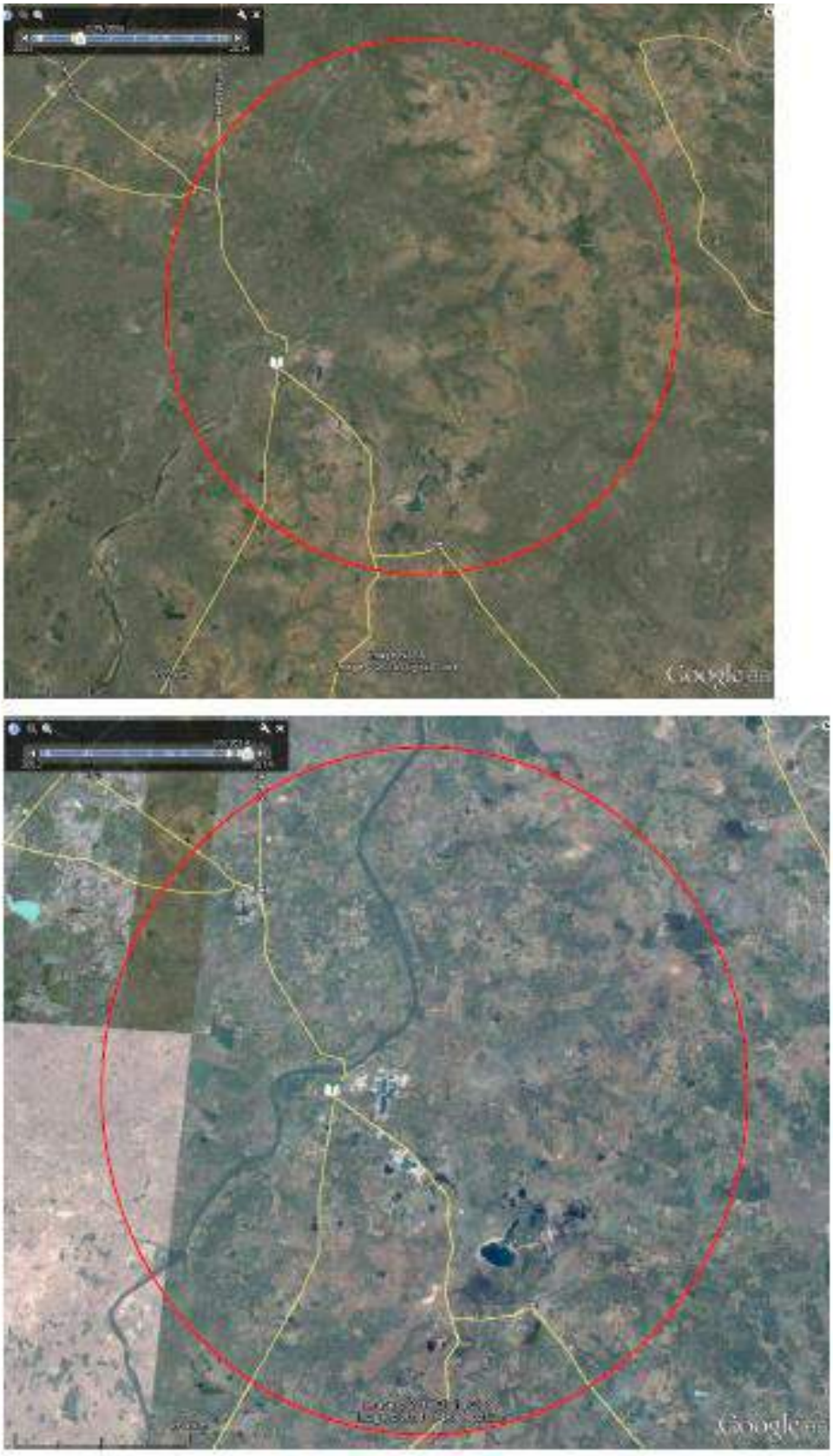


Fig 1.3: Long term change in topography and drainage in study area (2006-2014).

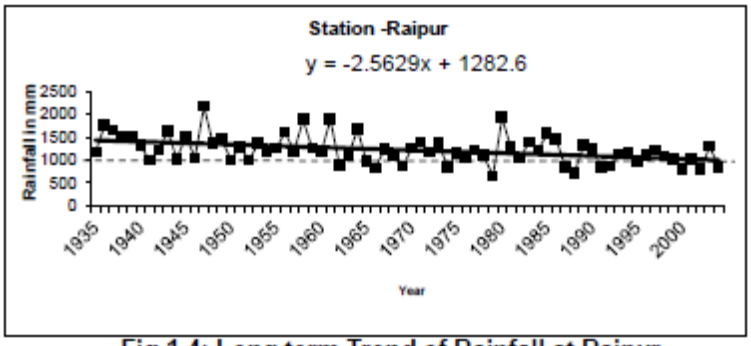


Fig 1.4: Long term Trend of Rainfall at Raipur

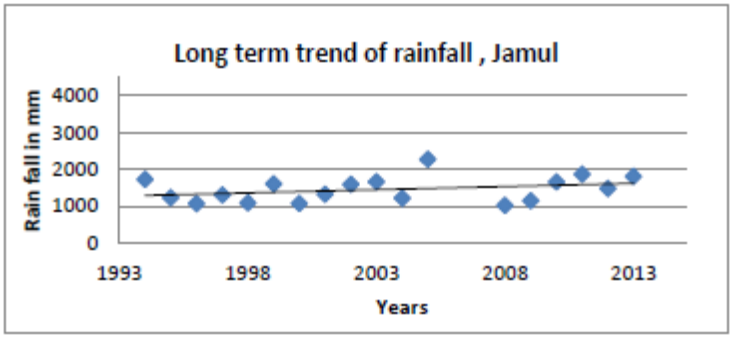


Fig 1.5: Long term Trend of Rainfall at JCW, Jamul

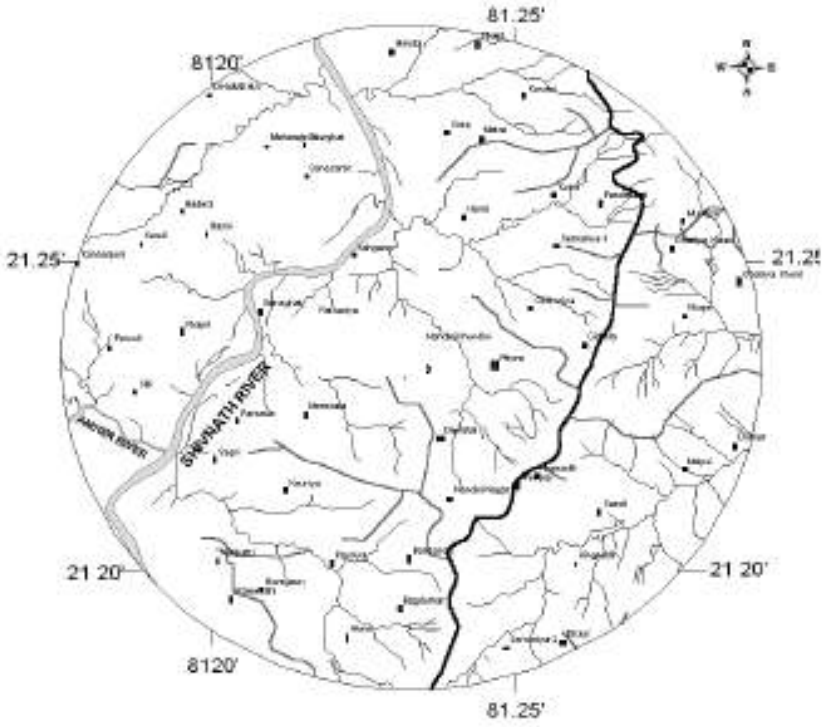


Fig 2.1 Drainage map

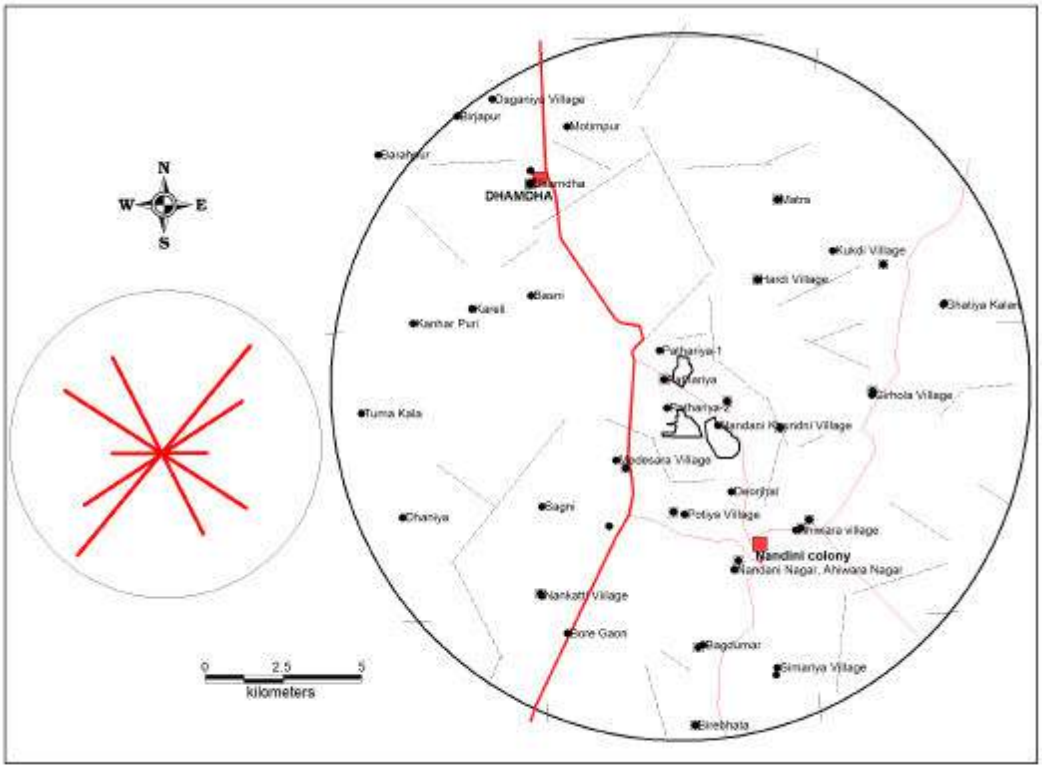


Fig 2.2 Lineament Map with rose diagram

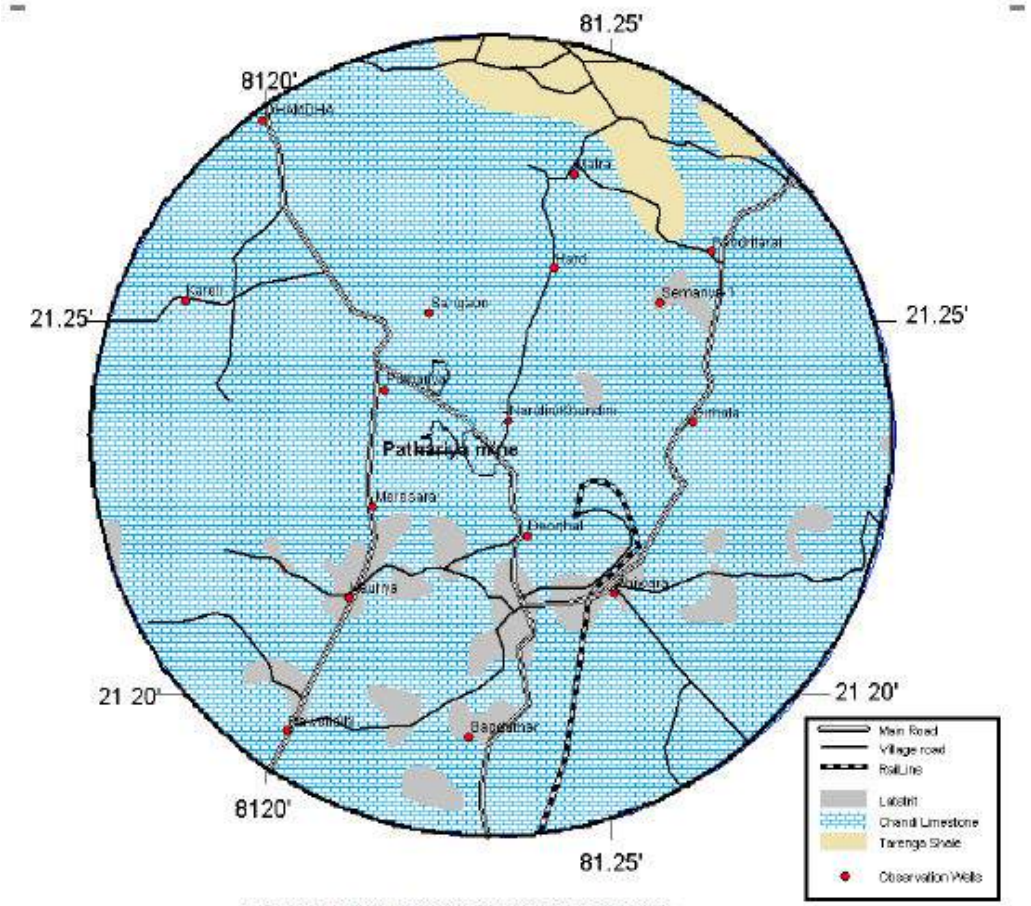


Fig 2.3 Geological map of Nandini mine area

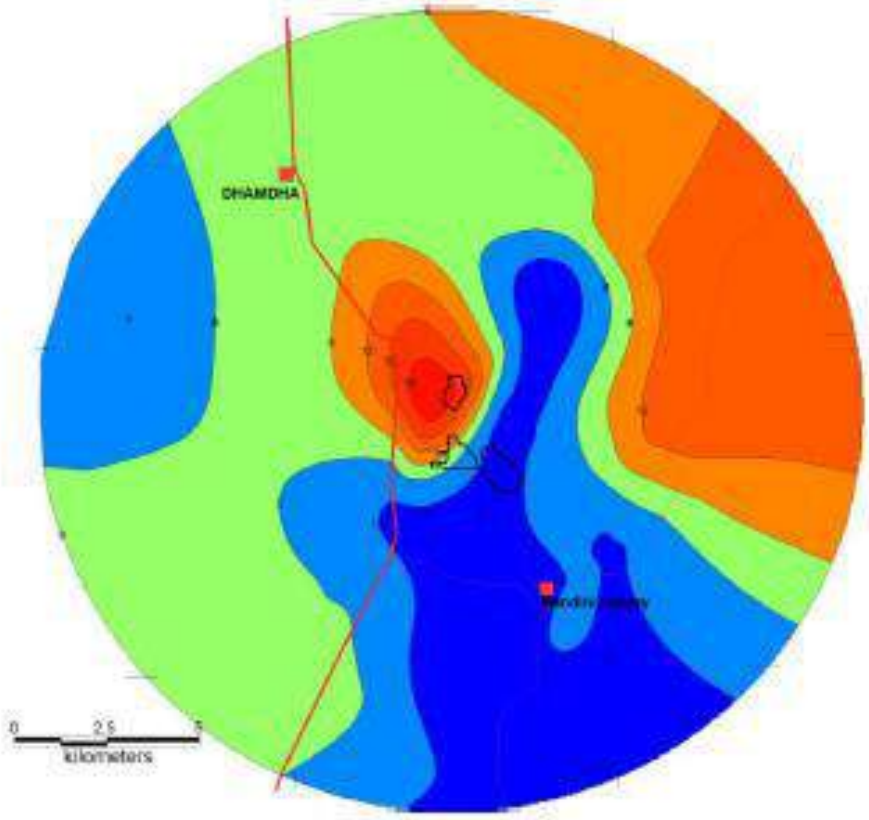


Fig 3.1 Groundwater DTW Map May 2014

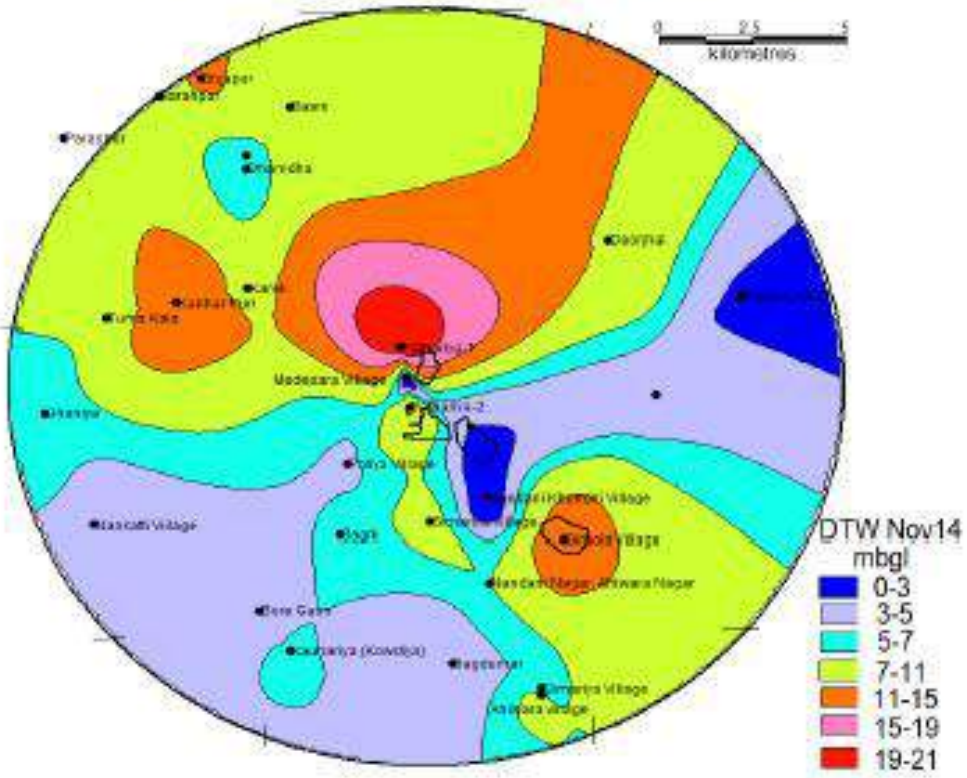


Fig 3.2 Groundwater DTW Map Nov 2014

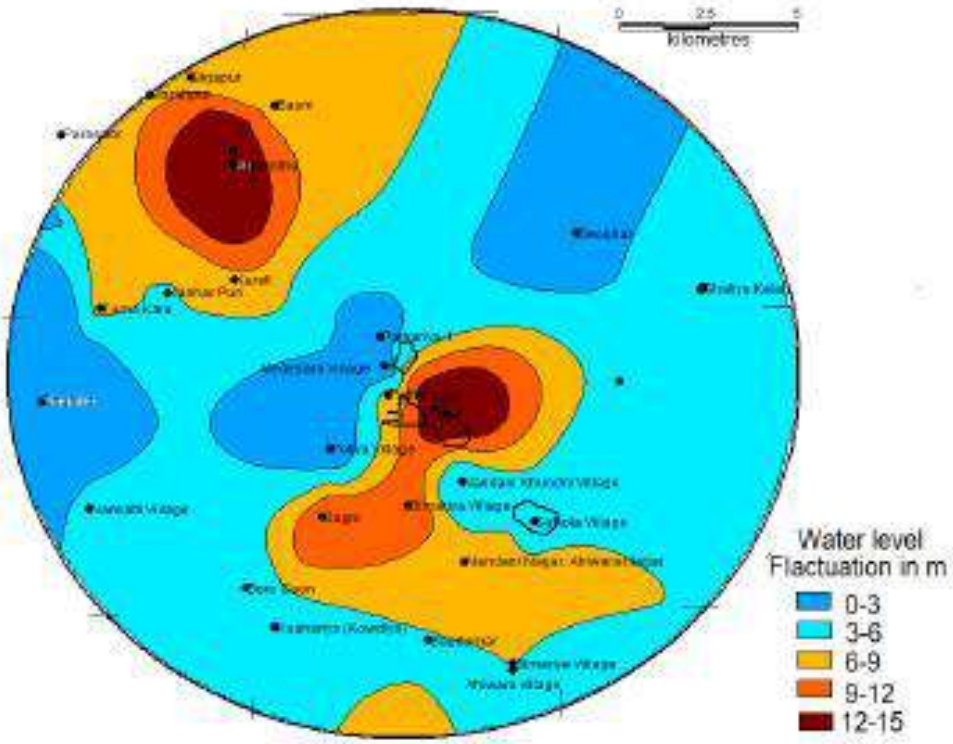


Fig 3.3 Groundwater fluctuation 2014

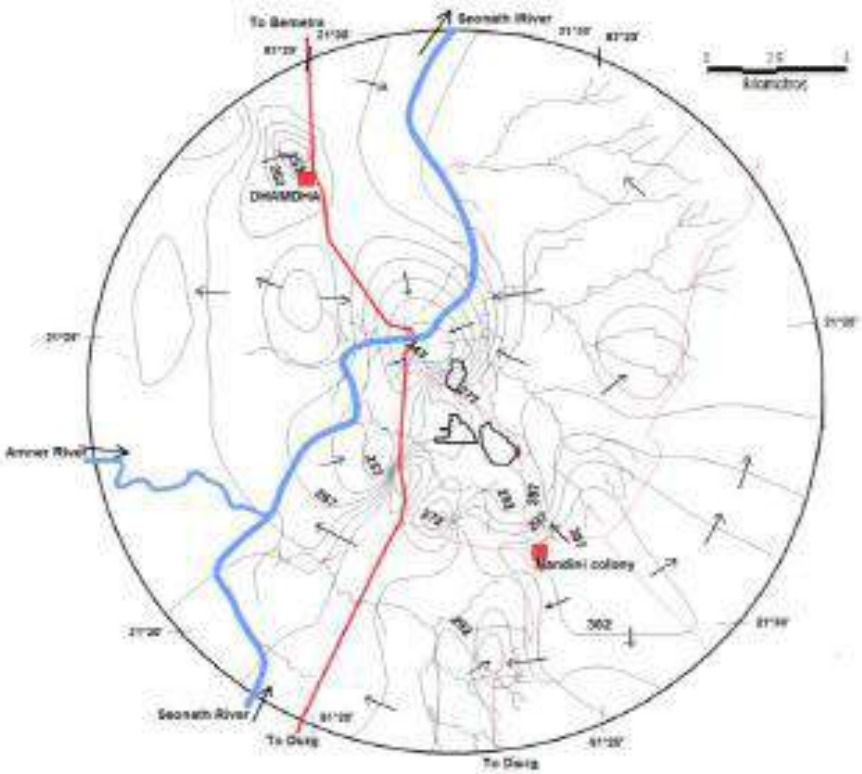
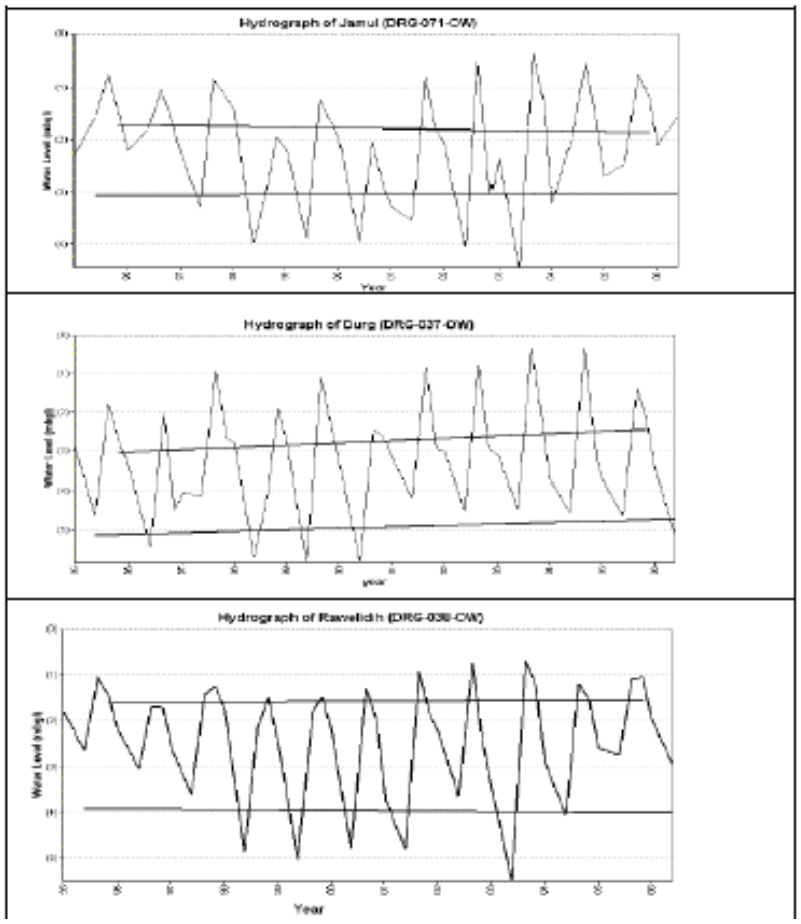


Fig 3.4 Groundwater contour Map May 2014



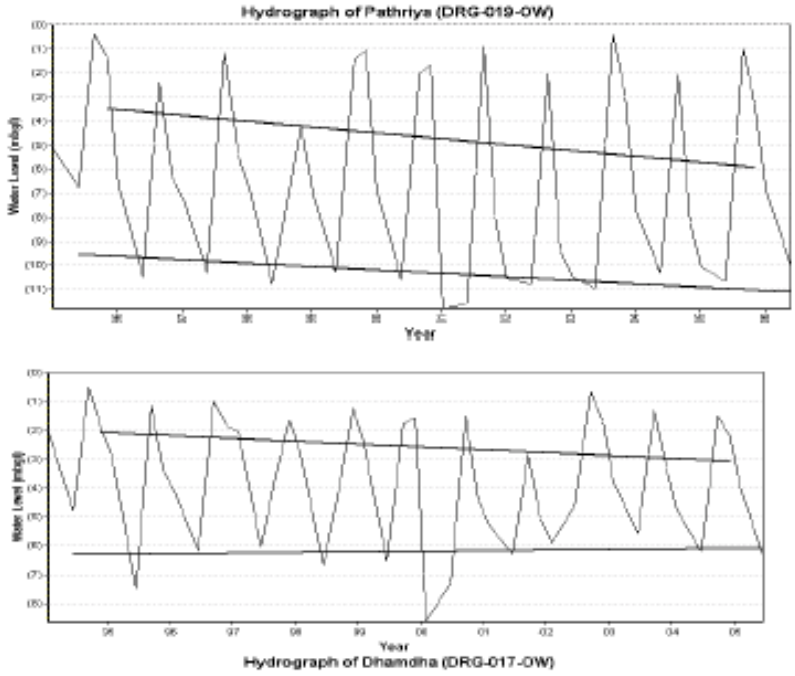


Fig3.5.Hydrograph of study area

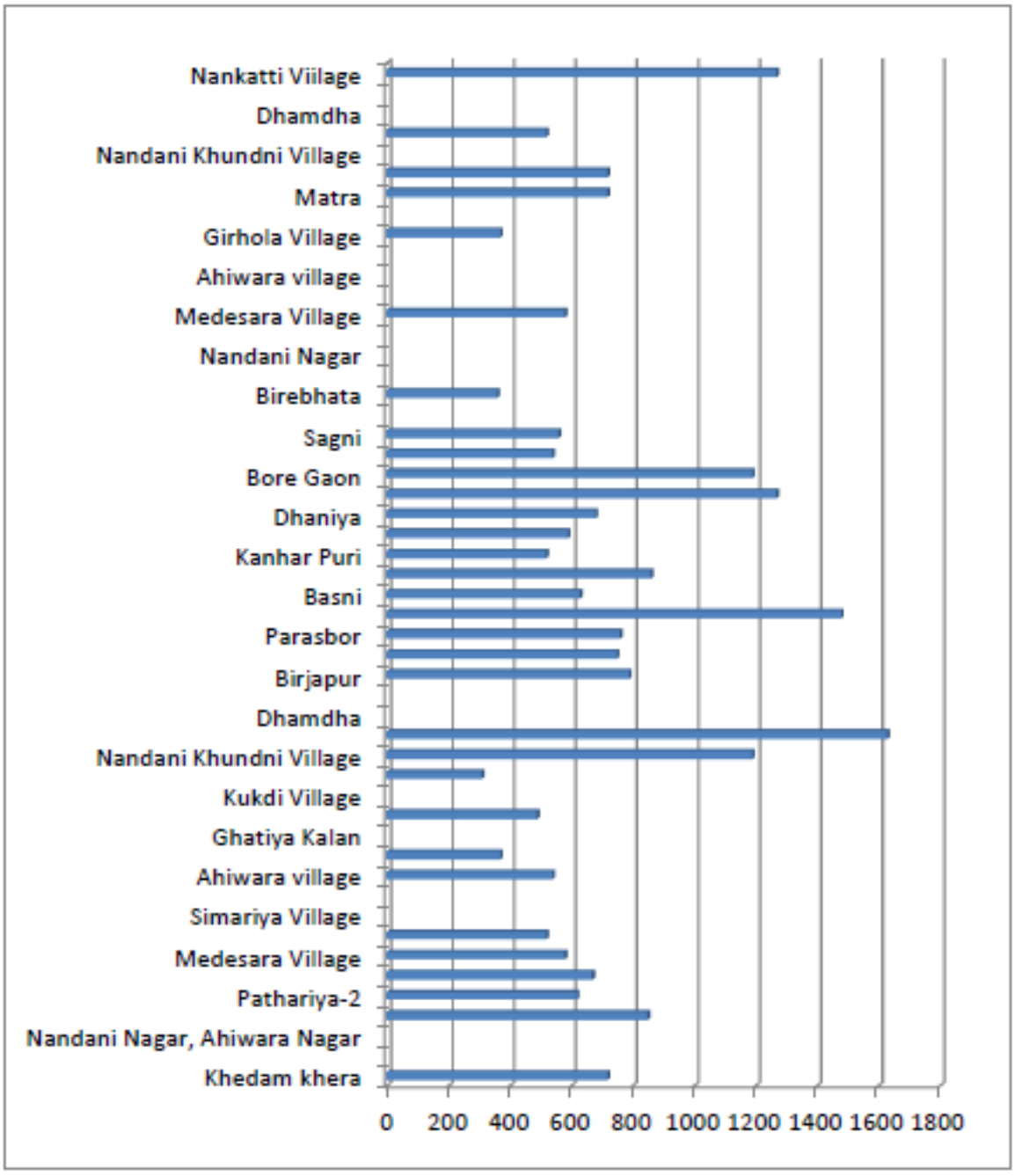


Fig 4.1 Electrical Conductivity of Groundwater Samples of Study Area (in µmhos/cm)

31/10/2003

07/04/2014

Fig 6.1 Google Image of Core Zone of NK mine & Surroundings as on 2003 & 2014

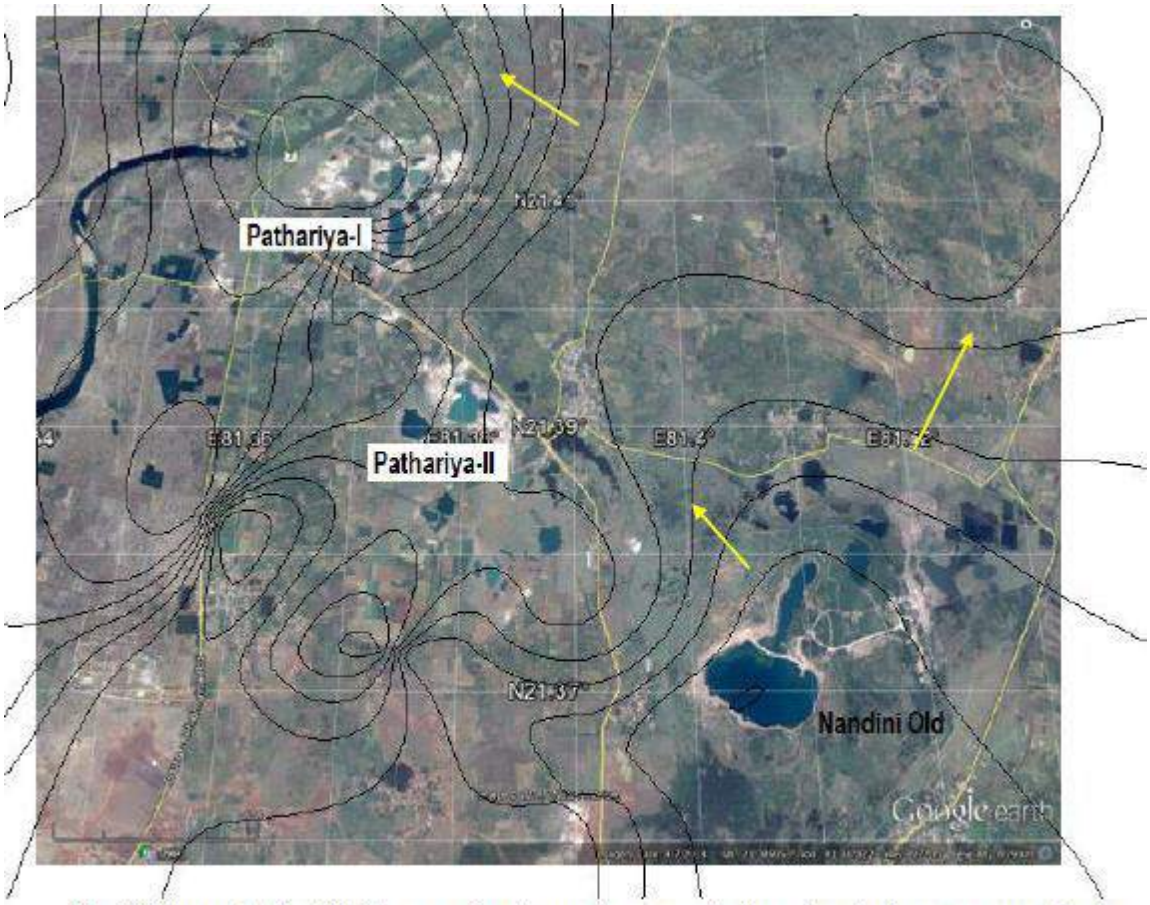


Fig. 6.2 Impact of artificial groundwater recharge and mine dewatering on groundwater regime.

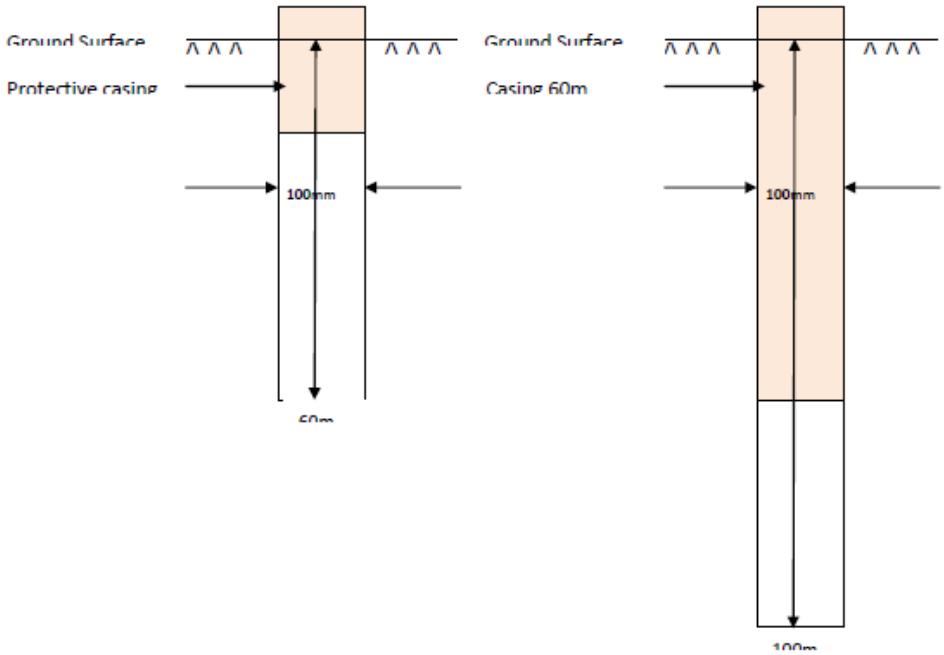


Fig 6.3 Design of proposed piezometers (60m and 100m)

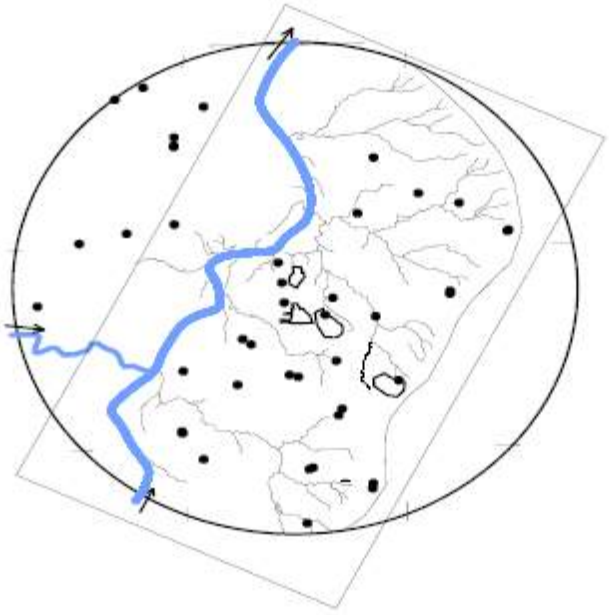


Fig.6.4: Map of 10km radius area, model domain area and model boundary area around Patharia and Nandini mine. Note the drainage and mine location

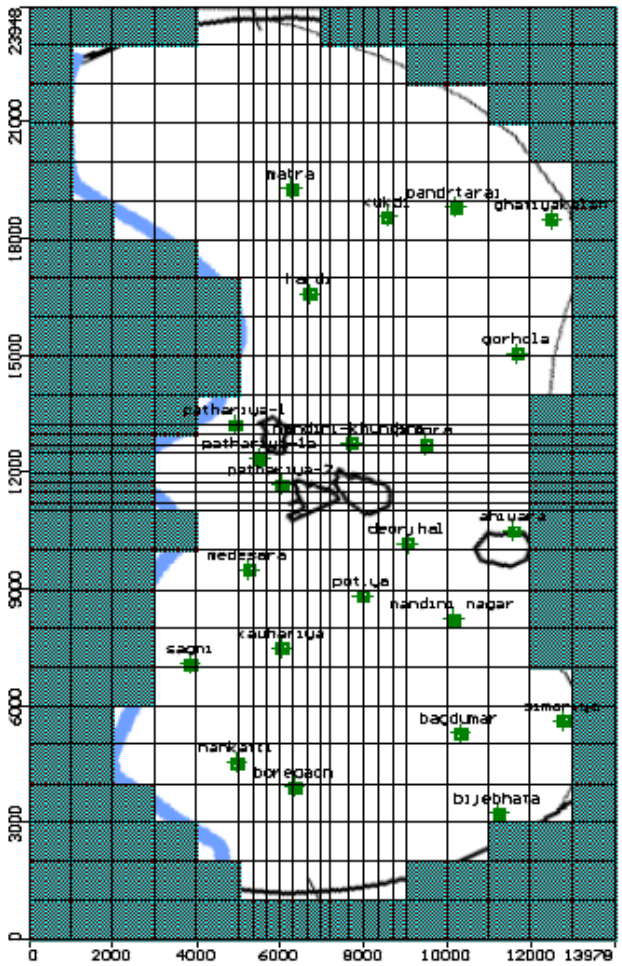


Fig.6.5: Grid design and head observation wells.

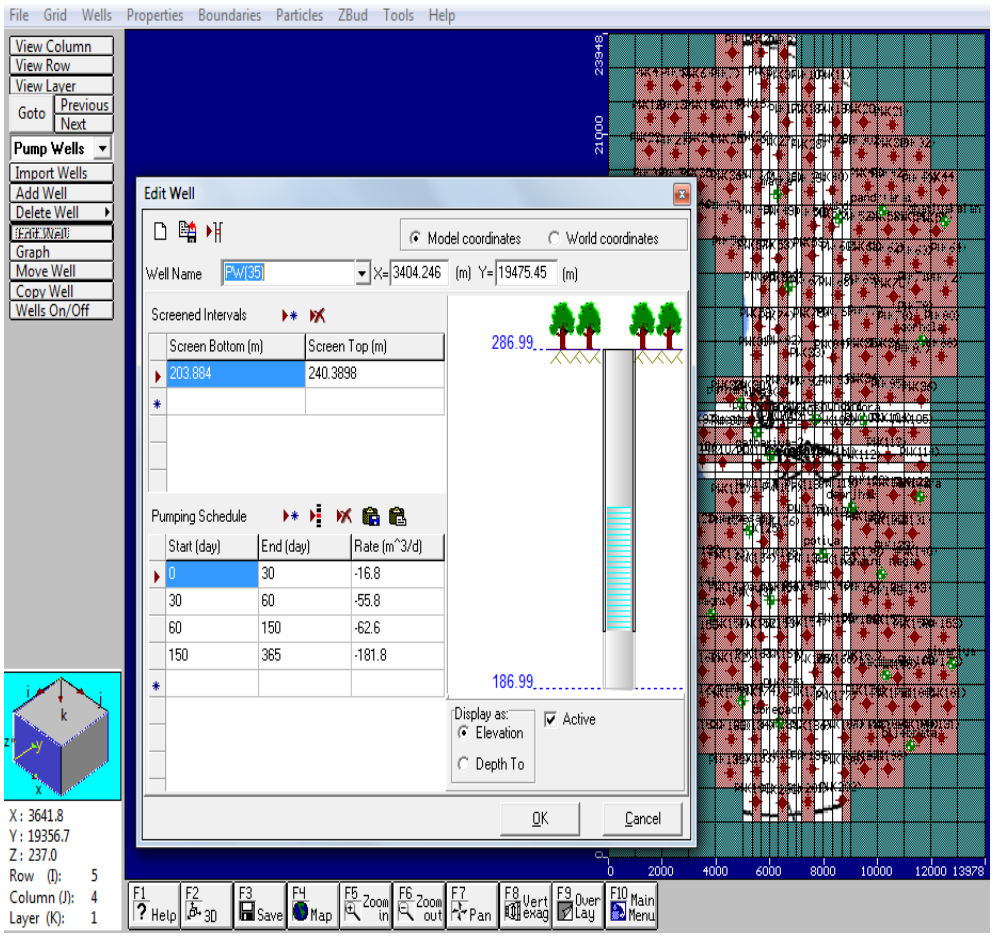


Fig.6.6: Sample Input Screens in Visual MODFLOW 3.1

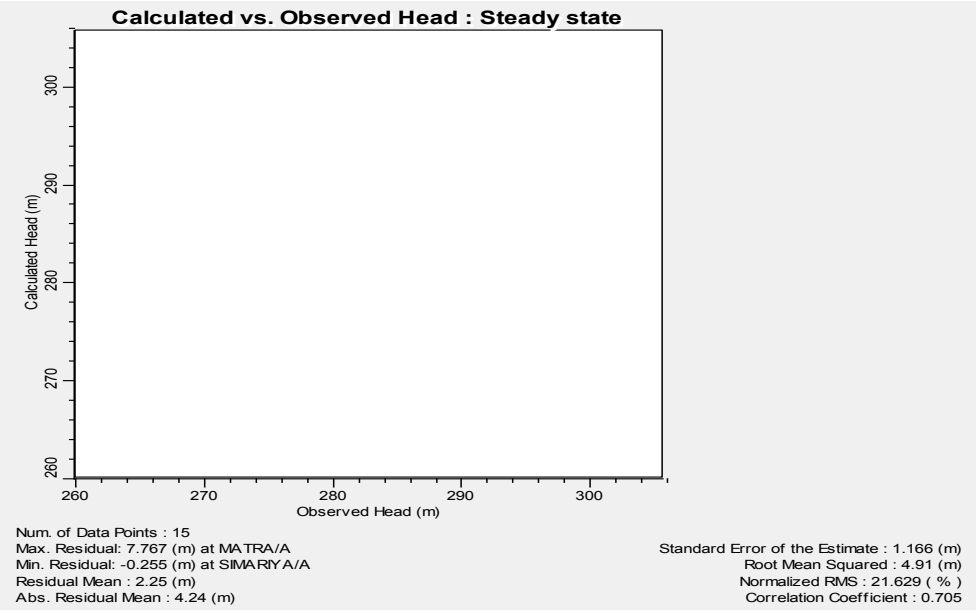


Fig. 6.7: Calculated Heads vs Observed Heads

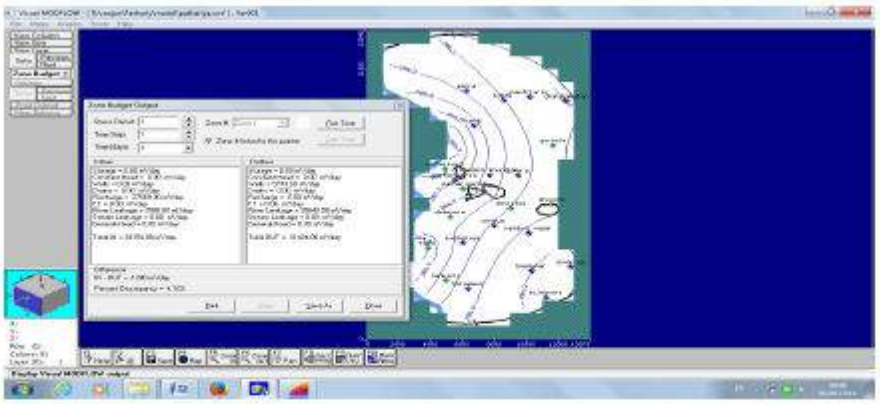


Fig.6.8: Model generated input output stresses

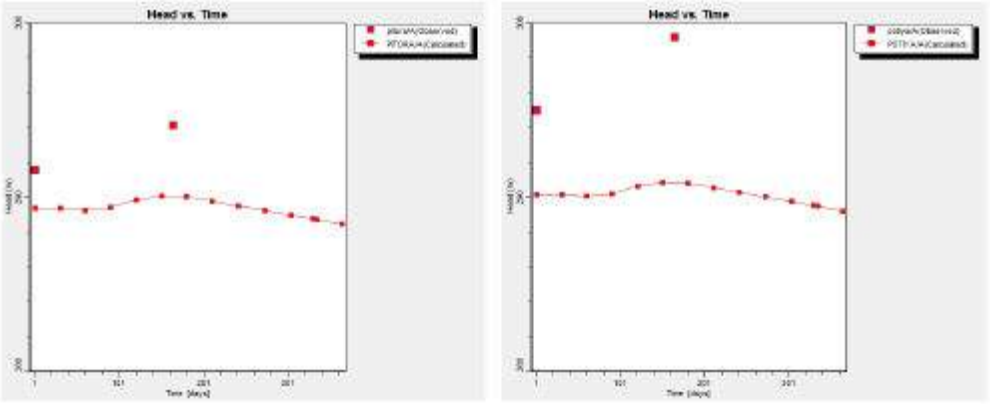


Fig.6.9: Results of transient calibration. Matching of calculated and observed hydrographs. A. Monitoring well at Pitora and B. Monitroing well at Potiya.

Fig.6.10: A. Water Table Contour in present day scenario

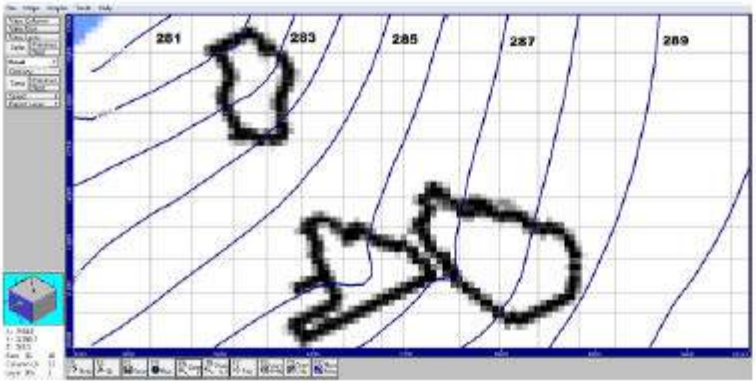


Fig.6.10: B. Water Table Contour near the mine area in present day scenario

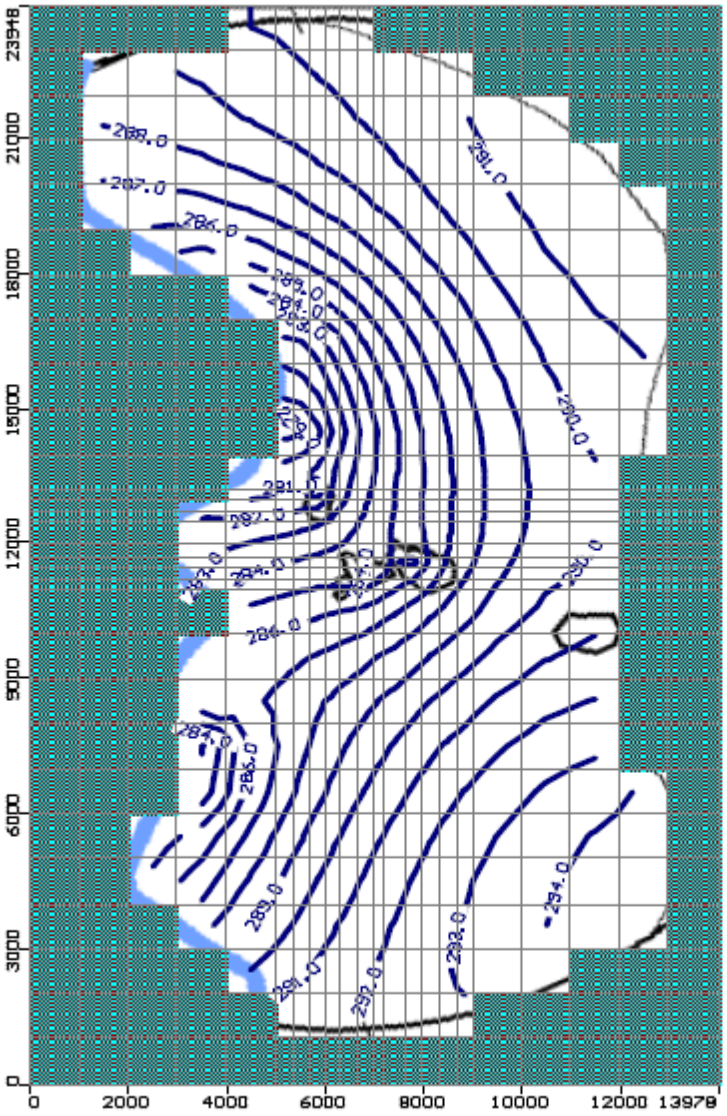


Fig.6.11: A. Water Table Contour in a scenario of increased mine dewatering

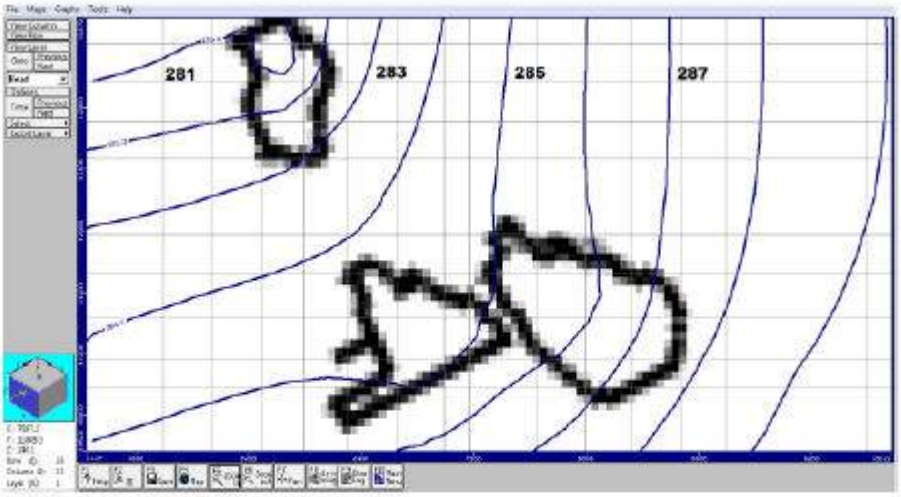


Fig.6.11: B. Water Table Contour near the mine area in a scenario of increased mine dewatering

Annexure 1 – Monthly Rainfall at Labhandi, Raipur (1958 – 2001)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	**1958**	1.5			21.6		95.7			403.3		7.1		**529.2**
2	**1959**	19.8			1.5			425.0		350.3	30.8			**827.4**
3	**1960**	11.0		61.0	14.2			320.2	269.1					**675.5**
4	**1961**				7.0	11.5				376.6	117.6		9.4	**522.1**
5	**1962**	2.8			36.9	70.0	121.5	263.6			42.2			**537**
6	**1963**			8.6	18.2	43.9	163.1	511.4	177.6	275.7	19.7			**1218.2**
7	**1964**		10.0	0.5	2.0	5.0	318.2	414.5	477.1	137.6				**1364.9**
8	**1965**	18.3		51.2	4.0	1.0	109.5	287.4	185.6	141.4	8.1			**806.5**
9	**1966**			10.7	14.4	31.0	236.0	165.6	207.8	81.2	4.8	14.2	29.0	**794.7**
10	**1967**				9.8		226.0	264.8	337.2	131.0			16.0	**984.8**
11	**1968**	24.2	31.8	16.8	31.6		222.7	308.8	184.3	206.9	13.2		4.4	**1044.7**
12	**1969**	2.4			1.4	41.8	112.6	244.0	208.6	175.6	27.3			**813.7**
13	**1970**	14.1		85.0	2.0	10.0	382.6	635.3		251.4				**1380.4**
14	**1971**	15.0	20.2	37.4	39.8	52.4	37.4	321.3	313.7	62.0	133.8			**1033**
15	**1972**		5.0		21.0	21.2	213.2	200.2	374.3	192.4	22.0	51.0	2.0	**1102.3**
16	**1973**		0.9	15.6		10.6	93.2	510.0	318.6	201.0	154.2			**1304.1**
17	**1974**		48.0			13.8	107.4	156.8	413.4	25.6	43.6	29.4		**838**
18	**1975**		8.2	26.4			168.0	512.6	246.4	184.4				**1146**
19	**1976**	0.4	3.6	0.2	36.6	16.2	73.8	305.6	460.4	155.2				**1052**
20	**1977**		3.4	2.6	19.4	30.6	114.0	296.1	450.0	261.7	7.0	37.4		**1222.2**
21	**1978**	6.0	14.2	27.0	19.4	20.8	114.0	312.4	478.6	81.8	1.4	4.0	12.2	**1091.8**
22	**1979**	26.4	25.8	0.6	2.1	8.7	114.0	206.3	201.8		8.2	46.8	8.6	**649.3**
23	**1980**	7.0	1.1	4.3	29.0	260.8	258.6	453.2	213.8	605.6	65.4		29.0	**1927.8**
24	**1981**	34.6	7.6	51.2	3.6	42.1	131.4	234.7	457.4	300.5	14.2			**1277.3**
25	**1982**	30.6	20.0	40.6	23.6	87.4	117.4	113.0	460.5	90.0	40.0	2.2		**1025.3**
26	**1983**		31.1		15.2	76.0	79.2	292.4	535.3	298.9	54.4		12.5	**1395**
27	**1984**	66.9	26.9		28.4	16.8	188.7	400.5	363.1	88.0	34.6			**1213.9**
28	**1985**	32.6	26.2		2.9	8.8	114.6	465.7	361.1	510.2	51.6			**1573.7**
29	**1986**	35.2	23.5	96.4	1.5	21.0	502.5	213.5	323.0	100.2	8.0	112.2	21.3	**1458.3**
30	**1987**	8.5	4.1	16.4	1.5	14.9	44.7	333.8	156.1	112.8	99.8	42.0	16.2	**850.8**
31	**1988**		22.4	10.8	3.4	2.0	132.8	176.0	173.6	185.5	2.4	0.2		**709.1**
32	**1989**			12.6		12.0	457.5	390.7	227.7	196.2			13.6	**1310.3**
33	**1990**		28.0	14.8	32.4	77.8	221.3	208.8	291.0	210.2	139.1	8.4	4.4	**1236.2**
34	**1991**	10.7		14.4	9.6	2.7	148.2	191.6	348.9	77.6	20.0	16.4	3.2	**843.3**
35	**1992**		0.4	44.2	12.6	13.8	75.8	228.6	302.9	127.6	34.8	28.8		**869.5**
36	**1993**			4.0	8.6	9.0	138.4	429.5	256.9	158.8	111.8			**1117**
37	**1994**	18.8	21.8	50.3	5.1	22.6	133.2	411.8	405.4	48.0	28.4	8.2		**1153.6**
38	**1995**	5.2	0.8		22.6	10.6	156.2	83.8	242.2	66.6	175.4	116.1	80.2	**959.7**
39	**1996**	0.2			13.6	2.4	88.4	247.5	480.9	198.4	75.2			**1106.6**
40	**1997**	12.6		19.2	64.0	6.4	119.8	448.4	301.8	136.6	29.2	9.0	72.6	**1219.6**
41	**1998**	26.0	13.8	36.6	12.4	37.6	202.6	225.4	184.6	182.2	99.0	66.8		**1087**
42	**1999**		11.0			70.0	98.6	135.9	421.0	263.7	21.0			**1021.2**
43	**2000**		39.4			18.6	199.1	330.2	141.5	56.1				**784.9**
44	**2001**	11.2		20.6	12.4	12.8	281.0	273.7	210.7	104.4	96.4			**1023.2**

Average rainfall for 1958 to 2001 1047.75 mm

Average monsoon rainfall for 1958 to 2001 period is 905.50 mm i.e. 86.4% of total av. rainfall

Annexure II - Long Term Trend Analysis of Rainfall at Raipur						
Year	Rainfall in mm	deviation from mean in mm	Percentage of the rainfall to the av rainfall	Category	Decade	**Decadal average in mm**
1958	529	-514	50.74%	DR		
1959	827	-216	79.33%	DR		
1960	676	-368	64.77%	DR		
1961	522	-521	50.06%	DR		
1962	537	-506	51.49%	DR		
1963	1218	175	116.80%	NR	**1961-70**	**946.7**
1964	1365	322	130.86%	ER		
1965	807	-237	77.33%	DR		
1966	795	-248	76.19%	DR		
1967	985	-58	94.42%	NR		
1968	1045	2	100.16%	NR		
1969	814	-229	78.02%	DR		
1970	1380	337	132.35%	ER		
1971	1033	-10	99.04%	NR		
1972	1102	59	105.69%	NR		
1973	1304	261	125.03%	ER		
1974	838	-205	80.35%	NR	**1971-80**	**1136.65**
1975	1146	103	109.88%	NR		
1976	1052	9	100.86%	NR		
1977	1222	179	117.18%	NR		
1978	1092	49	104.68%	NR		
1979	649	-394	62.25%	DR		
1980	1928	885	184.83%	ER		
1981	1277	234	122.46%	ER		
1982	1025	-18	98.30%	NR		
1983	1395	352	133.75%	ER		
1984	1214	171	116.39%	NR		
1985	1574	531	150.88%	ER	**1981-90**	**1204.99**
1986	1458	415	139.82%	ER		
1987	851	-192	81.57%	NR		
1988	709	-334	67.99%	DR		
1989	1310	267	125.63%	ER		
1990	1236	193	118.52%	NR		
1991	843	-200	80.85%	NR		
1992	870	-174	83.37%	NR		
1993	1117	74	107.09%	NR		
1994	1154	111	110.60%	NR		
1995	960	-83	92.01%	NR		
1996	1107	64	106.10%	NR	**1991-2000**	**1016.24**
1997	1220	177	116.93%	NR		
1998	1087	44	104.22%	NR		
1999	1021	-22	97.91%	NR		
2000	785	-258	75.25%	DR		
2001	1023	-20	98.10%	NR		
	NR-Normal Rainfall, ER- Excess rainfall, & DR- Deficit					

Annexure III - Monthly Rainfall Data at Jamul Cement Works (1994 to 2005)												
Year/ Month	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
JAN.	0.00	78.00	9.60	11.40	46.00	0.00	0.00	11.50	5.70	0.00	67.00	158.00
FEB.	13.40	13.30	0.00	0.00	21.00	13.40	58.70	0.00	6.50	59.70	4.20	0.00
MAR.	11.50	93.10	5.70	0.00	9.40	0.00	0.00	36.80	7.60	39.80	0.00	11.60
APR.	2.00	3.80	3.80	42.80	11.50	0.00	0.00	33.80	0.00	25.20	40.60	4.60
MAY	97.90	0.00	3.80	27.60	34.40	50.50	93.70	41.20	53.70	0.00	38.30	36.00
JUNE	324.70	95.70	68.90	139.70	149.40	214.60	300.30	365.90	347.10	176.70	302.00	146.90
JULY	594.40	477.00	425.80	466.20	284.70	254.00	328.70	383.60	509.10	482.30	413.70	529.40
AUG.	376.90	316.30	254.70	386.70	234.80	661.90	207.30	391.60	544.10	491.50	166.30	475.50
SEPT	147.10	43.90	117.20	110.90	229.40	281.40	89.30	37.00	66.20	264.30	140.10	485.40
OCT.	156.20	113.00	178.40	36.30	65.10	129.10	0.00	23.70	51.70	116.60	48.70	212.70
NOV.	1.90	0.00	0.00	31.70	2.40	0.00	0.00	0.00	0.00	0.00	0.00	212.70
DEC.	0.00	0.00	0.00	55.50	0.00	0.00	0.00	0.00	0.00	1.90	0.00	0.00
Total	1726.00	1234.10	1067.90	1308.80	1088.10	1604.90	1078.00	1325.10	1591.70	1658.00	1220.90	2272.80

	Monthly Rainfall Data at Jamul Cement Works (2005-2014)						
Year/ Month	2008	2009	2010	2011	2012	2013	2014
JAN.	19.2	0	12.2	12.2	29.9	0.4	0
FEB.	14.9	0	4	21.5	0	29.2	49.2
MAR.	14.6	3.1	3.2	0	0	2.7	6.2
APR.	8.4	8	2.7	127.9	37.5	22.3	17.6
MAY	0	21.4	5.4	34.2	0	24.2	59.6
JUNE	360.4	138.3	273.6	211.4	191.3	212.7	188.4
JULY	147.4	608.2	572.6	502.5	533.5	668.9	
AUG.	199	214	365.5	484.5	430.5	483.2	
SEPT	253.5	21.5	357.8	427.5	199.8	160.3	
OCT.	7.6	50.3	28.1	4.2	19.9	206.6	
NOV.	0	57.1	6.6	0	37.2	0	
DEC.	0	23	26.1	43	0	0	
Total	1025	1144.9	1657.8	1868.9	1479.6	1810.5	

Details of Inventory wells in the 10 km radius of Pathariya Lease-1&2, Nandani Khundni Mine

Location/Village	Owner	Gram Panchayat/Block/District	Cordinate	Elevation	Type of Well	Utility	Depth	Dia	Casing Length	Motor	Depth to water mbmp	Measuring Point -mp	Depth to water mbgl	Delivery Pipe	Ground water elevation
Khedam khera	Phoolbai Thakur	Khedam khera/Durg	N 21°16'34.9" & E 81°22' 98.6	308	Bore Well	Irrigation		6 inch			12.28m	0.60 m	11.68	2.5 inch	296.32
Khedmara Navatariya	Goyal Gajanand	Khedmara Navatariya/Durg	N 31°16'16" & E 81°22'96.8"	299	Dug Well		4.4 m	7 m				0.50 m	0.75		298.25
Birebhata	Bholashah Ashram	Birebhata/Durg	N 21°18'09" & E 81°22'9"	296	Dug Well	Drinking	6.33 m	5.70 m			3.15 m	0.52 m	2.63		293.37
Bagdumar	Infront of Phooldas Satnami House	Bagdumar/Dhamdha/Durg	N 21°19'46.4" & E 81°23' 03.	287	Bore Well		270 m	6 inch	19.81 m		9.67 m	0.66 m	9.01		277.99
Bagdumar	Behind the house of Uttam Shahoo	Bagdumar/Dhamdha/Durg	N 21°19'42.4" & E 81°22' 95'	294	Dug Well		5.33 m	2.26 m					0.77		293.23
Nandani Nagar	Dhanwa Ram Devangan	Nandani Khundni/Dhmdha/Durg	N 21°20'92" & E 81°23'69.8"	302	Dug Well	Domestic	10.56 m	1.67 m			2.04 m	0.44 m	1.6		300.4
Nandani Nagar, Ahiwara	Near Water Tank	Nandani Nagar/ Dhamdha/Durg	N 21°20'76" & E 81°23'61.9"	305	Bore Well			6 inch			14.68 m	0.75 m	13.93		291.07
Pathariya-1	Project Site	Pathariya/Dhamdha/Durg	N 21°24'52.9" & E 81°22'23.	266	Bore Well	Drinking	79 m	6 inch	42.67 m	Yes (3 Hp)	23.33 m	Ground Level	23.33	2.5 inch	242.67
Pathariya-2	Project Site	Pathariya/Dhamdha/Durg	N 21°23'54.6" & E 81°22'37.	285	Bore Well	Drinking		6 inch			18.26 m	0.30 m	17.96	2.5 inch	267.04
Pathariya-2	Infront of Hanuman Temple	Pathariya/Dhamdha/Durg	N 21°24'03.7" & E 81°22'32.	297	Dug Well	Domestic	20.14 m	2.36 m			19.69 m	Ground Level	19.69		277.31
Pathariya	Pandu Rang Dhole	Pathariya/Dhamdha/Durg	N 21°24'03.7" & E 81°22'32.	297	Bore Well	Irrigation	56.38 m	6 inch	10.66 m	Yes (3 Hp)				2.0 inch	297
Medesara Village	Near BSNL Tower	Medesara/Dhamdha/Durg	N 21°22'51.1" & E 81°21'61.	299	Dug Well	Domestic	9.75 m	3.35 m			3.35 m	0.35 m	3		296
Medesara Village	Toran Singh	Medesara/Dhamdha/Durg	N 21°22'64.3" & E 81°21'42.	259	Bore Well	Drinking	91.44 m	6 inch	12.19 m		3.29 m	0.40 m	2.89		256.11
Potiya Village	Near Gharidas Baba Temple	Potiya/Dhamdha/Durg	N 21°21'75.6" & E 81°22'49.	268	Dug Well			2 m			2.82 m	0.30 m	2.52		265.48
Potiya Village	Santu Ram Nirmal	Potiya/Dhamdha/Durg	N 21°21'71" & E 81°22'69.5"	302	Bore Well	Drinking	45.72 m	6 inch	12.19 m	Yes (1 Hp)	6.54 m	0.20 m	6.34	1.0 inch	295.66
Simariya Village	GorakhNath Morga,Bhari,Near Chatarbhuji Temple	Bagdumar/Dhamdha/Durg	N 20°19'07.8" & E 81°24'41"	318	Bore Well	Recharge	76.2 m	6 inch	15.24 m		18.20 m		18.2		299.8
Simariya Village	GorakhNath Morga,Bhari,Near Chatarbhuji Temple	Bagdumar/Dhamdha/Durg	N 21°18'95.4" & E 81°24'39.	302	Bore Well	Drinking	76.2 m	6 inch	18.28 m	Yes (3 Hp)	13.0 m	0.60 m	12.4		289.6
Ahiwara village	Infront of Sukhchewn Sahoo House	Ahiwara/Dhamdha/Durg	N 21°21'47.8" & E 81°24'84.	308	Dug Well	Constructi	7 m	2.80 m			3.64 m	0.20 m	3.44		304.56
Ahiwara village	Nandlal Tamrakar, Near Berla Road	Ahiwara/Dhamdha/Durg	N 21°21'44.3" & E 81°24'75.	318	Bore Well	Drinking &	76.2 m	6 inch	24.38 m	Yes (3 Hp)	11.05 m	0.29 m	10.76	2.0 inch	307.24
Ahiwara village	Shant Nath House, Ward No. -5, Rajra Camp	Ahiwara/Dhamdha/Durg	N 21°21'62.6" & E 81°24'99.	307	Dug Well		10.60 m	3.38 m			2.5 m		2.5		304.5
Girhola Village	Prem Raj Jain	Girhola/Dhamdha/Durg	N 21°23'83.9" & E 81°26'16.	291	Dug Well	Drinking	25 m	2.91m			13.9	0.68 m	13.22		277.78
Girhola Village	Rajendra Jain	Girhola/Dhamdha/Durg	N 21°23'76.5" & E 81°26'16.	305	Bore Well	Domestic	76.2 m	6 inch	27.43 m	es (0.75Hp	18.78 m		18.78		286.22
Ghatiya Kalan	Basant Dhurbay, Infront ofJunior Secondary School	Ghatiyal Kalan/ Berha/Durg	N 21°25'31.9" & E 81°27'47.	295	Bore Well	Drinking	48.76 m	6 inch			9.44 m	0.58 m	8.86		286.14
Ghatiya Kalan	Primary School	Ghatiyal Kalan/ Berha/Durg	N 21°25'34.6" & E 81°27'49.	295	Bore Well	Drinking	60.96 m	6 inch	30.48 m	Yes (1 Hp)	9.53 m	0.43 m	9.1	2.0 inch	285.9
Pandri Trai	Infront of Shashi Kumar, Near Ghasidas Temple	Pandri Trai/Dhamdha/Durg	N 21°26'01.4" & E 81°26'37"	297	Dug Well		18.50 m	2.40 m			14.0 m	0.9 m	13.1		283.9
Kukdi Village	Jugla Prasad	Pandri Trai/Dhamdha/Durg	N 21°26'25" & E 81°25'43.7"	291	Bore Well	Drinking &	57.91 m	6 inch	21.33 m	Yes (1 Hp)	7.2 m	0.54 m	6.68	1.5 inch	284.32
Matra	Jivra Khan Sahoo	Matra/Dhamdha/Durg	N 21°27'12.7" & E 81°24'41.	289	Dug Well		9.20m	1.37 m			8.50 m		8.5		280.5
Hardi Village	Sanskrtik Bhawan	Hardi/Dhamdha/Durg	N 21°25'75.2" & E 81°24'04.	285	Dug Well	Animal Dri	11.10 m	3.0 m			2.0 m	0.48 m	1.52		283.48
Deorjhal	Ram Prasad Githahre	Potiya/Dhamdha/Durg	N 21°22'10.7" & E 81°23'56.	293	Bore Well	Drinking	60.96 m	6 inch	12.19 m	Yes (1 Hp)	13.70 m	0.80 m	12.9		280.1
Nandani Khundni Village	Dhanen Shahu	Nandani Khundni/Dhmdha/Durg	N 21°23'24.3" & E 81°23'30.	288	Bore Well	Drinking		6 innch			5.46 m	0.83 m	4.63		283.37
Nandani Khundni Village	Girdhari Lal	Nandani Khundni/Dhmdha/Durg	N 21°23'66.1" & E 81°23'48.	288	Dug Well	Washing	13.25 m	3.5 m			2.75 m	0.75 m	2		286
Pitora Village	Sudha Ram Sahoo	Pitora/Dhamdha/Durg	N 21°23'20.6" & E 81°24'46.	297	Dug Well	Drinking	5.70 m	1.7			5.70 m	0.28 m	5.42		291.58
Dhamdha	Chow Khadiya Talab	Dhamdha/Dhamdha/Durg	N 21°27'41.1" & E 81°19'85.	290	Dug Well		7.60 m	2.90 m			7.60 m	0.76 m	6.84		283.16
Dhamdha	Mahaveer Prasad Tamrakar	Ward No.9/Dhamdha/Durg	N 21°27'39.1" & E 81°19'84.	258	Dug Well	Drinking	9.0 m	$(1.5m)^2$				0.19 m			258
Dhamdha	Mahaveer Prasad Tamrakar	Ward No.9/Dhamdha/Durg	N 21°27'39.1" & E 81°19'84.	258	Bore Well	Drinking &	68.58 m	6 inch	9.14 m	Yes (1 Hp)	18.28 m		18.28	1.0 inch	239.72
Dhamdha	Near Alankar Tailor	Dhamdha/Dhamdha/Durg	N 21°27'62.2" & E 81°19'85.	267	Bore Well	Drinking		6 inch		Yes (1 Hp)	23.4 m	0.40 m	23		244
Daganiya Village	Infront of Aganbadi Bhawan	Daganiya/Dhamdha/Durg	N 21°28'85.2" & E 81°19'15.	291	Bore Well	Domestic		6 inch		Yes (3 Hp)	24.0 m	0.45 m	23.55		267.45
Birjapur	Jagat Ram Sahoo	Birjapur/Dhamdha/Durg	N 21°28'55.6" & E 81°18'50.	302	Bore Well		51.81 m	6 inch	6.70 m	Yes (1 Hp)	20.6 m	0.80 m	19.8	1.0 inch	282.2
Barahpur	Manharan Sahoo	Barahpur/Dhamdha/Durg	N 21°27'89.5" & E 81°17'04.	294	Bore Well	Drinking	60.96 m	6 inch	31.08 m	Yes (1 Hp)	18.3 m	0.30 m	18	1.0 inch	276
Parasbor	Jeet Ram Sahoo	Parasbor/Dhamdha/Durg	N 21°27'12.4" & E 81°187'05	296	Bore Well	Drinking	53.34 m	6 inch		Yes (1 Hp)	18.52 m	0.50 m	18.02	1.0 inch	277.98
Motimpur	Shiv Kumar, Nirmal House	Ratadih/Dhamdha/Durg	N 21°28'38.4" & E 81°20'53"	285	Bore Well	Drinking	45.72 m	6 Inch	24.38 m	Yes (1/2 Hp	15.27 m	0.55 m	14.72	1.0 inch	270.28
Basni	Mandu Sahoo	Basni/Dhamdha/Durg	N 21°25'47.6" & E 81°19'86.	297	Bore Well	Drinking				Yes (1/2 Hp	17.42 m	0.33 m	17.09	1.0 inch	279.91
Kareli	Dr. G.L. Sahoo	Kareli/Dhamdha/Durg	N 21°25'24.5" & E 81°18'77.	286	Bore Well	Drinking	30.48 m	6 inch	18.28 m		18.61 m	0.14 m	18.47	1.0 inch	267.53
Kanhar Puri	Infront of Hanuman Temple	Kanharpuri/Dhamdha/Durg	N 21°24'99.3" & E 81°17'69"	300	Bore Well	Domestic	73.15 m	6 inch			20.15 m	0.5 m	20.1	1.0 inch	279.9
Tuma Kala	Infront of Champeswar House	Tuma Kala/Dhamdha/Durg	N 21°23'44.4" & E 81°16'73.	290	Bore Well	Drinking	73.15 m	6 inch			14.28 m	0.15 m	14.13		275.87
Dhaniya	Birbal Patel	Dhaniya/Dhamdha/Durg	N 21°21'65.8" & E 80°17'49.	289	Bore Well	Drinking	54.86 m	6 inch	18.28 m	Yes (3 Hp)					289
Nankatti Viilage	Near Shubhash Chandra Statue	Nankatti/Dhamdha/Durg	N 21°20'35.6" & E 81°20'04.	287	Dug Well		12.20 m	3.70 m			7.50 m	0.45 m	7.05		279.95
Nankatti Viilage	Kunj Lal, Sunwari House	Nankatti/Dhamdha/Durg	N 21°20'31.5" & E 81°20'05.	288	Bore Well	Drinking	27.43 m	6 inch	15.24 m		7.8 m	0.16 m	7.64	1.0 inch	280.36
Bore Gaon	Adjacent to Bhilai Power House Road	Bore Gaon/Dhamdha/Durg	N 21°19'66.9" & E 81°20'53.	293	Bore Well	Drinking	32.00 m	6 inch	12.19m		7.85 m	0.30 m	7.55		285.45
Kauhariya (Kowdiya)	Ishwari Sahoo, Near Vatenary Hospital	Kauhariya/Dhamdha/Durg	N 21°21'51" & E 81°21'30.9"	296	Bore Well	Drinking		6 inch		Yes (1 Hp)	10.86 m	1.24 m	9.62	1.0 inch	286.38
Sagni	Smt. Tizanbai	Sagni/Dhamdha/Durg	N 21°21'84.6" & E 81°20'06.	284	Bore Well	Drinking	35.05 m	6 inch	35.05 m	Yes (3 Hp)	16.9 m	0.36 m	16.54	2.5 inch	267.46

Annexure V Result of Chemical Analysis of Groundwater Samples

Parameters	Unit	Desirable Limits as per IS:10500	Test Methods	Nandini Khundini	Potia Village	Medasara Village	Pathariya-I	Pathariya-II	Ahiwara	Pathariya Village	Hardi Village	Girhola Village	Deorjhal Village	Khedemra	Basaini	Dhamdha	Ghatiyakala
pH	-	6.5 to 8.5	APHA-4500	7.98	7.6	7.44	7.54	7.84	7.51	7.74	7.42	7.39	7.95	7.69	7.4	7.43	7.08
Conductivity	mhos/cm		APHA-2510	1190	520	580	850	620	540	670	720	370	310	720	630	1630	490
Turbidity	NTU		APHA-2030B	3	2	2	3	2	2	2	3	2	2	2	2	3	2
Total Dissolved Solids	mg/l	500	APHA-2540B	**860**	388	412	**624**	458	402	496	**544**	282	222	**530**	462	**1210**	354
Total Hardness as $CaCO_3$	mg/l	300	APHA-2340C	280	220	240	290	260	210	280	230	190	120	310	260	**430**	220
Calcium as Ca	mg/l	75	APHA-4500B	**80**	72	**76**	**80**	72	68	**80**	56	52	32	**96**	68	**108**	44
Magnesium as Mg	mg/l	75	APHA-4500B	19.4	9.7	12.2	21.9	19.4	9.7	19.4	21.9	14.6	9.7	17	21.9	38.9	26.7
Sulphate	mg/l	200	APHA-4500B	58	9.8	21.5	38.6	13.8	11.2	22.8	88	7.5	6.8	18.6	22.8	122	11.8
Chlorides as Cl	mg/l	250	APHA-4500B	108	170	88	92	18	38	44	40	52	22	88	40	218	30
Nitrates as NO_3	mg/l	45	APHA-4500	9.8	7.5	8.9	8.2	7.5	7.2	8.6	9.2	7.5	6.2	8.8	7.5	11.2	8.6
Fluoride as F	mg/l	1	APHA-4500D	0.86	0.72	0.76	0.82	0.68	0.62	0.72	0.78	0.76	0.66	0.78	0.74	1.04	0.76
Phosphates as PO_4	mg/l		APHA-4500C	0.028	0.022	0.026	0.024	0.018	0.018	0.022	0.028	0.018	0.016	0.024	0.028	0.036	0.018
Iron as Fe	mg/l		APHA-3111B	0.045	0.028	0.032	0.028	0.024	0.022	0.026	0.036	0.024	0.018	0.036	0.044	0.056	0.026
Copper as Cu	mg/l	0.05	APHA-3111B	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Lead as Pb	mg/l	0.05	APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese as Mn	mg/l		APHA-3111B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Zinc as Zn	mg/l	5	APHA-3111B	0.68	0.54	0.72	0.66	0.72	0.54	0.76	0.84	0.36	0.32	0.76	0.86	1.36	0.68
Chromium	mg/l	0.05	APHA-3111B	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nickel as Ni	mg/l		APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Oil & Grease	mg/l		APHA-5520D	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Cadmium as Cd	mg/l		APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury as Hg	mg/l		APHA-3111B	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Arsenic as As	mg/l	0.005	APHA-3111B	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Selenium as Se	mg/l		APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt as Co	mg/l		APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total coliform	MPN/100ml		APHA-9230B	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Unit	Desirable Limits as per IS:10500	Test Methods	Paraswar	Nankatti	Barahapur	Birebhat	Sagni	Kohariya	Boregaon	Dhaniya	Tummakla	Kanharpuri	Kareli	Motimpur	Brijapur	Matra
-	6.5 to 8.5	APHA-4500	7.74	7.42	7.68	7.94	7.38	7.36	7.36	7.28	7.38	7.52	7.58	7.36	7.68	7.36
mhos/cm		APHA-2510	760	1270	750	360	560	540	1190	680	590	520	860	1480	790	720
NTU		APHA-2030B	2	3	3	2	2	2	3	2	2	2	3	3	2	3
mg/l	500	APHA-2540B	**558**	**932**	**548**	264	412	394	**876**	**502**	438	386	**612**	**1122**	**542**	**542**
mg/l	300	APHA-2340C	**390**	**410**	240	120	210	220	**380**	280	240	220	290	**410**	**360**	230
mg/l	75	APHA-4500B	72	**116**	80	40	36	64	112	76	52	48	**76**	**104**	**76**	56
mg/l	75	APHA-4500B	51	29.2	9.7	4.9	29.2	14.6	24.3	21.9	26.7	24.3	24.3	36.5	41.3	21.9
mg/l	200	APHA-4500B	18	54	18.2	5.8	14.6	18.8	66	22	28	18.2	64	112	24	80
mg/l	250	APHA-4500B	76	180	60	18	24	64	154	42	36	38	48	196	80	36
mg/l	45	APHA-4500	9.2	10.6	7.8	6.2	7.8	7.2	11.8	8.2	7.2	7.5	8.6	10.6	11.2	9.8
mg/l	1	APHA-4500D	0.84	0.88	0.78	0.45	0.72	0.74	0.86	0.76	0.78	0.76	0.74	0.96	0.82	0.76
mg/l		APHA-4500C	0.026	0.032	0.02	0.014	0.018	0.022	0.026	0.024	0.018	0.022	0.022	0.028	0.028	0.024
mg/l		APHA-3111B	0.038	0.045	0.028	0.022	0.032	0.028	0.056	0.036	0.032	0.042	0.026	0.045	0.034	0.032
mg/l	0.05	APHA-3111B	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
mg/l	0.05	APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
mg/l		APHA-3111B	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
mg/l	5	APHA-3111B	0.86	1.18	0.78	0.36	0.58	0.68	1.24	0.74	0.74	0.64	0.74	1.22	0.94	0.76
mg/l	0.05	APHA-3111B	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
mg/l		APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
mg/l		APHA-5520D	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
mg/l		APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
mg/l		APHA-3111B	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
mg/l	0.005	APHA-3111B	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
mg/l		APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
mg/l		APHA-3111B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MPN/100ml		APHA-9230B	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

Annexure VI : Analysis Results of Surface Water Samples

Sr. No.	Parameters	Desirable Limits as per IS:2296	SW1	SW2	SW3
1.	pH	6.5 to 8.5	8.02	7.55	7.88
2.	Total Solid, (mg/l)	NS	212	362	194
3.	Dissolved Solids, (mg/l)	1500	192	348	186
4.	Suspended Solids, (mg/l)	NS	20	14	8
5.	D.O., (mg/l)	4	2.1	2.0	3.1
6.	Total Choliforms MPN/100 ml	5000+	5	3	10
7.	BOD	3	1	0	3
8.	Total Hardness as $CaCO_3$, (mg/l)	NS	112	112	104
9.	Calcium as Ca, (mg/l)	NS	32	26	23
10.	Magnesium as Mg(*), (mg/l)	NS	8	12	12
11.	Sodium as Na(*), (mg/l)	NS	12	67	17
12.	Potassium as K, (mg/l)	NS	4	3	0.7
13.	Carbonate as CO3	NS	Nil	Nil	Nil
14.	Bi-carbonate, HCO3	NS	80	100	80
15	Chloride as Cl, (mg/l)	600	29	43	15
16.	Sulphate as SO_4, (mg/l)	400	20	94	30
17.	Nitrate as NO_3, (mg/l)	50	1	4	1
18.	Fluoride as F, (mg/l)	1.5	Nil	0.36	Nil
19.	Cyanide as CN, (mg/l)	0.05	Nil	BDL	Nil
20.	Chromium as Cr^{6+}, (mg/l)	0.05	BDL	BDL	BDL
21	Copper as Cu, (mg/l)	1.5	0.01	0.01	0.05
22	Lead as Pb, (mg/l)	0.1	BDL	BDL	BDL
23	Zinc as Zn, (mg/l)	15	0.2	0.2	0.4
24	Turbidity, (NTU)	NS	3	3	4

कार्यालय वनमंडलाधिकारी, दुर्ग वनमंडल, दुर्ग (छ.ग.)

पांच बिल्डींग, जेल रोड़ दुर्ग

कार्यालय: फैक्स न0 0788-2327531 ,2323686 ई-मेल: durgdfo@yahoo.com

क्रमांक/मा.चि./ 4232

दुर्ग, दिनांक/ 11 /12 /2014

Director. Ch. & Secy
Head - operations
DGM. Env.

प्रति,

ए.सी.सी. सीमेंट लिमिटेड,
पी.ओ. जामुल सीमेंट वर्क्स
जिला-दुर्ग

विषय :- Certificate from the forest Department Reg. 10 k.m. Radius around Nandini Khundini Limestone Mine Free from Forest cover.

संदर्भ :- Ref. N0.-JL/ENV/14/25 date: 22/03/2014

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विषयांतर्गत संदर्भित पत्र के माध्यम से चाही गई जानकारी निम्नानुसार है। दुर्ग जिले के दुर्ग वनमंडल अंतर्गत आवेदित स्थल के आस-पास निम्नानुसार flora and fauna पाये जाते है।

क्र.	स्थानीय नाम	वैज्ञानिक नाम/
1	2	3
Flora		
1.	बबूल	Acacia arabica
2.	रिया बबूल	Acacia leucophlea
3.	सीता/सरीफा	Anona Squamosa
4.	नीम	Azadiracta Indica
5.	पलाश	Butea monosperma
6.	शीशम	Dalbergia latifolia
7.	गुलमोहर	Delonix regia
8.	आंवला	Emblica offeicenalis
9.	बरगद	Ficus bengalensis
10.	भूई डूमर	Ficus semicardata
11.	पीपल	Ficus religiosa
12.	मोदे/गुंजा	Lannea cormandalica
13.	आम	Mangifera Indica
14.	आल/मुनगा	Moringa tinctoria
15.	कंरजी	Pongamia pinnata
16.	जाम/बिही	Psidium guava
17.	जामुन	Syzygium heyneanum
18.	ईमली	Terminalia indica
19.	कहुआ, अर्जुन	Terminalia arjuna
20.	बेर	Zizphus mauratiana
	Fauna	English Name
1.	बंदर	Rhesus macaque
2.	छछून्दर	Grey Muskshrew
3.	चमगादड़	Short nosed fruit bat
4.	नेवला	Common Mongoose
5.	गीदड़/सियार	Jackal
6.	लोमड़ी	Indian Fox
7.	गिलहरी	Five Striped
8.	घूहा	Indian Mole Rat
9.	सुअर	Indian wild Boar

ACC LIMITED RECEIVED 12 DEC 2014 Jamul Cement Works

उक्त प्रस्तावित क्षेत्र के 10 कि.मी. के अंतर्गत वर्तमान में नेशलन पार्क/सेन्चुरी/बायोसफियर रिजर्व/वाईल्ड लाईफ कोरीडोर/टाइगर/एलीफेन्ट रिजर्व एवं आरक्षित वन नहीं है, किंतु नंदनी खुंदनी में 130 हे. क्षेत्र संरक्षित वन के लिए अधिसूचित किये जाने हेतु प्रस्तावित क्षेत्र है।

वनमंडलाधिकारी
दुर्ग वनमंडल, दुर्ग (छ.ग.)

भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

SPEED POST
क्षेत्रीय कार्यालय, पश्चिम मध्य क्षेत्र,
Regional Office (WCZ)
Ground Floor, East Wing
"भू-तल पूर्व विंग"
"New Secretariate Building"
नई सचिवालय भवन,
Civil Lines, सिविल लाईन्स,
दूरभाष /Phone: 0712-2531318/19
नागपुर (महा.)/Nagpur-440001 (Mah.)
अणुडाक /E-mail: moefregionalofficenagpur@gmail.com

No: 3-10/2011(Env)/1176

Dated: ~~01.10.2015~~ 5/10/15

To,
Dr. U. Shridharam,
Director (IA)/Scientist F,
Ministry of Environment, Forest & CC,
Indira Paryavaran Bhawan,
Aliganj, Jor Bagh,
New Delhi-110003

Sub: New Nandini Khundini Limestone Mines production capacity 0.15 MTPA at villages Nandini Khnundi, in Tehisil Dhamda & district Durg - regarding.

Ref: Ministry's letter No. J-11015/237/2009-IA.II (M) dated. 10.03.2011

महोदय,

मंत्रालय के उपरोक्त संदर्भित पत्रांकों के संदर्भ में उक्त परियोजना को पर्यावरणीय दृष्टिकोण से अनुमति देते समय अनुबद्ध शर्तों के अनुपालन एवं अनुवीक्षण प्रतिवेदन (मॉनिटरिंग रिपोर्ट) एतद् द्वारा संलग्न कर प्रेषित है । अनुवीक्षण प्रतिवेदन मंत्रालय की वेबसाइट पर भी अपलोड की जा रही है । उपरोक्त अनुवीक्षण प्रतिवेदन (मॉनिटरिंग रिपोर्ट) सक्षम अधिकारी (अति.अपर प्रधान मुख्य वन संरक्षक, केन्द्रीय) द्वारा अनुमोदित है।

भवदीय,

संलग्न: उपरोक्तानुसार ।

(डॉ. एस. के. लाल)
वैज्ञानिक 'बी'

प्रतिलिपि: 1.Deputy Director (Monitoring Cell), Ministry of Environment, Forests and Climate Change, Indira Paryavaran Bhawan, Aliganj, Jor Bagh, New Delhi-110003 – for information and n/a.

2. Mr. Sunil Gupta - Cluster Head Agent ACC Ltd, Jamul Cement Works PO: Jamul Cement Works District: Durg, Pin code 490 024- for information.

(डॉ. एस. के. लाल)
वैज्ञानिक 'बी'

PART – II & III

DESCRIPTIVE REPORT ON STATUS OF COMPLIANCE TO CONDITIONS OF ENVIRONMENTAL CLEARANCE AND ENVIRONMENTAL MANAGEMENT

O.M. No.: J-11015/237/2009-IA.II (M) dated. 10.03.2011

SPECIFIC CONDITIONS:		
i.	The project proponent shall get consent to establish and consent to operate from the Chhattisgarh environment conservation board effectively implement all condition stipulated therein.	PA submitted that they have applied for the Consent to Establish which is still in process with state board. Assured to comply with all the conditions stipulated. **Agreed to comply with.**
ii.	Scheduled specie found in the study area shall be monitored closely and a plan shall be prepared and implemented for their conservation.	As per the list of flora and fauna received from forest department Durg Dist. there is no scheduled species found within the ten Km radius. **Not applicable at present.**
iii.	Groundwater shall not be extracted at any point of time during the project life.	The mine has not been started at the site only primary permissions and PH has been done. **Agreed to comply with.**
iv.	The top soil shall temporarily be stored at earmarked site (s) only and it should not be kept unutilized for long. The topsoil be used for land reclamation and plantation.	The mine has not been started at the site only primary permissions and PH has been done. **Agreed to comply with.**
v.	Garland drains, catch drains, check dams and siltation ponds of appropriate size shall be constructed around the mine working soil and mineral dumps to prevent run off of water and flow of sediment the water so collected shall be utilized for watering the mine area roads green belt development etc. Drains shall be regularly desilted particularly after the monsoon.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
vi.	Dimension of the retaining wall at the toe of the OB benches within the mine to check run – off and siltation should be based on the rainfall data.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
vii.	Greenbelt shall be raised including a 7.5m wide statutory barrier all around the mining lease reclaimed and rehabilitated areas , around water body , roads etc. By planting the native species in consolation with the local DFO/Agriculture Department. However a 30m wide greenbelt shall be developed on the northern side of the ML boundary. The ultimate area to be planted / afforestated shall not be less than 15.44 ha. The density of the trees should be 2000 plants per ha. Greenbelt shall be developed all along the mine lease in a phased manner and shall be completed within first five years.	It is informed that one thousand plants have been planted along the road toward the mine. The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Compliance in progress.**
viii.	The project authority shall implement suitable conservation measures including rain water harvesting measures to augment ground water resources in the area in consultation with the Regional director,Central Ground Water Board.	The mine has not been started at the site and no structure has been constructed however PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**

ix.	Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the operation . the periodic monitoring [(at least four times in a year – pre – monsoon, monsoon, post- monsoon and winter; once in each season)] shall be carried out in consultation with the state ground water board / CGWA and the data thus collected may be sent regularly to the MOEF, its RO, Bhopal , the CGWA and the Regional director, CGWA. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity; necessary corrective measures shall be carried out.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
x.	Vehicular emissions be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operation and in transportation of mineral within the mine lease up to the stockyard. The mineral transportation within the mine lease shall be carried out through the covered trucks only and the vehicles carrying the mineral shall not be overload. The mineral transportation outside the mine lease shall be carried out through the tarpaulin covered trucks only and the vehicles carrying the mineral shall not be overload. There shall be no spillage of mineral enroute up to the delivery point.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
xi.	The optimum charge for blasting shall be determined on vibration study. Blasting operation shall be carried out only during the daytime. Controlled blasting shall be practiced. The mitigate measures for control of ground vibration and to arrest fly rocks and boulders should be implemented.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
xii.	Drills shall either be operated with dust extractors or equipped with water injection system.	**Agreed to comply with.**
xiii.	Mineral handling area be provided with adequate number of high efficiency dust extraction system. Loading and unloading areas including all the transfer point should also have efficient dust control arrangements. These should be properly maintained and operated.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
xiv.	ETP shall also be provided for the workshop and wastewater generated during the mining operation.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
xv.	The company shall stress on the preventive aspects of occupational health.	**Noted for compliance.**

xvi.	Pre-placement medical examination and periodical medical examination of the workers engaged in the project shall be carried out and records maintained. For the propose, schedule of health examination of the workers should be drawn and followed accordingly.	PA assured that medical examination and periodical medical examination of the workers engaged in the project will be conducted as per OH&S policy and as per factory act. **Agreed to comply with.**
xvii.	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form temporary structures to be removed after the completion of the project.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
xviii.	The critical parameters such as RSPM (Particulate matter with size less than 10 micron i.e., PM 10) and NOX in the ambient air within the impact zone, peak particle velocity at 300m distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of discharge water also be monitored [(TDS, DO, PH, and Total Suspended Solids (TSS)]. The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site at a suitable location near the main gate of the company in public domain. The circular No. J-20012/1/2006-IA – II(M) dated 27.05.2009 issued by MOEF, which is available on the website of the Ministry www.envfor.nic.in shall also be referred in this regard for its compliance.	The mine has not been started at the site PA assured that condition will be complied after commencement of mining process. **Agreed to comply with.**
xix.	A final mine closure plan, along with details of Corpus fund shall be submitted to the ministry of environment and forests 5 years in advance of the final mine closure for approval.	The mine is not yet started however a progressive mine closure plan as per IBM guideline is under preparation and will be submitted. **Agreed to comply with.**
GENERAL CONDITIONS		
i.	No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.	**Agreed.**
ii.	No change in the calendar plan including excavation, quantum of mineral limestone and waste should be made.	**Agreed.**
iii.	At least four ambient air quality-monitoring stations should be established in the core zone as well as in the buffer zone for RSPM (PM with size less than 10micron i.e., PM_{10}) and NO_X monitoring. Location of the stations should be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive	PA informed that monitoring at four ambient air-quality monitoring is being carried out. The monitoring result for said parameters with location map is submitted. **Compliance in progress.**

	targets and frequency of monitoring should be undertaken in consultation with the CECB	
iv.	Data on ambient air quality [(RSPM(Particulate matter with size less than 10micron i.e., PM_{10}) and NO_X] should be regularly submitted to the Ministry including its Regional office located at Bhopal and the State Pollution Control Board / Central Pollution Control Board once in six months.	PA informed that monitoring at four ambient air-quality monitoring is being carried out. The monitoring result for said parameters with location map is submitted. **Compliance in progress.**
v.	Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained.	The mine is not yet started however a progressive mine closure plan as per IBM guideline is under preparation and will be submitted. **Agreed to comply with.**
vi.	Measures should be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.	The mine is not yet started however a progressive mine closure plan as per IBM guideline is under preparation and will be submitted. **Agreed to comply with.**
vii.	Industrial waste water should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19.5.1993 and 31.12.1993 or as amended from time to time. Oil and grease trap should be installed before discharge of workshop effluents.	**Agreed to comply with.**
viii.	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.	**Agreed to comply with.**
ix.	A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive, who will report directly to the Head of the Organization.	It is informed that a common Environment Management Cell for plant and mines is formed. A senior executive holding the cell is reporting directly to Sr. GM – Plant (Operation) and two supporting staff is given for EMC. PA has been advised to appoint trained and qualified persons to serve the Environmental Management. **Agreed to comply with.**
x.	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its RO, Bhopal.	**Agreed to comply with.**
xi.	The project authorities should inform to the RO, Bhopal regarding date of financial closures and final approval of the project by the concerned authorities and the date of start of land development work. A separate environmental management cell with suitable qualified	**Agreed.**

	personnel should be set up under the control of a Senior Executive, who will report directly to the Head of the company.	
xii.	The RO of this Ministry located at Bhopal shall monitor compliance of the stipulated conditions. The PA should extend full cooperation to the officer (s) of the RO by furnishing the requisite data / information / monitoring reports.	**Agreed upon.**
xiii.	The PA shall submit six monthly reports on the status of compliance of the stipulated environmental clearance conditions including results of monitored data (both in hard/soft copies) to the MOEF, its RO Bhopal, the respective Zonal Office of CPCB and the CECB. The PA shall upload the status of compliance of the EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the RO of the MOEF, Bhopal, the respective ZO of CPCB & CECB.	**Agreed.**
xiv.	A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parisad/ Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.	PA submitted that the copy of the clearance letter has been sent to concerned Panchayat, Zila Parisad/ Municipal Corporation, Urban Local Body. **Complied.**
xv.	The CECB should display a copy of the clearance letter at the Regional office, District Industry Centre and the Collector's office/ Tehsildar's Office for 30 days.	CECB displayed. **Complied.**
xvi.	The PA should advertise at lenst in two local newspapers of the district or state in which project is located and widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded EC and a copy of the clearance letter is available with the SPCB and also at web site of the MOEF at http://envfor.nic.in and a copy of the same should be forwarded to RO, Bhopal.	The information of issue of clearance letter was advertised in local paper **"NAV BHARAT"** in English and Vernacular Language on 15th March 2011. The copy of the news paper has already been submitted. **Complied.**
7	The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection.	**Agreed upon**
8	Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of the Environment (P) Act, 1986.	**Agreed upon**

9	The above conditions will be enforced inter-alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (P& C) Act, 1981, the Environment (P) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India/ High Court of Chhattisgarh and any other Court of Law relating to the subject matter.	**Agreed.**
10	The ES for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State P C B as prescribed under the Environment (P) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective RO of the MOEF Bhopal by e-mail.	**Agreed upon.**

SUMMERY NOTE:

1. **Implementation of Conditions:** It is inferred from the above that the implementations of environmental safeguards are in progress as the project work is at initial stage and mine is not yet opened, PA has been advised for implementation is to be taken up peri-pasu of the project development, and also the submission /uploading of six monthly compliance reports should be regular.
2. Review w.r.f to MOEFs letter dated 30.5.2012: The above mentioned report was prepared after site visit on 11.09.2015 for the proposed expansion which is planned to enhance production. To cater the required limestone for the production of 3.0 MTPA clinker it was planned by the ACC management to increase the production capacity of Nandini Kundini Limie Stone Mine from 0.15 MTPA to 1.03 MTPA in the same lease area of 53.57 ha. As this is a high grade limestone mine and it will be blend with low grade Jamul Limestone mine and feed to Crusher for manufacturing clinker. Nandini Kundini Limestone is located at villages Nandini Kundini, in Tehisil Dhamda & dist Durg C.G.
3. Court Cases and show cause/closure notices: PA submitted that there is no court case against the project and no show cause/closure notice issued by the state during last 3 years.

Scientist "B"

PROFORMA FOR ENVIRONMENTAL APPRAISAL OF MINING PROJECTS (MINING SECTOR PROJECTS)

Note 1 : All information to be given in the form of Annex/s should be properly numbered and form part of reply to this proforma.

Note 2 : Please enter √ in appropriate box where answer is Yes / No

Note 3 : No abbreviation to be used - **Not available** or **Not applicable** should be clearly mentioned.

Note 4 : **Core zone** is the mining lease area.
Buffer zone in case of ML area up to 25 ha. is to be considered as **5 km** all around the periphery of the core zone and for ML area above 25 ha. an area **10 km** all around the periphery of the core zone.

Note 5 : Adopt **Scoping process** in carrying out EIA study.

Note 6 : Please indicate source of data.

1. **General Information**

(a) Name of the project : Capacity enhancement of Nandini Khundini Limestone Mines of ACC Ltd from 0.15 MTPA to 1.03 MTPA (without increase in ML area)

(i) Name of the proponent : ACC Limited, Jamul Cement works

Mailing Address : PO Jamul Cement Works Dist : Durg (Chattisgarh)

E-mail : vinay.kapur@acclimited.com

Telephone : 09752599818

Fax No. : 0788-228285

(b) Objective of the project : Nandini Khundini is captive limestone mine to the Jamul Cement works. Capacity enhancement at Nandini khundini has been proposed to meet the additional limestone requirement of ACC Jamul cement works.

(c) Location of mine (s)

Village(s)	Tehsil	District	State
Nandini Khundini	Dhamdha	Durg	Chhattisgarh

(d) Does the proposal relate to

(i)	New mine	Yes		No	√
(ii)	Expansion	Yes	√	No	
	• Increase in ML area	Yes		No	√

•	Increase in annual production	Yes	√	No	
(iii)	Renewal of ML	Yes		No	√
(iv)	Modernisation	Yes		No	√

(e) Site Information

(i) Geographical Location

• Latitude	**21°23' 20.6" N to 81°23' 16" E** **21°23' 07.4" N to 81°23' 29" E**
• Longitude	**21° 22' 48.2" N to 81°23' 09.8"E** **21°23' 06.5" N to 81°22' 52.3" E**
• Survey of India Topo sheet number	56 P/10
• Elevation above Mean Sea Level	280 – 284 m MSL
• Total mining lease area (in ha.)	53.57 ha

(ii) Dominant nature of terrain

•	Flat	Yes		No	√
•	Undulated	Yes	√	No	
•	Hilly	Yes		No	√

2. Land usage of the mining lease area (in ha.)

(a)	Agricultural	0
(b)	Forest	0
(c)	Waste land	53.57
(d)	Grazing	0
(e)	Surface water bodies	0
(f)	Others (Specify)	0
	Total	53.57 ha

3. Indicate the seismic zone in which ML area falls. In case of zone IV & V, details of earth quakes in last 10 years.

(a) Severity (Richter Scale) II- The mine site falls in seismic Zone– II [as per IS 1893 (Part-I): 2002] i.e Low Damage Risk Zone.

(b) Impact i.e. Damage to

- Life Yes [ ] No [√]
- Property Yes [ ] No [√]
- Existing mine Yes [ ] No [√]

4. Break-up of mining lease area (in ha.) as per approved conceptual plan:

Purpose	Mining Lease Area				Total	Area acquired				Area to be acquired			
	Government		Private			Government		Private		Government		Private	
	Forest	Others	Agri.	Others		Forest	Others	Agri.	Others	Forest	Others	Agri.	Others
1. Area to be excavated	-	33.97	-	-	33.97	-	33.97	-	-	-	-	-	-
2. Storage for top soil	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Overburden / Dumps	-	1.79	-	-	1.79	-	1.79	-	-	-	-	-	-
4. Mineral storage	-	-	-	-	-	-	-	-	-	-	-	-	-
5. Infrastructure (Workshop, Administrative Building)	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Roads	-	-	-	-	-	-	-	-	-	-	-	-	-
7. Railways	-	-	-	-	-	-	-	-	-	-	-	-	-
8. Green Belt	-	3.01	-	-	3.01	-	3.01	-	-	-	-	-	-
9.Tailings pond	-	-	-	-	-	-	-	-	-	-	-	-	-
10.Effluent treatment plant	-	-	-	-	-	-	-	-	-	-	-	-	-
11.Coal handling plant / mineral separation plant	-	-	-	-	-	-	-	-	-	-	-	-	-
12. Township area	-	-	-	-	-	-	-	-	-	-	-	-	-
13.Other (water reservoir)	-	14.8	-	-	14.8	-	14.8	-	-	-	-	-	-
TOTAL	-	53.57	-	-	53.57	-	53.57	-	-	-	-	-	-

5. Township (outside mining lease) :

Not Required Colony for all employee of ACC Limited, Jamul Cement works is already in place. Employee working in Nandini khundini mines will reside in the ACC colony located at 25 km at Jamul Cement works.

(a)	Total area (in ha)	
(b)	No. of dwelling units	
(c)	Distance from mine site	

6. Distance of water bodies (in km)

Distance from	**River Bank ***	**Other Water bodies * Sea / creek / lake / nalla etc. (specify)**
Mining lease boundary	Shivnath R	3.5 km (W of ML area) Flow is from south to north)
	Amner R	6.5 km (SW of ML area) This river joins Shivnath river
Ancillary facilities	Nil	Nil

[* From highest flood line / high tide line]

7. For projects falling within the Coastal Regulation Zone (CRZ): Not applicable

Whether the mineral to be mined is of rare nature and not available outside CRZ? Yes [ ] No [√]

if yes, annex a scaled location map showing low tide line (LTL), high tide line (HTL) duly demarcated by one of the authorized agencies* [*Director, Space Application Centre, Ahmedabad: Centre for Earth Sciences Studies, Thiruvananthapuram: Institute of Remote Sensing, Anna University, Chennai: Institute of Wetland Management & Ecological Designs, KolKata: Naval Hydrographers's Office, Dehradun: National Institute of Oceanography, Panjim, Goa: and National Institute of Ocean Technology, Chennai], boundary of mining lease area, distance of ML area from LTL and HTL CRZ boundary and CRZ classification of the project area as per the approved Coastal Zone Management Plan, and settlements, sand dunes, mangroves, forest land/patches, turtles breeding and nesting sites etc., if any, in the project area.

8. Indicate aerial distance from the periphery of core zone / area from the periphery of the buffer zone to the boundary of following (up to 10 km):

S. No.	Areas	Name	Aerial distance from (in km.) Core * Zone	Buffer* Zone
1.	National Park / Sanctuary	None	-	

2.	Biosphere Reserve / Tiger Reserve / Elephant Reserve / any other Reserve	None	-
3.	Forest (RF / PF / unclassified)	None	-
4.	Habitat for migratory birds	None	-
5.	Corridor for animals of schedule I & II of the Wildlife (Protection) Act, 1972	None	-
6.	Archaeological sites * Notified * Others	None	-
7.	Defence Installation	None	-
8.	Industries / Thermal Power Plants	None	-
9.	Other Mines	None	Patheriya Lease I at about 1 km and Patheriya Lease-II mines of ACC Ltd is at a distance of 500 m from the Nandini Khundini mines.
10.	Airport	None	Nearest airport is Raipur which is at a distance of 70 km from the line lease boundary.
11.	Railway Lines	None	Mine is at a distance of 21 km NE of Durg railway station.
12.	National / State Highways	NH-6	Dhamdha - Durg road is located east side of NK mines boundary NH-6 (Mumbai to Kolkata is at a distance of 20 km

[* Buffer zone in case of ML area up to 25 ha. is to be considered as **5 km** all around the periphery of the core zone and for ML area above 25 ha. an area **10 km** all around the periphery of the core zone].

9. Description of flora & fauna separately in the core and buffer zones.*

[*Consult the Wildlife (Protection) Act, 1972 as amended subsequently and list species with (1) Common name (2) Scientific name and (3) under which schedule of the Wildlife (Protection) Act the identified species fall. Get the list authenticated by an Expert in the field / credible scientific Institute / University / Chief Wildlife Warden Office. **Information to be based on field survey.**]

A.	**Flora**	Core Zone	Buffer Zone
1.	Agricultural crops	None	Paddy

2.	Commercial crops	None	None
3.	Plantation	None	Mixed plantation (Sal, bamboo, teak)
4.	Natural vegetation / forest type	None	Scrub type
5.	Grass lands	None	None (except community land around villages used for grazing cattle.
6.	Endangered species	None	None
7.	Endemic species	None	None
8.	Others (Specify)	-	-
B.	**Fauna**		
1.	Total listing of faunal elements	List provided (No Schedule-I animals found)	List provided (No Schedule-I animals found)
2.	Endangered species	None	
3.	Endemic species	None	
4.	Migratory species	None	
5.	Details of aquatic fauna, if applicable	Not applicable	

List of Animals Observed in Buffer Zone

	Common Name	Scientific Name	Schedule
1	Striped squirrel	*Funambulus pennanti*	IV
2	Field rat	*Bandicota bangalonsis*	V
3	Porcupine	*Hystrix Indica*	IV
4	Hare	*Lepus nigricollis*	IV
5	Jungle cat	*Felis chaus*	II
6	Mongoose	*Herpestes edwardsi*	IV
7	Langur	*Presliptis entellus*	II
8	Rhesus macaque	*Macaca mulatto*	III
9	Fruit bat	*Cynopterus sphinx*	V
10	Frog	*Rana tigrina*	IV
11	Indian bull frog	*Hoplobatrachus tigerinus*	IV
12	Cobra	*Naja naja*	II
13	Common Krait	*Bungarus coeruleus*	IV
14	Russell's Viper	*Vipera russellis*	II
15	Rat snake	*Ptyas mucosus*	II
16	Forest Lizard	*Calotes versicolor*	II
17	Indian chameleon	*Chameleon zegylanicus*	II

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List of Animals Observed in Core Zone

	Common Name	Scientific Name	Schedule
	Striped squirrel	*Funambulus pennanti*	IV
	Field rat	*Bandicota bangalonsis*	V
	Hare	*Lepus nigricollis*	IV
	Jungle cat	*Felis chaus*	II
	Mongoose	*Herpestes edwardsi*	IV
	Langur	*Presliptis entellus*	II
	Frog	*Rana tigrina*	IV
	Indian bull frog	*Hoplobatrachus tigerinus*	IV
	Common Krait	*Bungarus coeruleus*	IV
	Rat snake	*Ptyas mucosus*	II
	Forest Lizard	*Calotes versicolor*	II
	Indian chameleon	*Chameleon zegylanicus*	II

10. Details of mineral reserves (as per approved Mining Plan)

		Quantity (in million tonnes)
(a)	Proved	**43.74** MT
(b)	Indicated	**Nil**
(c)	Inferred	Nil
(d)	Mineable reserves	43.74 MT

11. Major geological formation / disturbances in the mining lease area

(a)	Geological maps submitted	Yes	√	No	
(b)	Geological sections submitted	Yes	√	No	
(c)	Contour map submitted	Yes	√	No	
(d)	Whether the presence, if any, noted of				
	(i) Faults	Yes		No	√
	(ii) Dykes	Yes		No	√
	(iii) Shear Zone	Yes		No	√
	(iv) Folds	Yes		No	√
	(v) Other weak zones	Yes		No	√

(e) Source of data (Indicate): **Approved Scheme of Mining along with PMCP**

12. Production of mineral(s) and life of mine

(a) Rated capacity of mine mineral wise (Tonnes / annum) | 1030000 |

(b) Life of mine at proposed capacity (Years) | 45 years |

(c) Lease period (Years) | 30 years (Now extended upto 50years as per new MMDR amendment Act 2015) |

(d) Date of expiry of lease (D /M /Y) | 19-5-2038 (19.05.2058 As per new MMDR amendment Act 2015) |

(e) Indicate in case of existing mines

- **Nandini Khundini Limestone Mine was earlier held by Bhilai Steel Plant (SAIL) from 1971-1992. BSP after taking out the steel grade stone from the mine surrendered the mining lease. It was notified again by MP Government in 1992. On 5-2- 2008, CG government granted mining lease to ACC against MOU of the expansion of the Jamul clinkering unit. First EC was granted on dated 10 March 2011 for 0.15 MTPA limestone production. After taking the EC, ACC did not operate the mine.**

(i) Date of opening of mine

(ii) Production in the last 5 years from year…… to year …… in million tonnes.

1st year	5th year

(iii) Projected production for the next 5 years from year …… to year ……..in million tonnes.

6th to 10th year

(iv) Whether mining was suspended after opening of the mine? Yes [ ] No [ ]

If yes, details thereof including last production figure and reason for the same.

(f) Whether plans & sections provided? Yes [ ] No [ ]

13. Type and method of mining operations

TYPE		METHOD	
Opencast	√	Manual	
Underground		Semi-mechanised	
Both		Mechanised	√

14. Details of ancillary operations for mineral processing

(a) Existing — Not applicable

(b) Additional — Not applicable

15. Mine details

(a) Opencast mine

(i) Stripping ratio (mineral in tonnes to over burden in m^3) — 1 : 0.15

(ii) Ultimate working depth (in m bgl) — 60 m

(iii) Indicate present working depth in case of existing mine (in m bgl) — Not applicable. Presently mine is not in operation

(iv) Thickness of top soil (in m.)

- Minimum — 0.2
- Maximum — 0.3
- Average — 0.25

(v) Thickness of overburden (in m.)

- Minimum — 0.5
- Maximum — 3.0
- Average — 1.75 approx.

(vi) Mining Plan

- Height and width of the bench in overburden / waste. — 3 m height, 3 benches
- Height & width of the bench in ore body / coal seam. — 7 m height, 20 m width
- Proposed inclination / slope of the sides of the opencast mine (separately for overburden, coal / ore and overall slope of the pit sides) both while operating the mine as well as at the time of closure of the mine. — 45 degree in Limestone
37 degree in OB
- Whether transverse sections across the opencast mine at the end of fifth year and at the end of the life of the mine have been submitted? (upto 5th year) — Yes [√] No [ ]

(vii) Type of blasting, if any, to be adopted. — Controlled Blasting
NONEL

(b) Underground mine: **Not applicable**

Q-10

(i) Seam / Ore body | Min.Depth (m) | Max. Depth (m) | Avg. thickness (m)

Rate of dip in degree	Direction of dip

(ii) Mode of entry into the mine **Not applicable**

- Shaft
- Adit
- Incline

(iii) Details of machinery

- On surface
- At Face
- For transportation
- Others

(iv) Method of stoping (metalliferrous mines)

- Open
- Filled
- Shrinkage
- Caving
- Combination of above
- Others (Specify)

(v) Extraction method

- Caving
- Stowing
- Partial extraction

(vi) Subsidence

- Predicted max. subsidence (in m) ☐
- Max. value of tensile strain (in mm/m) ☐
- Max. slope change (in mm/m) ☐
- Whether identified possible subsidence area(s) superimposed on Surface Plan has been submitted? ☐ ☐
- Major impacts on surface features like natural drainage pattern, houses, buildings, water bodies, roads, forest, etc.
- Salient features of subsidence management (monitoring and control).

16. Surface drainage pattern at mine site

(a) Whether the pre-mining surface drainage plan submitted? Yes ☑ No ☐

(b) Do you propose any modification / diversion in the existing natural drainage pattern at any stage? If yes, when. Provide location map indicating contours, dimensions of water body to be diverted, direction of flow of water and proposed route / changes, if any i.e. realignment of river / nallah / any other water body falling within core zone and its impact. Yes ☐ No ☑

17. Embankment and / or weir construction

(a) Do you propose, at any stage, construction of

(i) Embankment for protection against flood? Yes ☐ No ☑

(ii) Weir for water storage for the mine? Yes ☐ No ☑

(b) If so, provide details thereof. Not applicable

(b) Impact of embankment on HFL and settlement around. Not applicable

(d) Impact of weir on down stream users of water. Not applicable

18. Vehicular traffic density (outside the ML area**)**

		Type of vehicles	No. of vehicles per day
(a)	Existing	Tipper, Bus, Car, Auto & 2-wheeler	1980
(b)	After the proposed activity	No change	275 (additional)

(c)	Whether the existing road network is adequate? (for staff movement) If no, provide details of alternative proposal?	Yes	√	No	

19. Loading, transportation and unloading of mineral and waste rocks on surface:

(a)	Manual	Yes		No	√
(b)	Tubs, mine cars, etc.	Yes		No	√
(c)]	Scraper, shovels, dumpers / trucks.	Yes	√	No	
(d)	Conveyors (belt, chain, etc.)	Yes		No	√
(e)	Others (specify).				

20. Mineral(s) transportation outside the ML area

		Qty. (in TPD)	Percentage (%)	Length (in km)
(a)	Road	3500	100%	20 km
(b)	Rail			
(c)	Conveyors			
(d)	Rope way			
(e)	Water ways			
(f)	Pipeline			
(g)	Others (Specify)			
	Total	3500	100%	

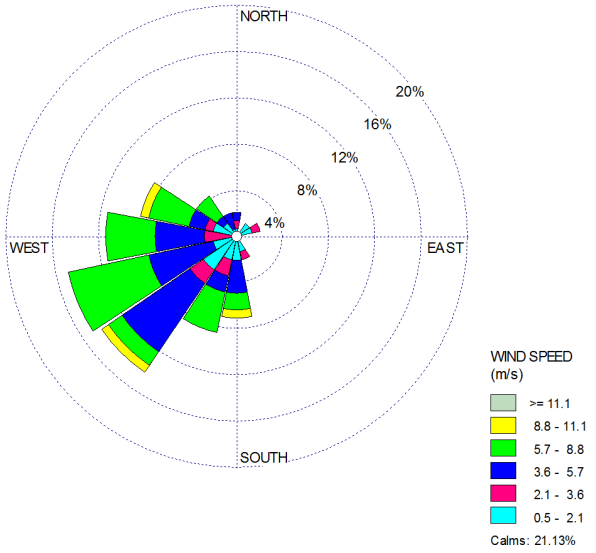
21. Baseline Meteorological and Air Quality data

(a) Micro-meteorological data

[Continuous monitoring through autographic instrument for one full season other than monsoon]

(i) Wind rose pattern for one full season (16 points of compass i.e. N, NNE, NE, ---) based on 24-hourly data. For coastal area also furnish day-time and night time data.

- Day time
- Night time
- 24 – hours period



Q-12

(ii) Site specific monitored data

Month	Wind Speed (m/s)			Temperature (°C)			Relative Humidity (%)			Rain Fall * (mm)			Cloud Cover** (Octas of sky)
	Mean	Max.	% of calm	Mean (Dry Bulb)	Highest	Lowest	Mean	Highest	Lowest	Total	24-hours Highest	No. of rainy days	Mean
Mar 14	0.5	8.8	22	-	34.6	19.8	45	54	20	-	10.2 mm	2	-
Apr 14	0.5	5.7	23	-	40.3	25.8	34	43	23	-	0	0	-
May 14	0.5	5.7	19	-	44.6	28.4	32	41	22	-	0	0	-

* 24-hours rainfall should be reported from 08:30 hrs. IST of previous day to 08:30 hrs. IST of the day.
* Rainy day is considered when 24 hrs. rainfall is ≥ 2.5 mm.
** Visual observations of cloud cover should be recorded four times a day at regular intervals.

(iii) Indicate name and distance of the nearest IMD meteorological station from which climatological data have been obtained for reporting in the EIA report, if any. Raipur

(b) Ambient air quality data* (RPM, SPM, SO_2, and NOx)

[*Monitoring should be carried out covering one full season except monsoon – same season as in 21 (a) (i)]
[*Frequency of sampling: Sampling to be done twice a week for the entire season 24 hourly for SPM & RPM. For gaseous pollutants 24- hourly data be given irrespective of the sampling period.]

(i) Season and period for which monitoring has been carried out.

(ii) No. of samples collected at each monitoring station

Name of monitoring equipment used	SPM	RPM (PM_{10})	SO_2	NO_2	Pb**
	-	Respirable dust sampler	Gas Sampler	Gas Sampler	-
Equipment sensitivity	-	5 µg/m^3	4 µg/m^3	9 µg/m^3	-

Permissible AAQ standard (CPCB)	R	-			100 µg/m^3			80 µg/m^3			80 µg/m^3			-		
	I	-			-			-			-			-		
	S	-			-			-			-					

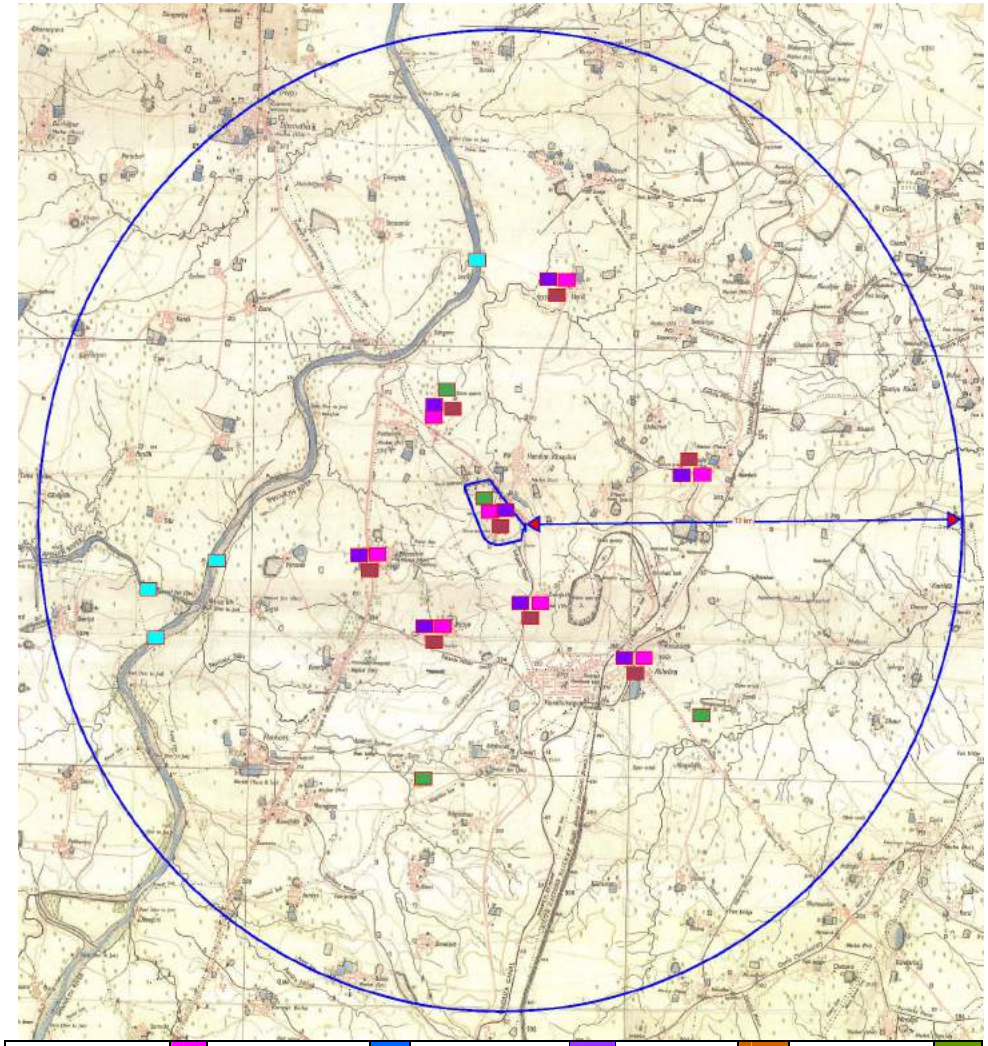
Monitoring Location	No. of Samples Drawn	Category* (R, I, S)	Min.	Max.	95% tile	Min.	Max.	95% tile	Min.	Max.	95% tile	Min.	Max.	95% tile	Min.	Max.	95% tile
Core zone **AQ2**		I	-	-	-	58	73	72	4	5.8	5.7	9.2	14.8	14.7			
Buffer zone **AQ1**		R	-	-	-	60	79	78	4.5	6.8	6.7	10.2	16.8	16.7			
AQ3		R	-	-	-	56	66	65	4	6	5.9	9	14.3	14.2			
AQ4		R	-	-	-	54	70	69	4	5.8	5.7	9	13.8	13.7			
AQ5		R	-	-	-	60	76	75	4.2	7.5	7.4	9.8	18.2	18.1			
AQ6		R	-	-	-	58	68	67	4	5.8	5.7	9	13.8	13.7			
AQ7		R	-	-	-	62	76	75	4.2	7.4	7/3	9.4	16.8	16.7			
AQ8		R	-	-	-	60	75	74	4	5.6	5.5	9.2	14.2	14.1			

*R = Residential; I = Industrial; S = Sensitive

**Pb for mineral specific sites only.

Annex a location map indicating location of AAQ stations, their direction and distance with respect to project site.

	Location	Distance& Direction wrt site	Terrain features
AQ 1	Patharia-I Mine Office	1.0 km N	Near mining zone, flat terrain, trees are present, upwind direction of NKM
AQ 2	Nandani Kundini vill	Core Zone	Barren land, rugged terrain, water body present at many places,
AQ 3	Hardi vill	4.5 km NNE	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction
AQ 4	Girhola vill	4.5 km E	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction
AQ5	Ahiwara vill	3.5 km SE	Urban area, flat terrain. Concrete buildings, crosswind direction of NKM
AQ6	Potia vill	1.8 km S	Rural village, flat terrain, surrounded by agriculture land, upwind direction of NKM
AQ7	Medesara vill	2 km SW	Rural village, flat terrain, surrounded by agriculture land, lies in upwind direction of NKM
AQ 8	Deorjhal village	1.6 km SE	Rural village, flat terrain, surrounded by agriculture land, lies in crosswind direction



Air & Noise	Surface Water	Ground Water	Soil	Ecology

22. Stack and emission details , if any* Not applicable

Sl. No.	Process / unit of operation (e.g. DG Set, Boiler)	Height of stack (m)	Internal top dia. (m)	Flue gas exit velocity (m/sec)	Emission rate (kg/hr)				Heat emission rate from top of stack (K.cal/hr)	Exhaust / Flue gas			
					SPM	SO_2	NO_x	CO		Temp ^oC	Density	Specific Heat	Volumetric flow rate (m^3/hr.)

23. Details of fugitive emissions during mining operations* Drilling, Blasting, Payloaders, Movement on haul road, crusher

24. Air Quality Impact Prediction (AQIP)*

(a) Details of model(s) used for AQIP including grid size, terrain features, and input meteorological data
Name of Model/Software: ISCST3
Grid Size: 250 m x 250 m
Terrain features: Flat
Input Met Data: Attached in Annexure 4 page 181

(b) Maximum incremental GLC values of pollutants based on prediction exercise

(in µg/m^3)

S. No.	Pollutants	Incremental Value	Ambient Air Quality	Resultant Air Quality
1.	PM_{10}	9	73	82
2**.	SO_2	-	-	-
3**.	NO_X	-	-	-

[* Question Number 22, 23 & 24 need not be filled-in for mines having ML area of **25 ha. or less.**]
[**Information on item no. 2 & 3 to be provided in cases with captive power generation of 500 KVA and above]

25. Water requirement (m^3/day)

Purpose	Avg. Demand	Peak Demand
A. <u>Mine site</u>		
1. Mine operation	0	0
2. Land reclamation	0	0
3. Dust suppression	8	10
4. Drinking	0	0
5. Green Belt	3	5
6. Beneficiation	0	0
7. Washeries	0	0
8. Fire Service	0	0
9. Others (specify)	5 (Toilets)	5 (Toilets)
B. <u>Township</u>		
1. Green Belt		
2. Domestic		
3. Other (specify)		
Total	16	20

26. Source of water supply*

S. No.	Source	m^3/day
1	River (name)	None
2	Ground water	None
3	Mine water (sump / pit)	20
4	Other surface water bodies (specify)	None

[*Annex a copy of sanction letter / permission from the concerned authority (Central Ground Water Authority in case of ground water abstraction is from notified area / State Ground Water Board in case of non-notified area / State Irrigation Department for surface water pumping) for drawing water.] **Application submitted to CGWA on 14-2-2016**

27. Lean season flow in case of pumping from river / nalla (cumecs):

Not applicable

28. Ground water potential of the study area

28.1. Ground water availability

(a) Range of water table (m bgl)

(i) Pre-monsoon (April/May)

- Core Zone: 20
- Buffer zone: 23

(ii) Post-monsoon (November)

- Core Zone: 15
- Buffer zone: 20

(b) Total annual replenishable recharge (million m^3/ year)

- By ground water table fluctuation method: 3196 ham
- By rainfall infiltration factor method: 2784 ham

(c) Annual draft excluding estimated draft through mine discharge (million m^3/ year): 31.25

(d) Estimated draft through mine discharge (million m^3/ year): 0.41

(e) Net annual ground water availability (million m^3/ year): 45.91

(f) Stage of ground water development in %: 68%

28.2. Water demand - Competing users of the water source Not applicable

S. No.	Usage	Present Consumption (million m^3/year)		Additional proposed as per local plan (million m^3/year)		Total (million m^3/year)	
		Surface	Ground	Surface	Ground	Surface	Ground
1	Domestic	—	—	—	—	—	—
2	Irrigation	--	--	--	--	--	--
3	Industry	—	—	—	—	—	—
4	Mining	—	—	—	—	—	—
5	Others (specify)	--	--	--	--	--	--
Total							

29. Water quality*

(a) Annex physico -chemical analysis of water at intake point ** **Not applicable as we are not withdrawing water from surface water.**

(b) In case of existing mine, annex report on quality of water discharge: Not applicable i.e. complete physico - chemical analysis**

[*For non-discharging mines at least four ground water samples to be taken preferably from downstream direction of the mine in pre-monsoon and post-monsoon periods and analysed. For discharging mines six samples are to be analysed]

**All parameters as per BIS 10500. Indicate name of Methodology, Equipment used for analysis, and Detection Level (DL) for each parameter.

*** Wherever any analytical parameter is below detection level, "BDL" (Below Detection Level) should be written instead of 'NIL'.

30. Impact on ground water regime / stream / lake / springs due to mine dewatering *

(a) Radius of influence (in m)

[To be estimated based on analysis of pumping test data and application of empirical formula] | 300 m |

(b) Whether saline water ingress will take place? (applicable to coastal areas) **Not applicable** Yes [ ] No [✓]

(c) Impact on stream / lake / springs: **Not applicable**

[* Provide a comprehensive hydro-geological assessment report if the average mine dewatering is more than 100 m^3/day and or going below water table in non-monsoon period. The report should be based on preferably latest one year pre-monsoon and post-monsoon baseline data covering information on ground water situation, aquifer characteristics, water level conditions (April – May and November), estimate of ground water resources, predicted impact of the project on ground water regime and detailed remedial / conservation measures such as artificial recharge of ground water etc. The report should be based on actual field inventory out of existing wells, at least 30 observation wells in the buffer zone with supplementary information from secondary sources (mention name). For estimation** of ground water resource (refer question no. 28 above) be designated study area of the buffer zone may be sub-divided into command and non-command areas, watershed-wise (in case of hard rock / consolidated formations) / block-wise / mandal-wise in case of alluvial / unconsolidated formations)]

[**For estimating ground water resources in the area follow the Ground Water Estimation Committee recommendations of 1997] Report attached in Annexure 5 page 184

31. Waste Water Management

Mine

(a) Daily average discharge (m^3/day) from different sources (there will be no discharge outside the mine premises. Mine water will be pumped to abandoned pits located inside the mine boundary

(i) Mine water discharge during

- Lean period | 0 |
- Monsoon period | 10 |

(ii)	Workshop	0
(iii)	Domestic (mine site)	4
(iv)	Beneficiation / Washeries	0
(v)	Coal Handling Plant	0
(vi)	Tailings pond	0
(vii)	Others (Specify)	0
	Total	14

(b) Waste water treatment plant; flow sheet for treatment process attached. Yes [√] No [ ]

(c) Quantity of water recycled / reused / to be recycled in

(i) Percentage - 0

(ii) m^3/day - 0

(d) Point of final discharge

Final Point	Quantity discharged (in m^3/day)
1. Surface	
(i) Agricultural land	0
(ii) Waste land	0
(iii) Forest land	0
(iv) Green belt	0
2. River / nallah	0
3. Lake	0
4. Sea	
5. Others (specify)	
Total	0

(e) Users of discharge water

(i)	Human	Yes		No	√
(ii)	Livestock	Yes		No	√
(iii)	Irrigation	Yes		No	√
(iv)	Industry	Yes		No	√
(v)	Others (specify)		Dust suppression in mines		

(f) Details of the river / nalla, if final effluent is / will be discharged (cumecs**): Not applicable**

(i)	Average flow rate				
(ii)	Lean season flow rate				
(iii)	Aquatic life				
(iv)	Analysis of river water 100 meters upstream and 100 meters downstream of discharge point submitted.	Yes		No	

Township:

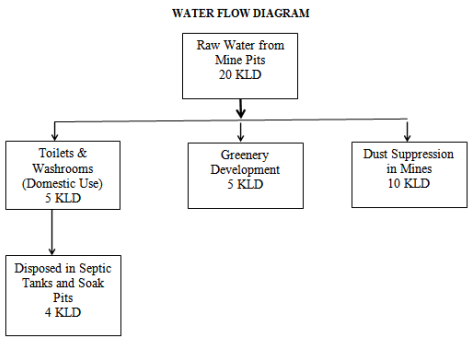
Not applicable as employee working in Nandini Khundini will be accommodated within the existing township available at Jamul Cements works.

(a) Waste water generation from township (m^3/day)

(b) Are you planning to provide sewage treatment plant? Yes No

(c) Usage of treated water

32. Attach water balance statement in the form of a flow diagram indicating source (s), consumption (Section-wise) and output.



Ambient noise level leq dB(A)

Location of sampling station	Noise level	
	Day Time	Night Time
A. Core Zone CN_1 Nandini Khundini	47.2	41.4
B. Buffer Zone BN_1 Pathariya-I, Mine Office	58.6	49.8
BN_2 Hardi Village	49.6	42.6
BN_3 Girhola Village	48.8	41.8
BN_4 Ahiwara Village	48.2	41.6
BN_5 Potia Village	50.2	42.4
BN_6 Medasara Village	51.4	42.6
BN_7 Deorjhal Village	51.4	42.6

34. Solid Waste

(a) Top soil and solid waste quantity and quality

Name (Lump/fines/slurry/ Sludge/others)	Composition	Quantity (million m^3)	Method of disposal
Mining activity* a. Top Soil	There is no fertile top soil except lateritic soil which will be removed and stacked properly within the lease boundary. In due course of mining, if some quantity of top soil gets generated i.e. Layer of 0.2 to 0.3 m of black cotton soil then it will be used for plantation on matured dumps. The quantity of top soil cannot be envisaged in the present stage of mine.		
b. Over burden	Clay , murrum , reject stone, etc	-	-
c. Others (specify)		3.6 -	Backfilling and OB dump inside mine lease area -
Effluent Treatment Plant (sludge)	Not applicable	-	-
Total	-	3.6	-

[* Annex layout plan indicating the dump sites.] Conceptual plan given in Figure 2.6 page 32

(b) (i) Does waste (s) contain any hazardous/toxic substance/ radioactive materials or heavy metals? Yes [ ] No [√]

(ii) If yes, whether details and precautionary measures provided? **Not applicable** Yes [ ] No [ ]

(c) Recovery and recycling possibilities.: **None**

(d) Possible user(s) of the solid waste.: **Mine reclamation (progressively till the end of mine life, when all limestone present has been excavated)**

(e) (i) Is the solid waste suitable for backfilling? Yes [√] No [ ]

(ii) If yes, when do you propose to start backfilling.

a. Top Soil: As and when extracted will be preserved used in greenbelt development
b. Over burden: When limestone extraction is complete till pit limit
c. Others (specify)

(in million m^3)

Solid waste (s)	Already accumulated (A)	To be generated (B)	% of A & B to be backfilled	
			A	B
Over burden	-	3.6	-	95 %
Others (specify)	-	-	-	-

Note: Safety parapet wall (approx 3 m height) will be made all along the boundary which will be stabilized by green belt development

<u>Land reclamation Plan</u>

(f) In case waste is to be dumped on the ground, indicate

(i) Associated environmental problems: Erosion of dump material, dump subsidence.

(ii) Number & type of waste dumps (OB dump created outside pit but within ML)

- No. of external dumps [1]
- Max. projected height of dumps (in m) [9]

- No. of terraces and height of each stage | 3 m (3 terraces) |
- Overall slope of the dump (degree) | <37 |
- Proposed reclamation measures : **Backfilling will be done in the mined out pit**

(iii) Section of the waste dump in relation to the adjacent ground profile attached. Yes [√] No [ ]

35. Fuel / Energy requirements*

[*To be furnished for mines having ML area more than 25 ha. or captive power generation of 500KVA and above]

(a) Total power requirement (in MW)

S. N		Mine Site	Township	Others (specify)	Total
1	Present	-	-	-	-
2	Proposed / additional	200000 units/yr	-	-	200000 units/yr
Total		200000 units/yr	-	-	200000 units/yr

(b) Source of power (in MW)

S. No.		SEB/Grid*	Captive power plant	DG Sets
1	Present	-	-	-
2	Proposed	From SEB	-	-
Total		200000 units/yr	-	200000 units/yr

[* Annex a copy of the sanction letter from the concerned authority]

(c) Details of fuels: No CPP or workshop proposed in mines, hence not applicable

S.No.	Fuel	Daily Consumption (TPD)		Calorific value (Kcals/kg)	% Ash	% Sulphur
		Existing	Proposed			
1	HSD					
2	LSHS					
3	Other (specify)					

36. Storage of inflammable / explosive materials (No storage inside mine)

S. No.	Name	Number of Storages	Consumption (in TPD)	Maximum Quantity at any point of time

1	Fuels	-	-	-
2	Explosives	-	-	-

37. Human Settlement

	Core Zone	Buffer Zone
Population*	Nil	1.16 lakhs
No. of villages	Nil	61
Number of households village-wise	Nil	24171

[* As per 2011 census record or actual survey]

38. Rehabilitation & Resettlement (R&R) Plan*

[*Provide a comprehensive rehabilitation plan, if more than 1000 people are likely to be displaced, other-wise a summary plan]: **Not applicable**

(a) Villages falling within the study area

	Villages	
	Number	Name
Core zone	0	None
500 m from the blasting site (s)	1	Nandini Khundini village
Buffer zone	60	-
Township site	None	None

(b) Details of village(s) in the core zone **Not applicable**

S. No.	Village name	Population*		Average Annual Income
		Tribal	Others	
1	None	None	None	None

[*As per 2001 census / actual survey]

(c) Population to be displaced and / or Land oustees **Not applicable**

Name of village(s) falling within	Number of oustees		
	Land (only)	Homestead (only)	Land and Homestead (both)

Mining Lease 1. 2. ▪ ▪	0	0	0
Township Site 1. 2. ▪ Not applicable	-	-	-

(d) Whether R&R package has been finalised? **Not applicable**
If yes, salient features of R&R plan for oustees.

(i) Site details where the people are proposed to be resettled & facilities existing / to be created.

(ii) Funds earmarked for compensation package.

(iii) Agency /Authority responsible for their resettlement.

(iv) Time of commencement of resettlement of Project Affected People (PAP).

(v) Period by which resettlement of PAP will be over.

39. Lease -wise plantation details

(a) Lease area (in ha.)	Existing mine	New mine
(i) Area broken up	**11.48**	
(ii) To be broken up	**33.97**	
(iii) Area not to be broken-up	**1.79**	
(b) Township area (in ha.) Not applicable	**Nil**	

(c) Area afforested and proposed (in ha.)

	Peripheral	Dumps	Roads	Township	Others
(i) Existing (not applicable)					
(ii) Proposed	7500	3580	-	-	-

(d) No. and type of trees planted and proposed

(i) Existing: **Not applicable**

- When plantation was started? Month / Year

No.of plant species planted	Number saplings (per ha.)

Survival rate %

- Avg. height

(ii) Proposed

No. of plant species to be planted	Number of saplings (per ha.)
10580	2500

40. Environmental health and safety

(a) What major health and safety hazards are anticipated? **Dust, Noise, Fire, Explosion, Accidents by vehicles**

(b) What provisions have been made/proposed to be made to conform to health and safety requirements? Permission from PESO shall be obtained for the Magazine. All risk mitigation measures shall be implemented to prevent fire.

- **All the safety precautions as per Mines Act 1952**
- **Permission from PESO will be obtained if required**
- **Regular health check up of the employee**
- **EMP is in the place for control of dust and noise**
- **PPE to all the employee**
- **Controlled blasting.**

(c) In case of an existing mine: **Not applicable**

(i) Comprehensive report on health status of the workers as under the Mines Act annexed. Yes No Not applicable

(ii) Mineralogical composition of RPM (dust)

- Free silica: less than 10% in PM
- Chromium* (Total as well as Hexavalent)
- Lead**

[* Only for Chromite mines]

[**Only for Base Metal mines]

(d) Information on radiation protection measures, if applicable. Not applicable

41. Environmental Management Plan

Salient features of environmental protection measures

S. No.	Environmental issues*	Already practiced, if applicable	Proposed
1	Air pollution	-	▪ Haul roads inside mines will be stabilised and water sprinkling using road tankers will be done periodically. ▪ The drilling machines equipped with dust collector arrangement prevent the generation and spread of dust and wet drilling. ▪ The personnel working on the drills will be being provided with dusk mask and other required Personal Protective Equipments (PPE) ▪ Regular maintenance of the vehicles and machinery shall be carried out. ▪ In order to minimize dust pollution, 30 m wide greenbelt will be developed from mines boundary to Nandini Khundini village.
2	Water pollution	-	▪ Wastewater from toilets and washrooms will be treated in septic tank for disposal. The treated water shall be used for dust suppression. ▪ Garland drains will be constructed around the dump to carry wash off from the bunds
3.	Water conservation	-	▪ Harvesting of rain water in the existing partially excavated pit.
4.	Noise pollution	-	▪ Greenbelt (7.5 m wide on all sides of the mine) ▪ Regular maintenance of HEMM ▪ Blasting will be done during favourable atmospheric condition and less human activity time. Avoiding blasting during high windy periods, ▪ No blasting in dark hours ▪ Adaptation of Controlled blasting technique ▪ PPE such as earmuffs will be provided to operators and other employees working in high noise zone. ▪ Regular maintenance of the vehicles and machinery shall be carried out.
5.	Solid waste / Tailings	-	▪ OB Dump properly terraced and plantation done for erosion control
6.	Land	-	▪ Land will be restored to its near original shape and

	degradation		given to the owners for useful purpose ▪ Water body created after mining would serve as water harvesting, groundwater recharge and developing fisheries
7.	Erosion & Sediment	-	▪ Green cover to be placed over the OB dump to control erosion and sediment transport down the OB
8.	Top soil	-	▪ There is no fertile top soil except lateritic soil which will be removed and stacked properly within the lease boundary. In due course of mining, if some quantity of top soil gets generated i.e. Layer of 0.2 to 0.3 m of black cotton soil then it will be used for plantation on matured dumps. The quantity of top soil cannot be envisaged in the present stage of mine.
9.	Ground vibration	-	▪ NONEL and Controlled blasting shall be adopted. ▪ Ground vibration to be monitored at each blast, as per DGMS norms
10.	Wildlife conservation	-	▪ Not applicable, as there is no schedule animal with in 10 km radius of the study area
11.	Forest protection	-	▪ Not applicable, as there is no forest land involved in the proposed ML area
12.	Others (specify)	-	▪ None

[* As applicable]

42. Compliance with environmental safeguards (For existing units)

Not applicable because the existing mine was not operated. Certificate from Regional Officer, MOEF obtained and submitted to MOEF

(a)	Status of the compliance of conditions of environmental clearance issued by MoEF, if any, enclosed.	Yes	√	No	
(b)	Status of the compliance of 'Consent to Operate' issued by SPCB, if any, enclosed. **Not applicable**	Yes		No	
(c)	Latest 'environmental statement' enclosed. **Not applicable**	Yes		No	

43. Scoping of EIA

	Whether environmental impact assessment of the project has been carried out by following scoping process?	Yes	√	No	
	EIA done as per TOR issued by MOEF If yes, a copy of scoping of EIA annexed.	Yes	√	No	

44. Mine closure

(a)	Have you planned mine closure? **(Progressive Mine Closure Plan)**	Yes	√	No	
(b)	Submitted a conceptual mine closure plan.	Yes	√	No	

(c) If yes, indicate estimated amount for implementing the same (in Rs. lakhs) — **5.12750 (as envisaged in approved scheme of mining for the first five year working.**

45. Capital cost of the project (in Rs. Lakh) (Based on latest estimate) — 1500

46. Cost of environmental protection measures

(in Rs. Lakh)

S. No.		Capital cost		Annual recurring cost	
		Existing	Proposed	Existing	Proposed
1	Pollution Control (Separately provide break-up)	-	39	-	4.5
2	Pollution Monitoring (Separately provide break-up)	-	2	-	1.5
3	Occupational Health	-	2	-	1.5

4	Green Belt • Mine • Township (not applicable)	-	2	-	2.5
5	Reclamation / Rehabilitation of mined out area Not applicable	-	-	-	-
6	Others (specify)	-	-	-	-
Total			**50***	**-**	**10**

*Revised cost

47. Amount earmarked for socio-economic welfare measures for the nearby villages other than R&R plans.

Rs.5 lakhs per year

48. Public Hearing

(a) Date of Advertisement: 14-2-2015

(b) Newspapers in which the advertisement appeared: Times of India and Haribhoomi

(c) Date of public hearing (DD/MM/YYYY): 19-3-2015

(d) Public Hearing Panel chaired by & members present: Upper Collector and RO-CECB

(e) No. of people attended the public hearing meeting
and number of people from the lease area. 89 people attended the PH

(f) Summary/details of public hearing in tabular form.

Sl no.	Issues raised by the Public	Response/Commitment of Project Proponents	Suggestions made by the PH panel	Action Plan
1	Poisonous gases and gun powder dust from Blasting	Mining operations at Nandini khundini mine has yet not started. ACC will carry out controlled blasting and use latest technology like NONEL and approved explosives for blasting.	None	ACC will carry out controlled blasting and use latest technology like NONEL and approved explosives for blasting.
2	Drainage and Canals passing through mine lease may get affected	There is no such Nalla or canal passing through the mining lease area.	None	Not Required

3	Mine lease area land is being used for Grazing, Disposal and Funeral	The ML area had been a mining field of BSP since 1971, the same has been granted to ACC in the year 2008. Almost 12 ha of the mining area is a broken up area. Nandini Khundini Limestone mining lease was held by Bhilai Steel Plant since 1971 to 1991. The lease was denotified vide Gazette Notification dated 9th June, 1992 prior to grant to ACC in 2008. The mining lease (53.57 ha) was granted to ACC Limited by the Chhattisgarh Government vide their office letter no. F 3- 18/2004/12 on 5th February 2008. The mine lease area has already obtained environmental clearance from the MoEF vide letter no. J-11015/237/2009/IA.II (M) dated 10th March 2011. Govt had granted the working permission to the ACC Nandini Khundini limestone for Mine vide letter dated 24.4.2011 (17.89 ha) and 11.09.2014 (35.68 ha)	None	Not applicable. However if village panchayat provides barren / waste land, ACC will provide support to village panchayat in development of grazing land.
4	Problem from Blasting	Nandini Khundini limestone mine will be fully scientific mechanised opencast mine with all latest technology of operation. ACC will provide thick plant (green belt of 15 meters) between the habitation and the mine Controlled blasting with proper monitoring will be integral part of the mining process. No Secondary blasting will be done. Hydraulic Rock breaker /mechanized breaking will be done to eliminate the secondary blasting Vibration monitoring will be done as per DGMS norms	None	ACC will follow all norms laid down under various mining acts to ensure a safe blasting. Nandini Khundini limestone mine will be fully scientific mechanised opencast mine with all latest technology of operation. ACC will provide thick plant green belt of 30 meters between the habitation and the mine Controlled blasting with proper monitoring will be integral part of the mining process. No Secondary blasting will be done. Hydraulic Rock breaker /mechanized breaking will be done to eliminate the secondary blasting Vibration monitoring will be done as per DGMS norms

5	Drinking water problem and water tank provision	ACC will put up the proposal to the village Panchayat to provide series of Syntax tanks connected to bore well for resolving the village water problem. Based on the approval from the panchayat and relevant government authorities the project will be implemented.	None	• Rs.2.0 lakhs has been spent for installing two syntax tank and two no of bore wells with pipeline. • Rs. 17.0 lakhs has been proposed to be spent to install further bore wells, laying of pipe lines and installation of overhead tanks within three years.
6	Air Pollution related problem and control	• Wet drilling will be practiced. The drilling machine will have inbuilt water sprinkling arrangement and dust extraction system. • Controlled blasting technique will be followed. The site will be wetted before blasting. Blasting will be done around noon. • Ground vibrations to be continuously monitored during blasting using Minimate • Mechanised breaking will be used to eliminate the secondary blasting. • Compaction, gradation and proper drainage will be provided for haul roads. • Haul roads in mines will be tabilized. Vehicular speed in mines area will be restricted to 20 kmph and water sprinkling will be carried out. • Plantation shall be done in the Mine periphery and dumps/reclaimed pits.	None	• Wet drilling will be practiced. The drilling machine will have inbuilt water sprinkling arrangement and dust extraction system. • Controlled blasting technique will be followed. The site will be wetted before blasting. Blasting will be done around noon. • Ground vibrations to be continuously monitored during blasting using Minimate • Mechanised breaking will be used to eliminate the secondary blasting. • Compaction, gradation and proper drainage will be provided for haul roads. • Haul roads in mines will be tabilized. Vehicular speed in mines area will be restricted to 20 kmph and water sprinkling will be carried out. • Plantation area has been already demarked wherein green belt will be developed for which ACC has earmarked Rs. 30 lakhs.
7	Repairing of Main Road from Nandini Khundini	As requested the option will be explored after discussion with the relevant authorities.	None	• Amount of Rs. 5.0 lakhs has been already been spent after public hearing as per the need of the community for construction of road the same will be maintained if used by us.

8	Health Camps at Village	• Medical Health Camps are being organised periodically at different villages like Pathariya, Madesra and Nandini Khundini. • Free medicines are distributed to the villagers. • Eye camps are being organised and Spectacles and goggles are being distributed • In future also organisation of health camps in villages will continue.	None	• We will continue to organize health camps at nandini khundini village.
9	Employment to nearby villagers	ACC will give preference to the local peoples depending upon the skill, job requirement and capability. Several other indirect employment opportunities will be created in the surrounding areas like transport of raw material, hotel operators, vehicle drivers and attendants, workshops, grocery and retails, medical, etc.	None	ACC Jamul has developed a comprehensive center for employability skill development and placement named "DISHA". Herein unemployed local youth are trained for enhancement of employability skills and helped for suitable placement. Villagers of Nandinin Kundini are also beneficiary of this scheme
10	Provision for Sulab Sauchalay	ACC will help in building Sulabh Sauchalay in the Village as per the requirement of Village Panchayat.	None	• Rs. 4.85 lakhs has been spent after public hearing for construction of community toilets. • Rs 6.0 Lakhs has been earmarked for the construction of community toilets
11	Green Belt development	Thick greenbelt will be developed around the periphery of mine and will start from the village side.		• ACC has earmarked Rs. 30 laksh for development of greenbelt.

12	School will get affected by blasting	The nearest school is approx.100 meters away from the mining lease boundary (East side) separated by the Highway. 50 m wide area has been left undisturbed between ML and highway. With the scientific mining being adopted and a greenbelt being developed at the lease boundary there is no adverse impact is anticipated. This is fully scientific mechanised opencast mine with all latest technology of operation. A wide thick greenbelt will be developed around the periphery of mine and will start from the village side.	None	ACC will follow all norms laid down under various mining acts to ensure a safe blasting. Nandini Khundini limestone mine will be fully scientific mechanised opencast mine with all latest technology of operation. ACC will provide thick plant (green belt of 15 meters) between the habitation and the mine Controlled blasting with proper monitoring will be integral part of the mining process. No Secondary blasting will be done. Hydraulic Rock breaker /mechanized breaking will be done to eliminate the secondary blasting Vibration monitoring will be done as per DGMS norms • ACC has earmarked Rs. 30 lakhs for development of greenbelt as mentioned in the point no 5 above
13	Dust pollution Level in the area is high due to presence of several mines and crushers	The ambient air quality was measured for PM10 and PM2.5 as per standard. The levels are well within the prescribed limit.	None	• ACC has already brought the matter to notice of authorities regarding air pollution from Crushers in EIA Report • The ambient air quality was measured for PM10 and PM2.5 as per standard. The levels are well within the prescribed limit.
14	VNR Seeds supply seeds to the surrounding area. This plant is located close to NK mines boundary. Dust and blasting will affect the quality of seeds and machinery in adverse way	Mining in this area was done by Bhilai Steel Plant from 1971 to 1991. ACC got the ML area in 2008 and is planning to start mining after implementing all pollution mitigation measures and getting Environmental Clearance. The baseline data of air, water, soil and noise is meeting the standard. EIA predicted that the standard will be met by this mine. Controlled blasting will be done and ground vibrations will be monitored. Greenbelt (15 m width) will be developed all along the mine boundary.	None	Not envisaged.

15	Hand pumps and dug wells will get dry	The water accumulated in mine pits has enhanced the water table of dug wells and hand pumps of surrounding areas.	None	• There is no impact is envisaged however budget has been already been mentioned in the point no 5 for RWH. • Ground water study has been done and all suggestions will be implemented.
16	Discharge of water accumulated in mine pit will create problem in surrounding areas	Surplus water from mine pit will be disposed in the mined out pit. No water will be discharged outside under normal circumstances. In case any discharge is required during emergency, the mine water will be treated and then discharged into nearby natural streams.	None	• Not required
17	CSR Activities to cover all issues like education, health, sanitation, hygiene, environment	ACC will abide by the CSR provisions contained in the MMD Rules 2015. The need based analysis of the area has been done and CSR activities for a budget of Rs.5 lakhs proposed. The amount will be spent in consultation with local administration, including panchayats of nearby villages.	None	• CSR plan already given in EIA Report (Chapter 6)

9. Whether the following approvals* (wherever applicable) have been obtained?

(i)	Site clearance from MoEF	Yes	✓	No	
(ii)	'Consent for Establishment' from the State Pollution Control Board	Yes		No	✓
(iii)	NOC from Atomic Mineral Division	Yes		No	NA
(iv)	Mining plan approval from IBM / Ministry of Coal	Yes	√	No	
(v)	In case of existing mines, mining scheme approval from IBM	Yes	✓	No	
(vi)	Forestry clearance under FCA, 1980	Yes		No	NA
(vii)	NOC from Chief Controller of Explosives	Yes		No	NA
(viii)	Commitment regarding availability / pumping of water from the concerned Authorities	Yes		No	NA
(ix)	In case of ML area falling in notified areas of the Central Ground Water Authority, NOC from them. {Annex copies of approvals and number them]	Yes		No	

50. Was / is there any court case relating to the project or related activities?
If so, provide details present status. No court cases related to the project

Verification: The data and information given in this proforma are true to the best of my knowledge and belief.

SUNIL GUPTA
CLUSTER HEAD
ACC LIMITED
PO-JAMUL CEMENT WORKS
DIST. DURG (C.G.) 490 024

Date: 16.03.2016

Signature of the applicant*

Sunil Gupta
Cluster Head
Jamul Cement Works
ACC Limited
Chhattisgarh

Place: DURG

[* Owner or his authorized signatory]
Given under the seal of organisation on behalf of whom the applicant is signing

SCHEME OF MINING
ALONG WITH
PROGRESSIVE MINE CLOSURE PLAN

Submitted under Rule 12 (2) of MCDR, 1988

NANDINI KHUNDINI LIMESTONE MINE

LEASE AREA: 53.57 HECTARES
AREA: NON-FOREST
CATEGORY OF MINE: 'A' (Fully Mechanised)
VILLAGE: NANDINI KHUNDINI
DISTRICT: DURG
STATE: CHHATTISGARH

PERIOD: 2013-2014 to 2017-2018

अनुमोदित
APPROVED

खान नियंत्रक (मध्यक्षेत्र)
Controller of Mines (Central Zone)
भारतीय खान ब्यूरो
Indian Bureau of Mines

PREPARED FOR:
ACC LIMITED
JAMUL CEMENT WORKS
DIST: DURG (C.G)
PIN: 490024

Submitted for Approval of Scheme of Mining along with Progressive Mine Closure Plan through Authority notified by the Controller General of the Indian Bureau of Mines

पत्र संख्या 314 (3)/ 2012 एमसीडीएस (एमजेड)/एसी
दिनांक 04/10/12
खान अनुमोदित किया गया।
Approved vide letter No.314 (3)/ dated

Volume-I (Text)

Prepared by

Sanjeev Tripathi, RQP
Reg No. – RQP/NGP/378/2008/A
Valid upto 06.10.2018

S.K.Sharma, RQP
Reg No. – RQP/NGP/230/2000/A
Valid upto 30.04.2020

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अनुमोदित
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CONSENT LETTER FROM THE APPLICANT

The Scheme of Mining along with Progressive Mine Closure Plan in respect of Nandani Khundni Limestone Mine over an area of 53.57 Hectares in Dist. Durg of State Chhattisgarh has been prepared by Mr. Sanjeev Tripathi RQP No. (Reg.No.RQP/NGP/378/2006/A) and Mr. S.K.Sharma, RQP No. (Reg.No.RQP/NGP/230/2000/A) and submitted under Rule 12 (1) of MCDR, 1988 to Competent Controller of the Mines, Central Zone and Regional Controller of Mines, Nagpur Region to make further correspondence regarding Scheme of Mining along with Progressive Mine Closure Plan with the said recognized person on his following address.

Sanjeev Tripathi
Chief Manager – Mining
ACC Limited, Jamul
P.O Jamul Cement Works
Bhilai, Durg (Chhattisgarh)
Pin-490024.

S.K Sharma
Manager - Mining
ACC Limited, Jamul
P.O Jamul Cement Works
Bhilai, Durg (Chhattisgarh)
Pin-490024.

I hereby undertake that all the preparation of Scheme of Mining along with Progressive Mine Closure Plan have been made with my knowledge and consent and shall be acceptable to me and binding to me in all respects.

For ACC Limited

(Rajdip Rauth)
CEO & Managing Director
and Nominated Owner
Nandini Khundni Limestone Mine

Date: 15.05.2013

अनुमोदित
APPROVED

CERTIFICATE

"The Progressive Mine Closure Plan under Mineral Conservation and Development Rules 1988, in respect of Nandani Khuadihi Limestone Mine in District- Durg, State of Chhattisgarh has been prepared in full consultation with me and complies all statutory rules, regulations and also orders made by the Central or State Government, statutory organizations etc. have been taken into consideration. I agree to implement all the measures proposed in this Progressive Mine Closure Plan in a time bound manner."

For ACC Limited

(Sudip Kapur)
CEO & Managing Director
and Nominated Owner
Nandani Khuadihi Limestone Mine

Date: 15.05.2015

अनुमोदित
APPROVED

CERTIFICATE

The provisions of Mines Act, Rules and Regulations made there under have been observed in Scheme of Mining along with Progressive Mine Closure Plan of Nandani Khundini Limestone Mine belonging to ACC Limited, over an area of 33.57 Ha. in the Durg District of Chhattisgarh State and wherever specific permissions are required, the applicant will approach the DGMS. Further, Standards prescribed by DGMS in respect of Miners Health will be strictly implemented.

For ACC Limited

(Kuldip Kaura)
CFO & Managing Director
and Nominated Owner
Nandini Khundini Limestone Mine

Date: 15.05.2013

APPROVED

Secretarial Division

ACC

ACC Limited
Registered Office
Cement House
121, Maharshi Karve Road
Mumbai 400 020 India

Phone : +91 22 6652 6500
Fax : +91 22 6652 7474
www.acclimited.com

Certified true copy of a Resolution passed at a meeting of the Directors of the Company held on 18th October 2012

"**RESOLVED** that in supersession of the Resolution passed at the Meeting of the Directors of the Company held on 5th August 2010, Mr. Kuldip Kaura, Chief Executive Officer & Managing Director of the Company be and is hereby appointed under the Mines Act, 1952 as "Owner" of the under mentioned Mines attached to the various Company's Manufacturing Units and be vested with ultimate control over the affairs of the said Mines. He shall have the power to exercise and do all such acts that may be necessary to look after the affairs of the said Mines, the possession of which shall vest in him with full powers of control and management thereof and in particular to comply with the requirements of the provisions of the Mines Act, 1952 in force from time to time:

Sr. No.	Name and Location of Mines attached to Cement Manufacturing Units
1.	Bargarh Limestone Quarry C/o. Bargarh Cement Works situated at Cement Nagar, P.O. Barlaid, District Bargarh - 768 038, Orissa
2.	Sajanka Limestone Mines C/o. Chaibasa Cement Works situated at P.O. Jhinkpani, District West Singhbhum - 833215, Jharkhand
3.	i. Gowari Limestone Mines ii. Sindola Limestone Mines C/o. Chanda Cement Works situated at P.O. Cement Nagar District,, Chandrapur 442 502, Maharashtra
4.	i. Gagal Limestone Mines ii. Dharkoh Quartzite Mine C/o. Gagal Cement Works situated at P.O. Barmana, District Bilaspur – 174 013, Himachal Pradesh
5.	i. Jamul Cement Works Limestone Mines ii. Pathariya Limestone Mines C/o. Jamul Cement Works situated at P.O. Jamul Cement, District Durg – 490 024, Chhattisgarh iii. Nandaili Khurdaili Limestone Mines C/o Jamul Cement Works situated at P.O. Jamul Cement, District Durg – 490 024, Chhattisgarh

ACC

Sr. No.	Name and location of Mines attached to Cement Manufacturing Units
6.	i. Kymore & Samaypaam Limestone Works ii. Mehgaon Limestone Mines iii. Jamuwani kala Limestone Mines (0.094 Ha.) iv. Jamuwani kala Limestone Mines (31.43 Ha.) v. Sedari Limestone Mines (5.62 Ha.) vi. Sedari Limestone Mines (1.121 Ha.) vii. Sedari Limestone Mines (1.093 Ha.) C/o. Kymore Cement Works as well as Kymore - Mehgaon One Million Tonne Plant both situated at P.O. Kymore, District Katni – 483 880, Madhya Pradesh.
7.	Lakheri Limestone Mines C/o. Lakheri Cement Works situated at P.O. Lakheri, District Bundi – 323 603, Rajasthan.
8.	i. Madukkarai Limestone Mines ii. Walayar Limestone Mines C/o. Madukkarai Cement Works situated at P.O. Madukkarai, District Coimbatore – 641105, Tamil Nadu.
9.	Wadi Cement Works Limestone Mines C/o. Wadi Cement Works situated at P.O. Wadi, District Gulbarga – 585 225, Karnataka.

Certified True Copy

Burjor D Navroji
Company Secretary & Head Compliance

November 27, 2013

अनुमोदित
APPROVED

CERTIFICATE FROM RQP

We, Sanjeev Tripathi and S.K.Sharma, duly recognized qualified person to prepare Scheme of Mining along with Progressive Mine Closure Plan have prepared the Scheme of Mining along with Progressive Mine Closure Plan of **Nandini Khundini Limestone Mine** of ACC Limited, in District Durg, Chattisgarh and submitted under Rule 12 (2) of MCDR, 1988.

The various data and write up enclosed have been compiled and verified by us. All the text part, drawings and other details given in the Scheme of Mining along with Progressive Mine Closure Plan have been prepared under our guidance and duly verified by us.

The provisions of MCDR, 1988 and MCR, 1960 have been observed in the Scheme of Mining along with Progressive Mine Closure Plan.

The Provisions of Mines Act, Rules and Regulations made there under have been observed in the Scheme of Mining along with Progressive Mine Closure Plan and also the precautions outlined by the Director General of Mines Safety.

The information provided in the Scheme of Mining along with Progressive Mine Closure Plan is correct and accurate to the best of our knowledge and belief.

Sanjeev Tripathi
RQP No. RQP/NGP/378/2008/A
Valid upto 06.10.2018

S.K.Sharma
RQP No. RQP/NGP/230/2000/A
Valid upto 30.04.2020

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APPROVED

CERTIFICATE OF RECOGNITION AS QUALIFIED PERSON TO PREPARE MINING PLANS

(Under Rule 22C of Mineral Concession Rules, 1960)

Shri SANJEEV TRIPATHI *son of Shri* V. S. TRIPATHI *resident of* D-10, ACC Colony, Jamul Cement Works, PO:-J. C. Works, Distt:- Durg, PIN - 490 024 (CHHATTISGARH) *having given satisfactory evidence of his qualifications & experience is hereby granted recognition under Rule 22 C of the Mineral Concession Rules, 1960 as a Qualified Person to prepare Mining Plans.*

His registration number is ROP / NGP / 378 / 2008 / A

This recognition is valid for a period of ten years ending on 06 OCTOBER 2018.

Controller of Mines (CZ)
Indian Bureau of Mines
Nagpur

Place : Nagpur
Date : 07. 10. 2008.

CERTIFIED
APPROVED

खान मंत्रालय भारत सरकार के
अधीन खनिज के लिए
खनन पट्टा का नूतनकरण

(खनिज रियायत नियमावली 1960 के नियम 33(3) के अधीन)

श्री _____

पता _____

जिला _____

आप अपने दिनांक 30.12.2019 के आवेदन द्वारा प्रस्तुत किये गये आवेदन सहित खनिज रियायत नियमावली, 1960 के नियम 33(3) के उपबंधों के अनुसार आपको पत्तन सीमेंट खनन क्षेत्र, ग्राम पिपरा, तहसील अतरू की पट्टा संख्या 16 खान से खनिज अयस्क की पट्टा के नूतनकरण किया जाता है ।

पट्टा संख्या एवं तारीख [illegible] RSP/MGT/230/2017-18 दि.

यह नूतनकरण दिनांक 31.12.2019 से प्रभावी

होगा और 30.12.2029 को समाप्त हो जाएगा ।

स्थान: [illegible]

दिनांक: 24.01.2020

अनुमोदित
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[illegible] Patwa

क्षेत्रीय खान नियंत्रक

Regional Controller of Mines (N.R.)

भारतीय खान ब्यूरो, जयपुर

Indian Bureau Of Mines, Jaipur

30-09-2029 तक नवीकृत

Renewed up to

क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो जयपुर
Indian Bureau of Mines, Jaipur

LIST OF ANNEXURES

Annexure No.1	Copy of Lease Deed in Form K State Government Consent Letter to grant the Mining Lease on the said area, Khasra Details of land area Wise and other related documents of Nandini Khundini Limestone Mine
Annexure No.2	Details of applicant, list of lease held by ACC Limited and also its copy of registration under Company Act
Annexure No.3	Typical borehole Logs done by BSP and ACC, (Result of present and previous investigation) and UNFC guidelines for Limestone deposit
Annexure No.4	Form J submitted for exploration done in Nandini Khundini Limestone Mines in 2011
Annexure No.5	NOC obtained from BSP in 1995 along with documents written in diversion of BSP Land to ACC Limited
Annexure No.6	Reserves calculation as per UNFC guidelines along with Feasibility Report of Nandini Khundini Limestone Mines
Annexure No.7	Letter of Environment Clearance from MOEF and other related documents
Annexure No.8	Proposed Five Year (2013 – 2018) Production Plan
Annexure No.9	Proposed Five Year (2013 – 2018) Development Plan
Annexure No.10	Ambient Air Quality details of Nandini Khundini Mine
Annexure No.11	Water Quality (SW & GW) details of Nandini Khundini Mine
Annexure No.12	Ambient Noise Quality details of Nandini Khundini Mine
Annexure No.13	Risk Assessment and Management Plan of Nandini Khundini Mine
Annexure No.14	Adequacy of Proposed HEMM at Nandini Khundini Mine
Annexure No.15	Time Scheduling for Abandonment – Year wise
Annexure No.16	Abandonment Cost Calculation – Year Wise
Annexure No.17	Financial Assurance Calculations of Nandini Khundini Mine
Annexure No.18	Cash Flow Forecast, Sensitivity analysis and UNFC economic analysis of Khundni Khundini Mine
Annexure No.19	Executive Summary of EIA Report of Nandini Khundini Mine
Annexure No. 20	Chemical Analysis Report of Limestone samples
Annexure No. 21	Photographs of Nandini Khundini Limestone Mines including Exploration Activity and Boundary Pillars

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LIST OF PLANS AND SECTIONS

Serial No.	Type of plan	Plate No.	Scale
1	Key Plan	I	1:50000
2	Revenue Plan	II	1:4000
3	Certified Copy of Revenue Plan	II A	1:4000
4	Geological Plan	III	1:2000
5	Geological Cross Sections	IV	1:2000
6	Surface Plan	V	1:2000
7	Yearly Development & Production Plan and sections	VI (Sheet 1 to 5)	1:2000
8	Conceptual Plan and Section	VII	1:2000
9	Environment Plan	VIII	1:5000
10	Progressive Mine Closure Plan	IX	1:2000
11	Environment Management Plan	X	1:2000

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PART – I

1.0 REVIEW OF MINING PLAN

1.1 **Name of the Mine**

Nandini Khondini Limestone Mine

Category: A (Fully Mechanized)

1.2 **Particulars of approval of Mining Plan along with PMCP**

a) **Mining Plan:**

Approval letter No. and Date: No 114(3)/2008-MC&M/MP-12 dated 01-08-2008;
Period of Approval: 20 years

1.3 **Date of commencement of mining operations:**
Mining Operations did not start till date. ACC Limited, Jamul Cement Works has approached village authorities for grant of **NOC** for getting **Consent to Establish (CTE)** from Chhattisgarh Environment Conservation Board. Mine operations will start after getting **CTE** and **CTO** for which management is continuously following up for getting NOC from village authorities.

1.4 (a) Deficiencies, if any, that existed in the approved mining plan along with PMCP to be taken note of and rectified by incorporating suitable proposals for implementation in the Scheme of Mining along with PMCP:

There is no such deficiencies observed in the earlier approved Mining Plan along with PMCP. Only the broken area in financial assurance table has changed from 9.28 Ha to 13.49 Ha. This change was encountered during fresh checking of plan with Auto Cad software.

Requirement of Scheme of Mining along with PMCP:

The Jamul Cement Works of ACC limited had started its production in the year 1965 with an installed capacity of 2.5 lakh tons of cement per annum (LTA). At present clinkerisation is done in three kilns having capacity of 2300 tons/day (TPD) in order to manufacture 6.0 LTA clinker. At present capacity of the plant is 15.00 lakh tones per annum of slag cement. The waste in the steel industry (Bhilai Steel Plant) thus found its way in the cement industry as a useful raw material.

New Proposal: It is now proposed to increase the annual clinkering at Jamul Cement Plant to 3 million tons from present level of 6.0 million tons by setting up a new additional kiln of capacity 3.0 million tons in the year 2014-15. Jamul Cement Works has already obtained amendment

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खान नियंत्रक (मध्यक्षेत्र)
Controller of Mines (Central Zone)
भारतीय खान ब्यूरो
Indian Bureau of Mines

due to change in project configuration for its cement plant from MOEF vide their letter no J-11011/251/2008-IA-II(I) dated 11.01.2013. Requirement of scheme of mining along with PMCP is because of the following reason:

1) **Increase in production capacity:** to meet the additional requirement of limestone, the capacity enhancement of Nandini Khurdini Limestone Mine to the tune of 1.03 MTPA or proposed as against the planned limestone production of 0.15 MTPA for rest will be catered from Patharyo limestone mines and Jamul Cement Works Limestone Mines. The limestone from Nandini Khurdini crystalline Mine is of High Grade and will be utilized along with the marginal grade quality limestone generated from Jamul Cement Works Limestone Mines located at about 2 Kms from Jamul Cement Works. In view of above enhanced requirement we propose this scheme of mining along with PMCP for Nandini Khurdini Limestone Mine covering the period of year 2013-14 to 2017-18.

Jamul Cement Works has already obtained Environmental Clearance for Nandini Khurdini Limestone Mines from MOEF vide their letter no. J-11015/237/2009 IA.II (M) dated 19th March 2011 for the production of 0.15 MTPA limestone. JCW will approach MOEF at later stage for environmental clearance for enhanced production capacity of Nandini Khurdini Limestone Mines from 0.15 MTPA to 1.03 MTPA. Executive summary of EIA report prepared for EC of Nandini Khurdini Mine is attached as **annexure - 19**. Letter of Environmental Clearance and other related documents of MOEF is enclosed in **annexure – 7**.

Present Capacity of Clinker Production: Approx 2200 TPD

Limestone requirement: 3450 TPD

Limestone sourced from Captive Mines of ACC Limited, Jamul Cement works: Currently limestone is sourced from Jamul and Patharyo Mines with a ratio of 60:40. As per granted EC of Nandini Khurdini limestone mine, 450 TPD was planned to produce but at present the same is raised from Patharyo mine for fulfilling limestone requirement.

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"Limestone Production to the tune of 1.03 million tonnes as proposed in Scheme of Mining will be done during the scheme period after the grant of Environment Clearance for the enhanced capacity of 1.03 MTPA from MOEF and grant of CTE and CTO from Chhattisgarh Environment Conservation Board"

(b) Review of compliance position of salient features of the mining plan / scheme of mining on chapter wise basis bringing out marked deviations, if any, and justifications / reasons thereof. Items to be covered may include exploration, mine development, exploitation, afforestation program, reclamation & rehabilitation, control of dust, noise & ground vibrations and any other significant feature.

Status of different parameters of scheme of mining vis-à-vis actual achieved:

1. **Mine Development: Overburden Removal**

Year	Proposed in Approved Mining Plan (Tm)	Actually Achieved (Tm)	Remarks
First	15000	0	EC obtained. Applied to CPCB for Consent to Establish and awaiting to obtain NOC from village authorities. Mine operations not started till date.
Second	20000	0	
Third	20000	0	
Fourth	25000	0	
Fifth	25000	0	

2. **Limestone Production:**

Year	Proposed in Approved Mining Plan (Tm)	Actually Achieved (Tm)	Remarks
First	15000	0	EC obtained. Applied to CPCB for Consent to Establish and awaiting to obtain NOC from village authorities. Mine operations not started till date.
Second	20000	0	
Third	30000	0	
Fourth	40000	0	
Fifth	100000	0	

3. **Other salient features of Scheme of Mining etc.**

Sl. No.	Parameter	Proposed in Approved Mining Plan	Actually Achieved	Remarks
1.	**Top Soil Storage, Preservation & utilization**	The mining lease area is 53.57 ha has OB in the form of lateritic soil. There is no fertile top soil except lateritic soil which will be removed and stacked properly within the lease boundary.	Mining operations did not start till date. After the commencement of operations, usage of top soil will be done in manner proposed in approved mining Plan.	
2.	**Exploration**	Proposals were framed to drill around 10 holes within lease area to establish resources and reserves.	21 boreholes were drilled within lease area to establish resources and reserves.	No Deviations
3.	**Reclamation**	At present there is no	Mining operations did	Yes

3.	on and Rehabilita tion	proposal of Land reclamation in detailed exploration of leave area is not yet carried out. Conceptually mined out area will be partially back filled and rest will be converted into water reservoir.	not start till date. After the commencement of operations, reclamation and rehabilitation will be done in manner as proposed in approved Mining Plan.	Devia tions
3. 4	Afforestati on Year wise First Second Third Fourth Fifth	 Planned 300 saplings 300 saplings 300 saplings 300 saplings 300 saplings	 Actual Nil NIL Nil NIL Nil.	Plant ation will be done after start of minin g opera tions
3. 5	Control of dust	To combat the air pollution, wet drilling will be done. Water will be sprayed on haul road and muck pile to suppress the dust.	Mining operations did not start till date. Dust control measures will be taken after start of mining operations.	No Devia tions
3. 6	Noise pollution	To check noise pollution, Periodic maintenance of machines will be done. Noise level survey will be carried out to check levels of noise.	Mining operations did not start, till date. Noise control measures will be taken after start of mining operations.	No Devia tions
3. 7	Control of Ground Vibrations	In order to control ground vibrations, blasting to be carried out using DTH/ NONEL detonators and surface initiation to be given by TLD's. Also regular Ground vibration studies to be done on regular basis.	Mining operations did not start till date. Monitoring of ground vibrations will be done on regular basis after start of operations.	No Devia tions
3. 8	Quality of water	Quality of water to be analyzed quarterly and monitored for pollutants.	Mining operations did not start till date. Water quality will be monitored regularly in later stages.	No Devia tions
3. 9	Quality of air	The quality of air will be analyzed regularly for SPM, SO_2, NOx, CO etc.	Mining operations did not start till date. Air quality monitoring will	No Devia tions

		Monitoring to carried out on selected stations such as haul road, loading site, adjoining villages quarry edges and mine office area.	once on regular basis after the commencement of mining operation.

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1.4 (c) Review of the compliance position of conditions and stipulations imposed, if any, while approving the mining plan. In case of non- compliance / partial compliance, detailed justifications / reasons thereof may be furnished along with proposal for compliance in the ensuing period.

No special condition and stipulations have been imposed while approving the Mining Plan.

1.4 (d) Review of compliance of violations pointed out after inspections made under MCDR, 1988 during last 5 years. The position emerging out of the yearly review of the mining plan while checking up implementation of the mining plans in the field shall also be taken note of at this stage.

There was no violation pointed out MCDR from 2008 to 2012.

1.4(e) Any other points requiring attention in the interest of proper mine design, development & conservation and environment & ecology of the area.

Nothing specific

PART – II

2.0 PROPOSAL UNDER SCHEME OF MINING FOR THE NEXT 5 YEARS (2013-2014 to 2017-2018)

2.1 Name and Address of the applicant:

Owner : **ACC LIMITED**
Nominated Owner : **Kuldip Kaura** (power enclosed Annexure – 6)
Address : Cement House, 121, M.K.Road, Mumbai
District and State : Mumbai, Maharashtra, 400020
Phone : +91 22 6665 4321
Fax : +91 22 6631 7440

Works : **Jamul Cement Works**
PO: J.C Works
Dist: Durg
Chhattisgarh (490024)

2.2 (a) Name and address of RQP who prepared the Scheme of Mining & PMCP

Mr. Sanjay Tripathi Chief Manager – Mines P.O: Jamul Cement Works District: Durg (C.G) 490024 Reg. No. RQP/CGD/378/2008/A Valid upto 06.10.2018	**Mr. S. K Sharma** Manager – Mines P.O. Jamul Cement Works District: Durg (C.G) 490024 Reg. No.: RQP/CGD/230/2008/A Valid upto 30.04.2020

2.3 Mineral(s) to be mined
Limestone for cement production and associated waste rock for disposal.

2.4 Lease details: Total Area: 53.57 Ha

Location / village	Dist.	State	Area in ha	Date of Expiry	Remark
Village Nandini (Khurdih)	Durg	C.G	53.57	03.12.2028	State Govt. Order no.F3-13/2004-12 dated 05.02.2008 and lease executed on 02.12.2008

(Details of Lease deed, Khasra, details and other Govt Orders provided in ***annexure – 1 and*** *certified copy of revenue plan attached as* ***Plate – II A)***

Land use Pattern: **BSP Land** : **35.68 Ha**
Govt. Land : **17.89 Ha**

ACC Limited, Jamul Cement Works has long back obtained NOC from Steel Authority of India Limited, Bhilai Steel Plant in the year 1990 for grant of mining lease. Prior to 1990, State Govt awarded mining lease to BSP which was surrendered by BSP before 1990. Based on Old geological report of BSP indicating presence of mineable limestone reserves, ACC approached State Govt for grant of Mining Lease and so was awarded to ACC Limited in the year 2008. Documents related to diversion of BSP Land after compensation is enclosed in Annexure – 5.

2.5 Date of expiry of 5 years period for last approved Mining Plan

31st March 2013 for Mining Plan along with PMCP.

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3.0 RESERVES

3.1 Category wise reserves estimated in the earlier mining plan / with grade.(as on 31.03.2012)

Category	UNFC code	Reserves (In M.T.)	Quality (%)			
			CaO	SiO_2	MgO	R_2O_3
Proved Reserve	111	4.01	42.66	13.72	2.98	1.65
Indicated Resource	333	15.61				

3.2 Depletion of Reserves:

As the mining operations in Nandini Khundini Limestone Mine did not start till date so the production from mines from 02.12.2008 to 31.03.2012 is Nil.

3.3 Additional reserves established category wise (with basis and parameters considered).

As per conditions stipulated in earlier approved Mining Plan, exploration was done and a fresh assessment of resources was carried out. The detailed report of same is incorporated in this Scheme of Mining. Notices of sinking of boreholes (Form I) in respect of Nandini Khundini Limestone Mine was submitted to IBM office vide our letter no JML/RMP/Q/95 dated 04th May 2011. Copy of same is enclosed in **annexure – 4**.

A Comprehensive Report on Exploration activity and Categorization of Resources as per UNFC guidelines:

Introduction

ACC Limited holds a mining lease in the village Nandini Khundini, District Durg of Chhattisgarh state. This lease lies at a distance of 23 km in north of Jamul Cement Works. Nandini Khundini Limestone deposit was proved first in 1960 by Bhilai Steel Plant of SAIL. Total 25 boreholes drilled in 1960, 06 holes falls in area granted as mining lease to ACC Limited and 02 boreholes along periphery of lease boundary.

Lease was granted to ACC Limited in 2008 and fresh exploration was done in 2011. As per the IBM Circular no 03 of 2010 regarding Exploration within prospecting licenses and mining leaseholds for iron

ore, Chromite, Bauxite, Limestone, Wollastonite and Talc (Steatite/Soapstone) minerals, ACC limited had taken up necessary exploration and entrusted the Raw Material and Mine Planning Division (RMMP) to carry out exploration work and reassess the reserves/resources in the lease area.

Geology

The area falls within Longitude E – 81°23'00" & Latitude 21°22'40" and is covered by Survey of India Toposheet number 64G/3. The site is flat and general ground level is 289 m above Mean Sea level.

General Geology:

Nandini Kurdmi area is located within Chhattisgarh basin. Chhattisgarh basin present at the central part of the Indian peninsula over the Bhandara craton. Rocks present here are of Middle to Upper Proterozoic age. Lithounits present here comprises metased ments, metamorphic rocks. North and west of the basin are faulted contact with Raipur- Bilaspur metamorphic of Satpura belt and Kaer- Dongargarh volcanics respectively. Granitoids of Bastar craton and Eastern Ghat mobile belt present at the eastern side of the basin and Sukaithali Greenstone belt present at the south of the basin. Granitic terrain surrounds this basin known to host several kimberlite pipes.

This basin holds 2500mts thick sediments of orthoquartzite carbonate-pelite suite, deposited in multiple sedimentary cycles, intercalated with mafic/felsic volcanic and pyroclastics and punctuated by unconformities (Ramakrishnan & Vaidyanadhan, 2010). The entire basin is divided into two sub-basins: Hirri sub-basin in the west and Baradwar sub-basin in the east. The western part of the Chattisgarh Basin (Hirri sub-basin) is dominated by stromatolitic limestones, mature sandstones and shales, and the succession is comparable with that of a stable shelf (Patranabis Deb & Chaudhuri, 2002). The eastern Chattisgarh succession, by contrast, is characterized by a thick sequence of immature to submature sandstones, conglomerates, shales, pyroclastics and limestones. The succession exhibits rapid litho-facies variations, and bears signatures of unstable basin conditions, and deposition in diverse paleo environments (Patranabis Deb & Chaudhuri, 2002).

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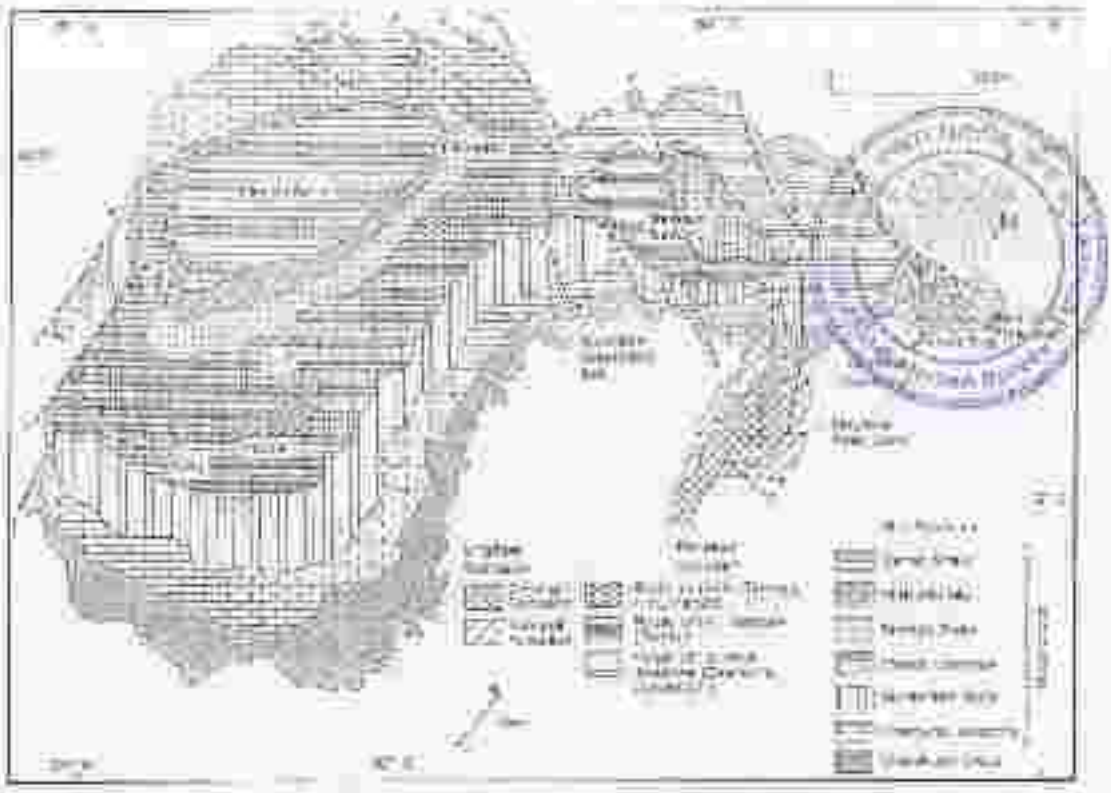
Chhattisgarh Supergroup is subdivided into 3 sub-groups- Raipur group, Chandrapur group and Singhora group.



Local Geology:

Lithologies present in the area were limestone, shale and dolomite. Geologically the area comes under Chandi limestone, Raipur group. Chandi limestone formation mainly comprise of stromatolitic limestone, dolomite, glauconitic sandstone and shale. Association of limestone-sandstone- shale and undisturbed sequence indicate stable shelf condition. Within the lease area, average thickness of overburden is 3 meters. Variation on the thickness of this overburden does not have a pattern. Regionally thickness of this overburden loosens more northward. Towards north, at the bank of Sirpanli River limestone was exposed at the surface. The rock units present in Nandini area were tectonically undisturbed. Beds are nearly horizontal; dipping about 2 degree towards north. Topography of the area is more or less flat. Minimum and maximum RL of the area was 279mts & 285mts. A local litho-stratigraphic succession within the lease area is as follows:

Overburden	(3 meters)
Limestone upper	(15 meters)
Argillaceous limestone	(5 meters)
Limestone lower	(15 meters)
Dolomite	(approx 5 meters)

An account of the litho units present and their typical quality is described below.

Overburden:
The overburden is dark brown in color some portion having very few calcitic granules. The average thickness encountered in the boreholes is around 3 mts and the quality is given below.

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
4.06	5.60	54.56	12.80	25.17	10.99

Limestone Upper
Limestone upper unit is present below the overburden. This rock is chocolate brown colored, very fine grained, compact and massive. They are stromatolite rich. Small scale patches were present at the surface outcrop of the limestone. Typical average quality of the lithology is as follows:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
44.24	2.10	10.49	2.67	1.56	37.21

Mg Shaly Limestone
It is a fine grained, chocolate brown colored rock and shaly in nature. The rock is less hard because of higher shale content. Bed of Mg shaly limestone is relatively thin and present in between the two limestone bands. Patches of Mgshist is also observed within the limestone bands. Contact between Mg shaly limestone with other litho units is very gradational. Typical average quality of the lithology is as follows:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
38.64	5.31	12.53	3.39	1.79	36.01

Limestone Lower
This limestone unit is present below the horizon of MgShist. This is a chocolate brown colored, fine grained, massive and compact stromatolitic limestone. Small shale patches are present within the limestone horizon. Typical average quality of the lithology is as follows:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
46.60	2.30	7.68	1.95	1.03	39.19

Dolomite
Dolomite is present below the horizon of limestone lower. It is a chocolate brown colored, medium grained rock. Patches of

stromatolites are present in the litho unit. Litho contact between dolomite and limestone or Mg shaly limestone is very gradual. Typical average quality of the lithology is as follows:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
53.14	1.13	5.81	2.14	1.48	36.41

Surface Plan, Geological Plan and Geological Sections:

Surface Plan (**Plate – V**) and Geological Plan (**Plate – III**) is prepared in 1:2000 scale and location of boreholes drilled is marked on these plans along with all other required salient features.

In order to prepare geological sections (**Plate- IV**), all drilling data comprising present investigation and those obtained during previous investigations were utilized. The various litho-units shown in the geological sections are over burden, Limestone upper, Mg shaly limestone, Limestone lower and Dolomite. These lithologies were demarcated based on both geological observation and litho chemical variations. Thus total 07 geological sections were prepared with sectional interval of 100 mts between each section.

Exploratory Work

Exploration carried out by BSP (as per report prepared by BSP):

The work carried out by BSP in Medesara and Nandini Khundni included topographical survey, drilling of 35 core boreholes, geological studies, estimation of quality and reserves. Out of 8 boreholes, 6 boreholes falls inside Mining Lease and 2 boreholes around periphery of lease boundary. Details of the 8 boreholes is given in the following table:

Core Quality of the boreholes present within the lease area

BH No	SRL		Core Quality				
	From	To	SiO_2	R_2O_3	CaO	MgO	LOI
18	284.75	274.00	10.66	2.15	38.40	6.50	36.73
	274.00	262.00	18.18	2.76	35.32	8.33	35.60
	262.00	250.00	15.62	2.45	38.29	5.84	36.97
19	284.75	274.00	11.42	1.73	46.65	1.94	37.98
	274.00	262.00	16.55	2.41	12.86	2.95	25.08
	262.00	247.50	14.53	2.22	36.87	4.14	37.84
20	284.75	274.00	10.90	2.50	35.51	7.71	30.56
	274.00	262.00	21.60	3.31	30.78	9.12	34.59
	262.00	247.50	15.63	1.93	35.33	8.25	37.33
21	284.75	274.00	11.89	1.38	45.67	1.91	

	274.00	262.00	12.00	2.00	24.00	4.80	19.20
	262.00	247.00	15.00	2.50	37.50	6.25	31.25
22	284.75	274.00	10.75	1.79	19.24	3.21	16.03
	274.00	262.00	12.00	2.00	24.00	4.00	20.00
	262.00	247.00	15.00	2.50	37.50	6.25	31.25
23	284.75	274.00	10.75	1.79	19.24	3.21	16.03
	274.00	262.00	12.00	2.00	24.00	4.00	20.00
24	284.75	274.00	10.75	1.79	19.24	3.21	16.03
	274.00	262.00	12.00	2.00	24.00	4.00	20.00
	262.00	247.00	15.00	2.50	37.50	6.25	31.25
25	284.75	274.00	10.75	1.79	19.24	3.21	16.03
	274.00	262.00	12.00	2.00	24.00	4.00	20.00
	262.00	247.00	15.00	2.50	37.50	6.25	31.25

This analysis report is based on the geological report of BSP

Exploration carried out in 2011 by ACC:

To prove the resource of the area exploration program of the deposit were taken up during May to October 2011. At first geological mapping has been done for the entire mining lease area. For detailed exploration total 21 deep bore holes were drilled in 7 section lines, with cumulative 1260 mts. After drilling logging, sampling, carbonate and full chemical analysis of the borehole samples was done. Photographs of exploration activity and core boxes are enclosed in **annexure – 21.**

Core drillings were done at approximately 100x250 mts grid interval. Details of the drilled boreholes are given in the following table:

Borehole details

Sl No	Bore hole	Northing	Easting	SRL	Depth	BRL
1	NK/C/01/01/11	2364210.09	539548.90	285.06	48	237.06
2	NK/C/01/02/11	2364220.00	540155.50	284.03	51	233.03
3	NK/C/02/01/11	2364342.78	540371.11	285.31	63.5	221.81
4	NK/C/02/02/11	2364330.66	539830.56	281.67	45.5	236.17
5	NK/C/02/03/11	2364347	540073	285	48.5	236.50
6	NK/C/03/01/11	2364426.89	539951.15	280.98	57	223.98
7	NK/C/03/02/11	2364439.58	540409.15	285.62	54.5	231.12
8	NK/C/03/03/11	2364428.38	539758.66	280.20	57	223.20
9	NK/C/03/04/11	2364456.29	540111.48	281.50	47.5	234.00
10	NK/C/04/01/11	2364533.35	540032.69	280.31	63.5	216.81
11	NK/C/04/02/11	2364531.65	539650.40	280.63	57.5	223.13

12	NK/C/04/03/11	2364533.76	539765.34	279.54	45.5	214.04
13	NK/C/04/04/11	2364542.19	540053.59	283.59	54.5	229.09
14	NK/C/05/01/11	2364629.89	539715.27	279.84	83.5	196.34
15	NK/C/05/02/11	2364636.88	540165.25	281.15	84.5	196.65
16	NK/C/05/03/11	2364639.43	539978.42	279.31	60.5	218.84
17	NK/C/06/01/11	2364735.14	540194.01	280.54	68.5	212.04
18	NK/C/06/02/11	2364730.30	539637.63	279.86	72.5	207.36
19	NK/C/06/04/11	2364735.75	540005.91	279.06	63.5	215.50
20	NK/C/07/01/11	2364629.76	539707.89	278.38	48.0	230.38
21	NK/C/07/02/11	2364635.17	540054.99	279.25	32.5	221.75

Sampling and Analysis:

The core recovered during drilling is re laid inside the S.I Sheet core boxes. Then there length was measured for core recovery computation and logged accordingly. The core was split longitudinally into two halves, one half was preserved and other half taken up for crushing and grinding using iron pestle and mortar as well as porcelain pestle and mortar. Care was taken to powder the sample and completely pass it through 240 mesh (.63 micron) sieves. The powdered sample was made in duplicate and by giving borehole number and sample length Viz. C/03/01(1.0 – 1.5). The samples generated are analyzed for Minor and Major constituents.

Total 647 nos. of samples were prepared. Carbonate and full oxide analysis is done for all the samples.

QUALITY:

Based on the detailed analysis carried out and IBM threshold cut off values for limestone in Chhattisgarh (Circular No: 3/2010) the average quality of the various lithologies are summarized below.

	SiO2 %	Al2O3 %	Fe2O3 %	CaO %	MgO%	LOI
Overburden	35.46	12.99	25.17	4.08	0.6	15.99
Limestone Upper	10.48	2.87	1.56	41.24	7.18	37.31
Mg shaly Limestone	12.93	3.39	1.79	38.69	5.31	36.21
Limestone Lower	7.64	1.45	1.05	48.69	2.39	39.15
Dolomite	9.81	2.18	1.08	33.14	12.13	38.33

The full major and minor oxide results of analysis of borehole core are incorporated in litho chemical logs given in **annexure – 3.** Chemical Analysis report of field samples of Nandini Khurdini limestone mine done by laboratory of Directorate of Geology and Mining is enclosed here **annexure – 20**

Categorization of Resources as per UNFC Guidelines

Geological Reserves & Grade:

UNFC axis and code	Guideline	Studies Done
E1 Economic	1. Detailed exploration.	1. Detailed exploration has been done
	2. Mining report /mining plan / mining scheme.	2. Mining Plan approved in 2008 and currently proposed Scheme of Mining from 2013 to 2018. Mining operations did not start till date.
	3. Specific end use grades of reserves (above economic cut-off grade).	3. End use grades of reserves have been defined clearly in the geological report & mining plan.
	4. Specific knowledge of forest/non-forest and other land use data.	4. Forest land use data are clearly available and given in the scheme of mining. There is no forest land within the lease area.
F1 Feasibility Study	1. Geology: Geology of area and project, detailed exploration, closed spaced drilling, ore body modelling, bulk samples for beneficiation, geotechnical and ground water &surface water studies. However for coal, bench wise studies to be carried out depending upon coal seam dips.	1. Detailed geological studies have been carried out. Detailed exploration, close spaced drilling, ground water & surface water studies have been carried out.
	2. Mining: Mining plan, mine recoveries and schedule, equipment selection, manpower / equipment.	2. Mining plan has been prepared and not approved by IBM.
	3. Environment: EIA studies and EMP including geo-technical impact, identification of project affected persons, waste disposal/reclamation and detailed land use data.	3. EIA studies and EMP including socio-economic impact, rehabilitation of project affected persons, waste disposal / reclamation, detailed land use data, have been carried out.
	4. Processing: Pilot scale/ bench scale investigation data, list of equipment, manpower and environmental considerations, tailing waste disposal of tailing, etc.	4. Industrial scale processing has been done. Machinery and Manpower requirement have been identified. Environmental considerations have been taken care of.
	5. Infrastructure and services	5. All details have been incorporated in

UNFC axis and code	Guideline	Studies Done
	construction activities in full details.	the approved mining plan.
	6. **Costing:** Item wise break-up of capital cost, operating cost, details of working capital.	6. Detailed break up of capital cost, operating cost, working capital etc. are regularly done as per the finance department.
	7. **Marketing:** Overview, specific market aspects.	7. The market of the said mine is entirely consumed by our captive cement plant.
	8. **Economic viability:** Cash flow forecast, inflation effects on many studies.	8. Cash flow forecast, inflation effect of 5% and sensitivity studies have been done (Enclosed as annexure - 18)
	9. **Other factors:** Statutory provisions relating to labor, land, mining, taxation etc.	9. All statutory provisions have been taken care of in the mining plan and are regularly complied with.
G3 Detailed Exploration	1. **Geological survey:** i. Mapping for coal mapping 1:5000 for other all scale 1:1000. ii. Preparation of detailed vicinity/all-cum geological map including all surface geological features, extent of deposit, structure, location of boreholes, survey plan and sections of exploratory / for development and lithological data. iii. Topographical/triangulation stations physically mark in the maps.	1. Detailed geological survey has been done. Mapping has been done on 1:1000. Detailed topographical cum geological map including all required features has been prepared. Triangulation stations have been fitted with spherical coordinates.
	2. **Geochemical survey:** Detailed grid pattern sampling are available.	2. Done
	3. **Geophysical survey:** Detailed and specific borehole geophysical survey.	3. Done
	4. **Technological:** 1. Nearly 2 to 4 bore per sq. km. for simple deposit. 2. *Trenching - At spacing of 200-300m;* 3. Drilling- closer spacing (with definite grid pattern) than that for G2 category. i) For coal deposit of boreholes to be 12 to 15 per sq.km. Depending on the complexities for geo structural province. ii) For opencast project drill spacing may be 100m x 50m depending on the geology, weather, mantle cover, burning nature of coal seam.	4. Detailed drilling and pitting have been done. Drilling has been done on a grid of 100*250 m. Detailed sampling has been done.

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UNFC axis and code	Guideline	Studies Done
	4. Exploratory drilling and check drilling results (if available)	
	5. Sampling- systematic pit and trench sampling, core and sludge sampling for laboratory scale and bulk sample for the pilot plant scale beneficiation studies.	5. All the exploration data have been refined on the petrographic character of rocks of the deposit and its surrounding.
	6. Petrographic and mineragraphic study- refining of data on the petrographic character of rocks of the deposit and its surrounding. Alterations (if any), including study of grain size, texture, fabric and its precision characteristics for further refining of data.	6. Detailed Geological survey of workable area has been done.
	7. Geostatistical analysis of borehole data, thickness of ore, waste encountered in holes, assay values	

Quantity Assessment of Resources:

Nandini Khundini Limestone deposit was granted to ACC Limited in the year 2008. In 1960 Bhilai Steel Plant has done some boreholes out of which 08 holes were present in lease area awarded to ACC Limited. Since then reserves and resources were estimated under old system of categorization i.e proved, probable and indicated.

As per the UNFC guidelines Nandini Khundini Limestone mines can be categorized as Stratiform, Stratabound and Tabular Deposit of regular habit. After the introduction of UNFC (United Nations framework for classification of reserves and resources) system and compliance to IBM circular no 03 of 2010, Exploration work was done. All drilling data comprising present investigation and those obtained during previous investigations were utilized and Resources are again classified under new classification.

Finally, Resources at Nandini Khundini Limestone Mine is classified under **331 – Measured Mineral Resources**

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331 – Measured Mineral Resources: The entire lease area was explored thoroughly by core drilling with smaller grid. The total resources in the leyne area work out to be 59.26 million tonnes. Detailed break of resources are given below. Feasibility and economic viability is required to be studied for conversion of these resources into reserves. It covers area of approx 53 Ha. Deepest bore hole has reached upto 72.5 m. Average CaO grade

ranges from 1.18 % in OB to 46.69% in limestone. MgO grade is < 3% in Limestone.

Category	Lithology	Resources (Mt.s)
Measured Mineral Resource (UNFC Code : 331)	Overburden	2.57
	Limestone ore	38.82
	Mg shaly limestone	11.08
	Limestone waste	23.83
	Total	76.40

A Feasibility study is now applied on the above mentioned resources for assessment of economic and feasible viability of resources and hence to convert them to Reserves i.e. Proved mineral reserve (111).

"Feasibility Study of Nandini Khundini Limestone Deposit"

(Also enclosed in **annexure – 8**)

Geographical Conditions:

The area falls within latitude 21°22'40" N & longitude of 81°23'00" E and is covered by Survey of India Toposheet number 64G/7 on 1: 50,000 scale. The same is enclosed as Key plan (**Plate – I**) in volume II of this scheme. The site is flat and general ground level is 282 m above Mean Sea Level (MSL). The cement plant site is about 23 km in south direction of the mine site and well connected with all electronic communication facilities.

Location and approach details are as follows:

Toposheet No.	Part of Toposheet nos.64 – G/7
Latitude	21°22'40" N
Longitude	81°23'00" E
Village Covered	Nandini Khundini
Taluqa /Tehsil	Dhamda
District	Durg
State	Chhattisgarh
Nearest Railway Station	Bhilai Pwr House which is 25 km towards south
Nearest Highway	N.H no 06 which is 28 km towards south
Nearest Airport	Mana Airport, Raipur which is 67 km from site

Infrastructure:

Public utilities:

Jamul is well located near to Bhilai and Durg city. All public utilities such as hospitals, market areas, banks, post office, weekly markets, religious places, schools and colleges are located within the radius of 10 KM. Management has provided a school bus for students attending schools and colleges in durg and Bhilai. Local transport is easily available to the colony residents.

Road, Railway and other:

Village Nandini Khurdini is at about 25 km, NE of Durg Railway station (situated on Nagpur-Howrah Broad Gauge of South Eastern railway). Nandini Khurdini is well connected to important cities & towns by a network of National & State Highways. The National Highway No. 6, Mumbai to Calcutta, passes through Bhilai and is only 28 km away from Mines. The mine site is at a distance of approximately 30 km from Bhilai (nearest town). The nearest airport is at Raipur about 60 km from the mine site.

Manpower:
The mine is not yet operated since last 05 years. But management has plans for recruiting skilled workforce in managerial as well as in management cadre.

Geology:
Nandini Khurdini area is located within Chattisgarh basin. Chhattisgarh basin present at the central part of the Indian peninsula over the Bhandara craton. Rocks present here are of Mid to Upper Proterozoic age. Lithounits present here comprises metasediments, metamorphic rocks. North and west of the basin are faulted contact with Raipur- Bilaspur metamorphic of Satpura belt and Kotri- Dongargarh volcanics respectively. Granitoids of Bastar craton and Eastern Ghat mobile belt present at the eastern side of the basin and Sonakhan Greenstone belt present at the south of the basin. Granitic terrain surrounds this basin known to host several lamboite pipes.
This basin holds 2500mts thick sediments of orthoquartzite carbonate-pelite suite, deposited in multiple sedimentary cycles, intercalated with minor felsic volcanic and pyroclastics and punctuated by unconformities (Ramakrishnan & Vaidyanadhan, 2010). The entire basin is divided into two sub-basins: Hiri sub basin in the west and Baradwar sub-basin in the east. The western part of the Chattisgarh Basin (Hiri sub-basin) is dominated by stromatolitic limestones, mature sandstones and shales, and the succession is comparable with that of a stable shelf (Patranabis Deb & Chaudhuri, 2002). The eastern Chattisgarh succession, by contrast, is characterized by a thick sequence of immature to submature sandstones, conglomerates, shales, pyroclastics and limestones. The succession exhibits rapid litho-facies variations, and bears signatures of unstable basin conditions, and deposition in diverse paleo-environments (Patranabis Deb & Chaudhuri, 2002). Chhattisgarh Supergroup is subdivided into 3 sub-groups- Raipur group, Chandrapur group and Singhora group.

Structure size and shape:
The ore body is bedded and dipping around 2 deg towards north. It pinches towards south of deposit. Topography of the area is more or less flat. Minimum and maximum RL of the area was 270mts & 285mts.

Legal Matters:

Rights and Ownership:

Nandini Khundini Limestone Mine having lease area of 53.57 ha is located at Village- Nandini Khundini, Tehsil Dhunda in the district of Durg of Chhattisgarh State. Mining lease area over this area was first granted to Bhilai Steel Plant of SAIL. But it was later surrendered to the State Government. ACC Limited applied for the mining lease of this area and lease was granted to ACC Limited in 2008. Land of Mining lease is partly Govt Land and part of it belongs to BSP. BSP has issued a **NO OBJECTION CERTIFICATE** to ACC Limited in 1990 for granting mining lease on this surrendered lease. State Government by their order no F3-10/2004/17 dated 05.02.2008 has granted mining lease for a period of 20 years to ACC Limited, Jamul Cement Works. Execution of Mining lease was done on 02.12.2008. Mining lease party comprises of Govt Land of 17.69 ha and rest belongs to BSP. State Government by their order no F32/MAN.CHI/KHANIJ/2011 dated 29.04.2011 has also granted permission to start mining in government land of mining lease. The copy of all interim orders and Form K is attached as **annexure -1.** Certified copies of Revenue Plan are attached as **Plate – IIA.**

Explanation: Exploration done in mining lease area (BSP as well as Govt. land)

21 nos of boreholes were drilled in mining lease area considering the following:

(i) **"NO OBJECTION CERTIFICATE"** issued by Bhilai Steel Plant in favor of ACC Limited for grant of mining lease in the area surrendered by BSP.

(ii) Exploration proposal as approved by IBM during approval of Mining Plan in the year 2008 which has to be executed before submission of next scheme.

(iii) Timely submission of Notice of Sinking of Boreholes (Form – 3) vide our letter no JK/IBM/03/05 dated 04.05.2011 and resubmitting the same on 23.01.2013 to IBM regarding exploration to be done in Nandini Khundini lease area.

(iv) For scientific development of minerals and declaration of reserves and resources as per UNFC guidelines within five years from the approval of last mining plan / scheme of mining.

Operating:

Mining Method:

The Nandini Khundini Limestone Mine will be worked by mechanised system of opencast mining method. Initially overburden will be removed and stacked along lease boundary by shovel – dumper combination. This

material will be utilized for developing green belt along lease boundary. After removal of OB, limestone benches will then be ready for drilling and blasting operation. Blast holes of 115mm dia will be drilled up to 7 meters with the help of drilling machines with 5% sub grade drilling. The complete drilling operation will be carried out by wet drilling method and no dust is allowed to be air borne while drilling. The blast holes so drilled will have burden of 2.5 to 3.5 m and spacing 3 to 5.5 m. These blast holes will be charged with explosive (mixture of ANFO and booster). Around 70 % of hole depth will be charged with explosives and balance 30% will be stemmed with desa soil to have effective blast. These blast holes after charging with explosives will be normally blasted by using non electric shock tube detonator/delay system. This reduces the ground vibration and throw. For breaking the oversize boulders, Rock breaker will be used.The blasted stone will then be loaded by Hydraulic Excavators and transported by Tippers to crusher at Jamul Mines for further processing. The distance from the mines to the plant is approx 23 Kms. The mode of transportation chosen is by 16 tonne capacity tippers. Loading of limestone is done by shovels having a bucket capacity 4.0 cubic meter. To arrest the dust pollution while hauling the limestone by tippers, water will be sprinkled on the haul road with help of water tanker. The width of the working benches will be maintained at 15 to 20 meters, bench height will be maintained 7.0 mts and the ultimate slope will be 60° from the horizontal.

Mining Equipment:

As the mining is yet to start at Nandini Khurdini Mining Lease area, Mining equipments are not deployed. The type of HEMM proposed for various mining operations is listed below.

List of Mining Machinery proposed to be used

S. No.	Type	Make	Model	Capacity	Nos
1	Hyd. Excavator	Komatsu	PC 650	4.0 Cu. Mts	2
2	Tippers	TATA / Leyland		16 Tonnes	As per requirement
3	Track Mounted Drill	Atlas Copco	ROC L6	115mm dia Hole	1
4	Dozer	[illegible]	D 155 A-1	310 HP	1
5	Pyd Rock Breaker	Krupp or PC-220	PC-220		1
6	Jeep	Tata	Sumo Victa		1
7	Water Tanker	Tata		10KL	1
8	Water Pump	Kirloskar Pratt		[illegible]	2

Construction plan and schedule:

Construction of buildings, workshops, substation will be done in due course of time as the mine starts operation.

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Mill and Processing Plant:
The ROM mineral of Nandini Khundini mine is used for captive use for production of cement. All facilities for crushing and subsequent processing is installed in cement plant. Uncrushed limestone is delivered to cement plant for further processing.

Tailing disposal:
There is no beneficiation plant within the mine premises as there is no tailing generation or tailings.

Water Management:
Industrial water is required for mining operations/establishment like for sprinkling on haulage roads and at faces for suppression of dust. Water is also required for washing and servicing utilities for equipments. Water requirement after start of operations will be approx 5 m^3/day which will be met from rain water harvesting in pit pits within the lease area. Groundwater is not utilized for the mine operations.

Transportation:
Transportation of ROM limestone is done through tippers from mine pit to crusher in plant. This activity is done in one shift.

Power:
The power is required mainly at the mine office premises, workshop, lighting and dewatering purpose. Power will be drawn from Rural grid for CSMP.

Manpower:
All mining operations except transportation proposed in Nandini Khundini mine will be done by departmental. Transportation of ROM stone will be done by engaging contractor tippers. Total workforce will be divided in two groups i.e management cadre and non management cadre.

Closure Design:
Nandini Khundini mine is not yet started for mining. After commencement of operations, it will be operated for more than 30 years. A conceptual closure plan i.e Progressive mine closure plan is prepared and attached in this scheme. All activities to be done during the time of closure are tentatively planned and details are provided in Progressive mine closure plan.

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Environment:
This chapter is separately discussed in chapter no 09 of this Scheme of Mining.

Market Analysis:
The limestone mined from Nandini Khandini Limestone mine will be supplied to cement plant for manufacturing of cement. The cement produced in plant has huge demand in eastern region. There is always a continuous demand of Jamul cement in eastern market.

Capital Cost:
As the mine is not yet started till date, major investment is not yet done. Approx Rs 50.0 lakhs only has been invested till date and there are proposals to invest approx Rs 10.0 crores for HEMM, infrastructure and other ancillary facilities. In the current stage a feasibility analysis is carried out to assess cash flow i.e. cash out flow with respect to investment proposed and cash inflows with respect to sale price and market demand of cement.

Cash flow Forecast:
The receipt from sales per tonne of Cement is taken as Rs 2000 and proportionate receipt of Limestone is taken as Rs 300 per tonne hence return of Rs 64 per tonne is taken for limestone at mines level. The same is discussed in PMCP and the calculations are mentioned in **annexure - 18**. Yearly cash flow and returns for next 5 yrs given below:

CASH FLOW STATEMENT FOR THE YEARS :

Year	Cement Sales (Qty. in tonnes)	Receipts from sales at works level	Quantity of LS Consumed in tonnes	Proportionate receipt at mines level	Cost of LS	Return at mines level
2015-2016	01454	14530707	143137.5	4294200	3192200	910800
2016-2017	105135	16423935	156625	9400537	4224925	5175600
2015-2018	103105	16342320.6	160025	9787938	4334500	5453438
2018-2017	705470	11470787.0	1010000	58443000	26140000	32303000
2017-2018	705470	11470787.0	1010000	64652400	26140000	38512400

INVESTMENT CRITERIA

Value of investment as on 31.05.2012 is taken as its Book cost.

Additional investment to be done in next 5 year period is estimated

gross block	
Total =	
10500000	

1.Calculation of NPV :-

Year	Cash Inflows	Cash Outflows	Difference	Discounted factor @ 10%	NPV
2014-2015	474404000	378113200	96290800	0.909	87550898
2015-2016	505098571	422917620	100681000	0.826	83188618
2016-2017	515557135	424460200	101111549	0.751	75925903
2017-2018	526602200	431430200	95172000	0.683	64977286
2018-2019	574602200	439032200	77570000	0.621	48232763
					1419320180
					1500000000
Less:- Capital investment at the beginning of the year					
				NPV	1,82,95,180

2. Calculation of Pay back period :-

		Rs.
	Capital Invested :-	1850000000
Less:-	Net Discounted Cash flow at the end of 1st yr	96290800
		90290800
Less:-	Net Discounted Cash flow at the end of 2nd yr	96681001
		0

378113200	0.909	343759538.88
422917620	0.826	349413332.56
424460200	0.751	318759179.20
431430200	0.683	294691502.6
439032200	0.621	272687483.2
		1579311036.44
		1500000000.00
		79311036.44
		488550545.74
		2.99

Pay Back period for the above will be 1 year and 10 months.

3. Calculation of IRR :-

NPV	182955180.00
Present value of outflows	488550545.74

= 3.10

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The internal rate of return calculated as per Net Present Value is 3.38 % which is low during initial stages of proposed new investment.

Operation cost:

The operation cost at Nandini Khundani mine for delivering stone to crusher is divided in two basic zones i.e fixed cash cost and variable cash cost. The

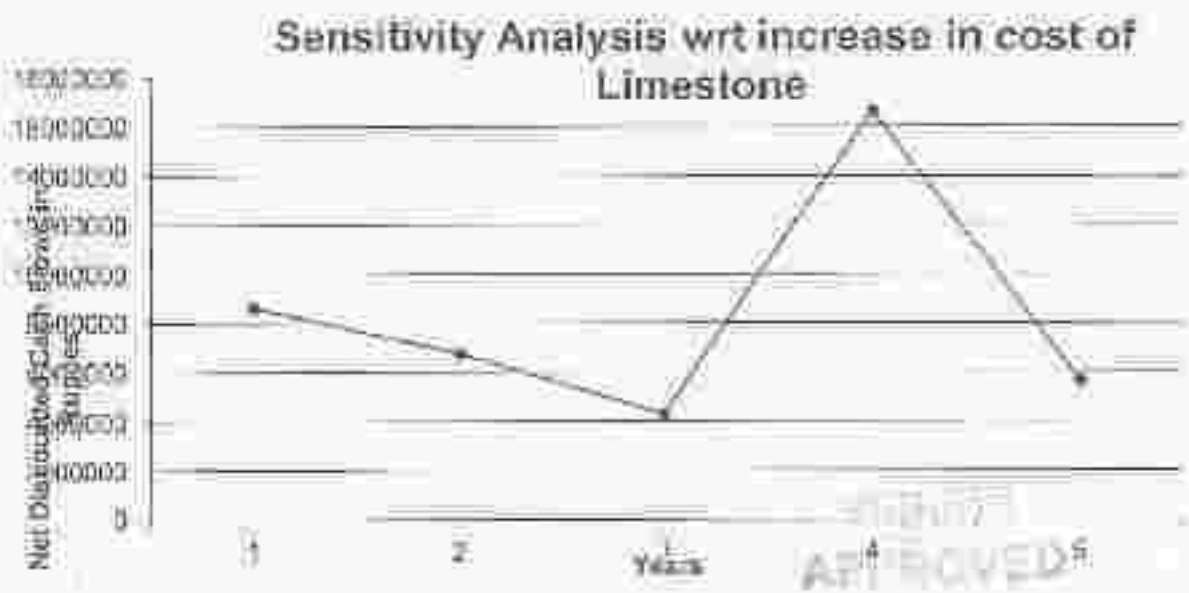
cost of operations includes manpower cost, fuel cost, explosives cost, machine spares cost, O/S repair cost, electricity cost, depreciation cost, establishment cost and royalty and cess. Presently it is assumed that it will vary from 250 to 260 per tonne.

Sensitivity Studies:

The sensitivity studies are done based on two criteria

a) With respect of increase in cost of limestone:

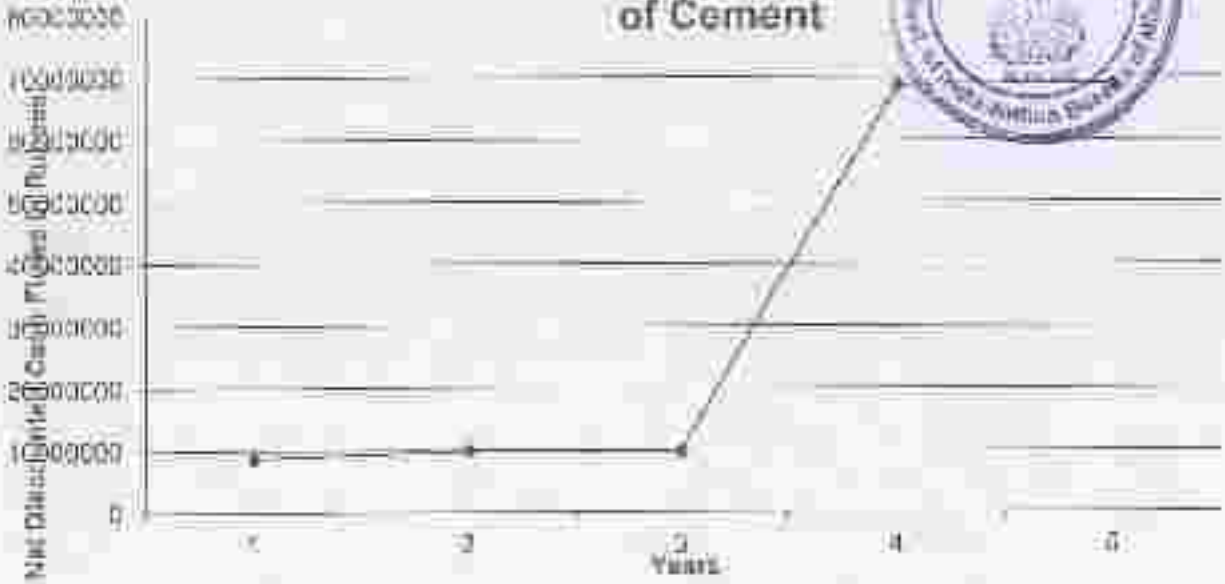
Year	Sales (Tonnes)	Sales (Rs.)	5% Increase in cost of Lime stone	PBIT	Disc.factor @ 10%	Net Disc. Cash Flows
2013-2014	1481374	47404000	37823230	9480800	0.909	8618609
2014-2015	159425	51018000	42653440	8364560	0.826	6911817
2015-2016	165535	48171200	42285248	5886952	0.751	4420625
2016-2017	1230000	328000000	285242560	24357440	0.683	16638269
2017-2018	1230000	328000000	320504038	7036312	0.621	8647473
						47315394
		LESS = Capital Investment at the beginning of the year				168000000
					NPV	(6,30,00,615)



b) With respect to increase in sale price:

Year	Sales (Tonnes)	5% Increase in Sale Price	Limestone Cost (Rs.)	PBIT	Disc.factor @ 10%	Net Disc. Cash Flows
2013-2014	1481374	47404000	37823230	9480800	0.909	8618609
2014-2015	159425	53625518	42812800	11556731	0.826	9544051

2016-2016	1030000	31950000	32610000	1302.078	0.751	9783079
2016-2017	1030000	2643625000	2698980000	1038882500	0.693	68150007
2017-2018	1030000	2774662500	2830850000	1118750000	0.641	63991501
						140035544
		Less : Capital Investment at the beginning of the year				140000000
					NPV	35544



Closure cost and rehabilitation cost: A sinking fund has been created to make available these costs during running of mines. However progressive mines closure is done along with mine operation to reduce the burden at the end. The same is discussed in **annexure – 15** and **annexure – 16**.

Specific statutory conditions applicable to operations of mine:

- Land Rights of Govt land is already obtained and transfer of GSP Land to ACC is under progress.
- EIA and EMP studies have been done and MOEF clearance for Mines for 0.15 MTPA and Plant has been obtained by the company.
- Company is in process of obtaining required permissions under mines act, Environment act etc. for running the Mines. Later on appointment of sufficient no of officers and competent persons of all cadres will be done as required by all statutory Laws to run the Mines.

- The Company has been actively engaged in CSR activities like construction of Schools building, hand pump Installation, Roads making, seeds providing, providing knowledge modern techniques of farming, etc. Company has good reputation and acceptability in the eyes of Local Public.
- Consent to establish has already been obtained.
- Environmental point of view, the area is feasible for mining. EC has already been granted for the mining lease.
- On quality point of view, Proved reserves (111) are adequate suitable for cement manufacturing process.
- No marketing is needed for limestone as it is required for captive usage for manufacturing of cement.
- Lower sensitivity of limestone cost with respect to cement cost.
- No villages will be displaced due to mining activity.
- No water course will be diverted.

Application of Feasibility study and categorization of reserves and resources as per UNFC Guidelines:

Measured (331) mineral resources categories have been considered for feasibility assessment. Above resources will be reducing by non-mineable parts due to statutory obligation and tonnage having grade below cut off grade. Statutorily, some part of area cannot be mined as NE pal of lease has to be diverted for plantation purpose. 50 Mtr safety barriers from public road, 7.5 mtr safety carriers from boundary of lease area, 7.5 m left over for development of green belt and ultimate pit slope at 45° for slope stability of pits etc.

In Nandini Khandini Deposit, some quantity of Limestone reserves will be blocked due to 7.5 m safety barrier and green belt along mining lease boundary, 30 m left out for creation of green belt in NE part of lease area and some material will be blocked due to maintenance of ultimate pit slope of 45 to 60 deg all along the mineral blocks.

Conversion of Measured mineral resources (331) to Proved mineral reserves (111) demonstrated through feasibility study:

Category	Lithology	Resources (Mill.t)
Measured Mineral Resources (UNFC Code : 331)	Overburden	2.57
	Limestone Upper	18.62
	Marshy Limestone	11.64
	Limestone Lower	[illegible]
	TOTAL	33.26

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Non mincable part of Measured Mineral Resources (Blocked due to statutory obligation): These are approx areas are estimated due to 7.5 m safety barrier and green belt along lease boundary, 30 m width area left for development of green belt in NE

along lease boundary and limestone blocked due to ultimate pit limit at 45 – 60 deg.

Category	Lithology	Reserves(Mt.t)
Feasibility Mineral Resources (UNFC Code 211)	Limestone Upper	7.00
	Mg Shaly Limestone	3.29
	Limestone Lower	3.15
	TOTAL	13.43

The detailed breakup of the reserves spread sheet for various lithologies is given in annexure – 5.

Proved Mineral Reserves (111): Proved mineral reserves are obtained after subtracting feasibility mineral resource from measured mineral resource. Mg Shaly Limestone is also considered under proved category due to presence of an average CaO % of 38.64%. Break up as per different litho units is tabulated below:

Category	Lithology	Reserves(Mt.t)
Proved Mineral Reserves (UNFC Code 111)	Limestone Upper	27.35
	Mg Shaly Limestone	9.52
	Limestone Lower	5.89
	TOTAL	42.74

Method of Estimation of Reserves (*Geological Cross-Sectional Area Method*)

Reserve estimation is done by geological cross sectional area method.

For estimation of resources using cross-sectional area method cross-sections were drawn first using borehole logs. Topography of the sections was updated as per detailed topographical survey. Cross sectional area of different lithounits are calculated from all the sections. Between two consecutive sections average cross sectional area is calculated for different lithounits. The average intersectional area was then multiplied by the distance between two sections to arrive at the volume between the two sections. The volume so determined then converted into weight (in tones) by applying 'volume to weight' ratio commonly referred to as 'tonnage conversion factor' (TCF).

TCF for different litho-units were determined from the borehole core by weighing samples and the total volume of NX core was computed using the core length and radius of core samples. TCF thus calculated for different lithologies are tabulated below:

Overburden	1.8
LST_U	2.5
LST_L	2.5

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Mining Benches

Following mining benches are proposed are being maintained.

Bench	Level (in metres)	Remarks
	Above 280	Laterite Soil
I	280 - 267	Quarry
II	267 - 250	Benches developed in limestone deposit which includes limestone (upper) patches of low grade limestone and limestone (lower)
III	250 - 233	
IV	233 - 220	

ESTIMATED RESERVES AND RESOURCES

Classification	Code	Quantity (Mio T)	Grade
(1)	(2)	(3)	(4)
Total Mineral Resources(A+B)			Grade of Mineral is good & it is entirely blendable with Mineral of our other captive Mine (Jamul & Pathariya L/s Mine) and suitable for cement manufacturing
A) Mineral Reserve			
(1) Proved Mineral Reserve	111	43.74	
B) Remaining Resources			
(1) Feasibility Mineral Resource	211	8.95*	
(2) Measured Mineral Resource	331	Nil	
(3) Indicated Mineral Resource	332	Nil	
(4) Inferred Mineral Resource	333	Nil	
(5) Reconnaissance Mineral Resource	334	Nil	
* *Non mineable due to Statutory obligations, Not economical and feasible due to current cement market scenario & mining technology presently in use.*			

Enhancement of Reserves after Exploration done in 2011: Summary

Reserves Declared in Mining Plan (2010)		Approx Exploration Expenditure during Exploration done in 2011		Reserves / Resources as per UNFC system (in 2012)	
Category	Reserves (in mill.MT constant)	Activity	Amount (in Rs. Lakhs	Category	Reserves (in million tonnes)
Proved Reserves (UNFC 111)	43.71	Staff, Wages	3.0	Proved Reserves (UNFC 111)	43.71
		Spare parts	1.0		
		Explo. Explosives	1.0		
		Analysis	2.5		
		Simple Rec. Exp.	1.35	Feasibility Mineral Resource (UNFC 211)	8.95
		Inventory	1.5		
Indicated Resources (UNFC 332)	15.91	Consumables	2.0		
		Site Preparation & Rehabilitation exp.	2.9		
		Labor Expenses	1.5	Measured Mineral Reserves (UNFC 331)	6.09
		Camp Vehicle	1.5		
		Core boxes	3.15		
		Other Expenses	2.0		
		Total	18.2		

3.4 Category wise updated Proved Reserves (111) with weighted average Grade of each radical (as on 31.03.2012)

Litho Unit	UNFC 111 in Mn Tns	BSM Quality					
		SiO_2 %	Al_2O_3 %	Fe_2O_3 %	CaO %	MgO %	LOI %
Limestone Upper	17.36	6.15-14.81	1.27-2.89	0.72-3.59	39.31-53.24	1.10-4.05	34.87-43.31
Mg Shaly Limestone	9.34	7.4-20.97	1.24-5.20	0.78-3.10	31.35-43.75	2.1-4.7	31.35-41
Limestone Lower	17.04	6.85-15.74	1.7-4.28	0.55-2.77	40.31-50.44	1.35-2.74	33.87-41.85
Total	**43.74**	**9.66**	**2.62**	**1.40**	**43.85**	**2.60**	**38.19**

Year wise exploration proposed in the next five years:

During next five years of Scheme period, exploration program is not proposed as lease area is fully explored as per requirements to fulfill G1 norms of UNFC guidelines. 05 nos. of Boreholes are proposed. The same is mentioned in Geological Plan (Plate III).

Suitable Justification for steep hike in Mineral Reserves:

In the earlier Approved Mining Plan, Mineable reserves in UNFC – 111 was 4.01 million tonnes. This data was based on Geological Report of BSP. In the current document mineable reserves are enhanced to 43.74 million tonnes. Following specific reasons justifying the steep hike in mineral reserves is mentioned below:

1. **Increase in mineralized area:** In the earlier Approved Mining Plan, mineralized area in mining lease was considered taking in to account of 05 nos. holes done by BSP in Mining Lease area. Also the spacing of boreholes was on a bigger grid and depth of boreholes was approx 35 meters. Only one third area of mining lease was evalved for calculating reserves. After last approval, 21 boreholes were drilled in the year 2011 and reserves were re estimated in the total mining lease area. Depth considered for assessment of reserves is 52 meters. Total lease area is now considered in mineralized category. As an outcome of this study, mineralized area has increased three times.

2. **Re-assessment of old boreholes and assessment of exploration:** During study, data of all previously drilled boreholes (08 nos) done by BSP was reassessed in terms of depth. In the current scenario reserves are considered upto an average depth of 52 meters. In addition to old boreholes done by BSP, 21 boreholes were drilled and assessment as per results of

all boreholes was done. Due to this, reserves under UNFC - 111 have increased from 4.01 million tonnes to 40.74 million tonnes. Detailed break up of exploratory boreholes drilled during different exploration ramps from 1956 till 2011 is mentioned below.

3. **Assessment of reserves with respect of new Threshold limit fixed for limestone (CaO > 34%):** During all previous investigations done, limestone reserves were considered based on its quality for producing clinker. Limestone of Approx. + 42% CaO was only considered for computation of reserves. In the current scenario, Threshold limit of limestone i.e +34% CaO is taken in to account which has increased mineable reserves (in UNFC – 111) to 43.74 million tonnes.

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4.0 CONCEPTUAL MINING PLAN

(a) Salient feature of conceptual mining plan.

As per conceptual mining plan of Nandini Khaudini Limestone Mine, the mine shall advance in all directions towards lease boundary. In the first five years on after the commencement of mining operations the production level from Nandini Khaudini Mine will be 1.6 LTPA to the maximum of 1.03 LTPA. The method of mining will be Mechanised system of opencast mining with deep hole Drilling and Blasting activity, Loading and transportation by Upper-Shovel combination. Back filling in worked out area will be done after deepest level of exploitation of limestone. It is also proposed to create a new plantation area in north side of lease as per the condition stipulated in EC. The balance mined out voids / portion of the pit will be either back filled with OB generated during mining process or will be converted into water reservoir.

Post mining conceptual land use pattern: As per current conceptual mining plan, post mining conceptual land use pattern is given below:

Post Mining (Conceptual) land use pattern (in ha. area)

Sr No.	Description	Total Area	Land Use (ha)				
			Backfilled Water body		Plantation	Undisturbed	Total
1.	Excavation / Backfilling	33.97	33.97	0	0	0	33.97
2.	Water Reservoir	14.8		14.8	0	0	14.8
3.	Peripheral Dump or back fill on North side of Lease	1.79	1.79	0	0	0	1.79
4.	Green Belt in Mining area boundary	3.01	3.01	0	0	0	3.01
	Total	53.57	38.76	14.8	0	0	53.57

Note: Date end of mine life, Total bottom pit will be approx. 48.77 Ha Out of which area likely to be back filled will be approx. 33.97 Ha and area left out for Water reservoir will be 14.8 Ha

(b) Period of anticipated life of mine

Proved reserve under UNFC - 111 as on 1.4.2012 is 43.74 million tonnes. The average yearly consumption will be around 1.03 million tonnes as propose in this scheme of mining. Hence the anticipated life of the mine is around 43 years.

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(c) Mine development (Future strategy with basis)

As there is almost uniform layer of overburden of average 3 meters, the mine development which shall be carried out has been depicted on the Five Yearly Basis Conceptual Plan and sections which can be seen in Plate – **VII**. The top layer of fertile soil will be dumped on the top of the dump for plantation. In the north side of lease area, some space has been

demarcated for development of plantation. Also the fertile soil generated during mining operation will also be dumped along lease boundary for development of green belt.
Back filling activity will be carried after exploitation of limestone to the desired level out side UPL. Backfilling will be done in Ist, IIIrd, IVth and Vth year. Back filling will also be done beyond the completion of this scheme. After waste Backfill, the top layer will be covered with top soil and plantation will be carried out accordingly.

(d) Inclination of dumps

The slope of the individual dump is maintained at the angle lower than natural angle of repose of material (37degree) and they are benches of height not exceeding 9 mts in height.

The bund of sufficient height shall be provided along the periphery of the dumps to prevent soil erosion. A good quantity of boulder / waste material is surrounded on the down side of the dumps in order to prevent any kind of soil erosion. Some places trench has been dug around the dump for the purpose. The top soil will be spread over the dumps and on the slopes, plantation will be done for stabilization.

(e) Exploration (Future strategy with basis)

As such the estimated reserves of the deposit are of measured category in respect of mineralized area within lease boundary. Exploration is already done on detailed exploration basis (G 1) and entire lease area is explored. Accordingly, Reserves are finally categorised in respective classes.

(e) Optimum exploitation (Future strategy with basis)

The limestone of Nandini Khundini Limestone Mine will be used for consumption in the factory. At present, the limestone available in Nandini Khundini limestone deposit is categorized as per UNFC guidelines and Proved reserves are established. Based on current conditions, it is not economic/feasible to win limestone available in UNFC Code 211. In future, if condition permits, this limestone which is mainly nearer to the lease boundary will be exploited.

(f) Utilization of mineral (future strategy based on advanced technology development elsewhere)

The quality of limestone won from Nandini Khundini limestone mine is adequate to meet the kiln feed requirements, after it is blended with marginal grade limestone from our Jamul mine.

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(g) Environmental Aspects

Degradation of Land:

Though there is degradation of land by the mining activity, the part of mined out areas will be reclaimed simultaneously by partial back filling and rest to be converted into water reservoir.

Water Regime:
At present there is no water regime of any importance in the area. Also we have carried out studies to ascertain any adverse impact of mining on water table of inside and surrounding area of mines. The study has revealed that there is no adverse impact effect of mining activity on the water table of the surrounding areas. Details provided in **annexure – 11**.

Creation of VOID:
After completion of mine working the work out pit will be partly back filled and rest will converted into water reservoir.

Air Pollution:
Studies for ambient air quality has been done in the study zone of 10 km radius around the mine site which forms the baseline information. Stations to be established in case area are shown in **plate – VIII**. All dust control measures will be in practice i.e. wet drilling, water spraying on haul roads, water spray on blasted stone and plantation of trees along haul roads etc. Details provided in **annexure – 10**.

Noise Pollution:
Noise survey is done in neighboring villages which forms the part of baseline information. Periodical maintenance of equipment will be carried out. Moreover, the green belt that would be progressive along lease boundary, dumping yards, and haulage roads will help in restricting noise level. Noise due to blasting will be controlled by using NONEL. There will be no impact of noise due to increase in production. Details provided in **annexure – 12**.

Ground Vibration:
Blasting will be carried out by using NONEL detonators, which controls air blast and ground vibration effectively. Ground Vibration monitoring will be done regularly in each year. We have Seismometer DS –077 instantel make for the above purpose.

5. MINING

5.1 Salient description of Present mining methods

The Nandini Khundini Limestone Mine will be worked by mechanised system of opencast mining method. At present, Mining operations are not started in Nandini Khundini Mine. The limestone deposit is overlain by 3 m of overburden consisting of Alluvium, black cotton soil, hard murrum and boulders stone. Initially overburden will be removed by shovel – dumper combination and unloaded at properly defined area called Dumps. Dozer is then operated at these dumps to maintain the dump design and to create adequate space for future dumping. After removal of OB, limestone benches will be ready for drilling and blasting operation. Blast holes of 115mm dia will be drilled up to 7-8m bench with the help of drilling machines with 5% sub grade drilling. The complete drilling operation will be of wet drilling method and no dust is allowed to be air borne while drilling. The blast holes will be drilled with parameters having burden of 2.5 to 3.5 m and spacing 3 to 5.5 m. These blast holes will be charged with explosive (mixture of ANFO and booster). Around 70 % of hole depth will be charged with explosives and balance 30% is stemmed with loose soil to have effective blast. These blast holes after charging with explosives will be then normally blasted by using non-electric shock tube detonator/delay system. This will reduce the ground vibration and throw. For breaking the oversized boulders, Rock breaker will be used.The blasted stone will be loaded by Hydraulic excavators and transported by tippers to crusher at cement plant for further processing. The distance from the mines to the plant is approx 23 Kms. The mode of transportation chosen is by 16 tonne capacity tippers. Loading of limestone is done by shovels having a bucket capacity 4.0 cubic meter. To arrest the dust pollution while hauling the limestone by tippers, water will be sprinkled on the haul road with help of water tanker. The width of the working benches will be maintained at 20 meters, bench height: 7 mts and the ultimate slope will be 60° from the horizontal. The present layout of the mine is shown in Surface Plan in **Plate – V**.

5.2 Yearly pit-wise development plan for next five years

(i) Overburden

Overburden will be kept in advance of limestone benches. Bench height to be maintained for overburden bench is from 3m. Overburden handled will be dumped at suitable sites and will be dozed regularly. Waste material if generated during excavation will be backfilled in the worked out pit. Proposed handling of OB and waste quantity and specified area for the next five years of the scheme period is shown in **Plate - VI (Sheet 1-5)** and in **annexure – 9.**

Year Wise Proposed Bench Configuration: Overburden

Year: 2013-2014 to 2017-18

S. No.	Year	OB	Location between section lines and direction	Bench RL From - To	Face Length (m)	Face Advance (m)	Height of Bench (m)	Quantity (Tns)
1	2013-14	OB	SL – 3 to SL – 5, W side	280 - 277	450	60	3	270100
2	2014-15	OB	SL – 3 to SL – 5, EW side	280 - 277	645	30	3	422340
3	2015-16	OB	SL – 3 to SL – 6, EW side	280 - 277	1301	18	3	843585
4	2016-17	OB	SL – 3 to SL – 7, EW & N side	280 - 277	756	55	3	498960
5	2017-18	OB	SL – 1 to SL – 7, EW & N side	280 - 277	470	53	3	248710

(ii) Top Soil

No mining lease area in 53.57 ha has OB in the form of laterite soil. There is no fertile top soil except lateritic soil which will be removed and stacked properly within the mine boundary. In due course of mining, if some quantity of Top soil gets generated i.e layer of 0.2 to 0.3 m of black cotton soil then it will be used for plantation on matured dumps. The quantity of top soil cannot be envisaged in the present stage of mine.

5.3 Year wise production plan for next five years and grade

Year wise production of limestone for the next five years will be done from the central part of the mineralized area of the lease. For the cause of systematic mining and mineral conservation, it is proposed to extract limestone from the maximum depth possible. The details of year wise limestone production for next five years is shown in **Plate - VI (Sheet 1-5)** and in **annexure – 8.**

Year Wise Proposed Bench Configuration: Limestone Benches
Year: 2013 – 2014 to 2017-2018

	Year	Bench	Location between section lines, Bench & Direction	Bench RL From - To	Face Length (m)	Face Advanc e (m)	Height of Bench (m)	Weighted Avg. SG	Quantity (Tns)
1	2013-14	II	SL – 3 to SL – 5, W side	277-270	422	60	7	4.2	148137.5
							Total	4.2	148137.5
2	2014-15	I	SL – 3 to SL – 5, EW side	277-273	645	15	7	4.2	135425
							Total	4.2	135425
3	2015-16	I	SL – 3 to SL – 6, EW side	277-273	1055	30	7	4.2	310035
		II	SL – 3 to SL – 4, E side	273-263	958	40	7	4.2	526520
							Total	4.2	836555
4	2016-17	II	SL – 3 to SL – 6, W side	277-273	1014	22	7	4.2	327054
		III	SL – 3 to SL – 6, EW side	273-263	491	10	7	4.2	118272
		IV	SL – 3 to SL – 5, W side	263-256	337	60	7	4.2	203581
							Total	4.2	1070308
5	2017-18	II	SL – 2 to SL – 6, EW side	277-270	419	60	7	4.2	296805
		III	SL – 2 to SL – 6, EW side	270-263	807	60	7	4.2	536497.5
		IV	SL – 2 to SL – 4, EW side	263-256	559	53	7	4.2	437970
							Total	4.2	1271272

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खान नियंत्रक (केन्द्रीय क्षेत्र)
Controller of Mines (Central Zone)
भारतीय खान ब्यूरो
Indian Bureau of Mines

SUMMARY: Stripping Ratio

S.No	Year	LS Production in tonnes	OB in tonnes	Stripping Ratio
01	2013-14	166127.5	27019	0.16
02	2014-15	155425	72230	0.46
03	2015-16	130934	60756	0.46
04	2016-17	1050000	74601	0.072
05	2017-18	1050000	74665	0.072

Blending proposal:

The quality of limestone won from Nandini Khundmi Limestone Mine will be adequate to meet the kiln feed requirement only after blending with low-grade limestone from our Jamul Mines. The average raw kiln feed will be maintained as per blending ratios established as per the availability of Limestone from Jamul and Patharlya and Nandini Khundim Mines. Currently blending ratio is Jamul: Patharlya: 60:40.

Blending Technique:

There is no blending technique adopted in mines. The blending is carried out in plant after crushing. For the cause of grade control, the ROM quality supplied from mines is between 75 % TC to 81.5 % TC. There is a system of blending high grade and low grade mineral in desired proportion in plant. The blending commences after crushing of mineral in crushed limestone gantry.

Fresh area broken every year from 2013-14 to 2017-18:

YEAR	Broken fresh area (in sq. mt)	Location of broken area
2013-14	5002	SL – 3 to SL – 6 W side
2014-15	13378	SL – 3 to SL – 6 EW side
2015-16	12992	SL – 3 to SL – 8 EW side
2016-17	13815	SL – 3 to SL – 7 EW & N side
2017-18	13827	SL – 3 to SL – 7 EW & N side

5.4 Any change in proposal method of Mining & Deployment of Mining Machine:

As the mining is yet to start at Nandini Khundim Mining Lease area, Mining equipments are not deployed. The type of HEMM proposed for various mining operations is listed below.

List of Mining Machinery proposed to be used

S. No.	Type	Make	Model	Capacity	Nos.
1	Hyn Excavator	Komatsu	PC - 650	4.0 cu. mts	2

2	Tippers	TATA / Ashok Leyland		16 tonnes	As per requirement
3	Track Mounted Drill	Atlas Copco	RDH 18	115mm dia hole	2
4	Dozer	BEML D	D 155 A-1	240 HP	1
5	Rock Breaker	Krupp or EC 220	EC 220		1
6	Jeep	Tata	Sumo Victa		1
7	Water Tanker	Tata		6500 Ltr	1
8	Water Pump	Mather & Platt		75.00 m³/hr	1 set

Adequacy of proposed mining machinery is enclosed as **annexure – 14.**

Justification: Mining Operations at location proposed in Scheme of Mining:-

Location of mining operations as proposed in the scheme of mining is due to the following reasons:

a) Mining lease of Nandini Khandini Limestone mine was earlier worked by Bhilai Steel Plant and surrendered in 1990. In the year 2006, ACC Limited was granted mining lease in this surrendered lease. There was presence of old pits worked by BSP in the lease area. For the purpose of production planning, one of the pit was chosen and development of benches is shown. This pit lies near the lease boundary and road is also present leading towards the pit.

b) Area where working permission is granted by state government is in small batches due to which scientific mining is not possible. Also it is not possible to start mining from lease boundary due to presence of dwellings of villagers.

c) As per conditions stipulated in granted EC by MOEF, green belt has to be developed in northern part of lease area because of presence of village very near to the lease boundary. In order to fully exploit limestone upto the mineable depth, it is necessary to start working from centre and then projecting outward towards north so the maximum limestone can be extracted from northern area before development of green belt.

d) ACC is regularly following up with state government for obtaining surface rights of BSP land. Matter has been appraised with Collector, Durg and final hearing for compensation to be paid has to be completed. As the compensation to be paid is finalized, ACC will pay accordingly and gain surface rights from BSP and operations in mine can be started as per proposals given in this scheme of mining.

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खान नियंत्रक (केन्द्रीय)
Controller of Mines (Central Zone)
भारतीय खान ब्यूरो
Indian Bureau of Mines

6.0 HANDLING OF WASTE/SUB-GRADE MATERIAL

6.1 (a) Pit wise rate of yearly generation of waste:

The limestone deposit is overlain by OB of overburden consisting of Alluvium, lateritic soil, bara murrum and float ore. Other than this, there may be irregular occurrence of intercalated strata of argillaceous limestone throughout the area. If encountered, the weathered limestone encountered from first bench will be sorted out while handling the over burden & collected at one place and after breaking with the help of hydraulic rock breaker, supplied to crusher. In this manner 10 percent limestone from first bench may be recovered. The quantity of this limestone cannot be calculated in a definite manner, it is not taken in to account for the purpose of production planning in this scheme of mining. Below table gives the details of yearly waste generation in terms of OB:

Year	OB (Tons)	Waste (T.C.)
2014-2015	27010	NIL
2015-2016	72220	NIL
2016-2017	91760	NIL
2016-2017	74001	NIL
2017-2018	74035	NIL

(b) Proposal for disposal for next five years of scheme of mining

Disposal of OB material is proposed in three ways i.e Dumping along lease boundary for creation of green belt, filling old worked out pits in North West side of lease area for plantation and back filling of waste in working pit after complete exploitation of limestone. Designated dumping areas are located outside the mineralized zone in north western part of the lease area. The OB material generated during mining operations will be dumped in these areas. Back filling will start from first year onwards in old worked out pits by OB and it will continue beyond the completion of scheme after 05 years also. The dumps and their year wise buildup and afforestation is shown in **Plate - VI (Sheet 1-5)**. Manner of disposal of O.B will be loading and transportation by shovel – tipper combination and / Compacting by dozer operation.

Year	Location of Dumps as Back Fill area
2013-14	100 m North West side of SL – 7 (Back Fill)
2014-15	70 m North West side and 10 m North East side of SL – 7 (Back Fill)
2015-16	70 m North East side of SL – 7 (Back Fill)
2016-17	100 m North East side of SL – 7 (Back Fill)
2017-18	200 m North West side of SL – 7 (Back Fill)

(c) Selection of dumping site: The dumping yards have been selected for complying the requirements of EC granted for Nandini Khurdini

Limestone Deposit from MOEF. The backfill area proposed in this scheme of mining is old worked out pits in North Eastern part of lease area. There is no public road, vegetation or streams. There is no danger from rolling stone or caving of dumps. The dumping sites selected for disposal of OB is of two types, i.e either along lease boundary for creating green belt or on Old worked out pits.

(i) Dumping of Ob for green belt: Dumping will come in north part of lease area out side UPL. It is also planned to cover total lease boundary with plantation by dumping OB along lease boundary and planting saplings.

(ii) Backfilling of OB in old worked out pits: The backfilling activity is planned by filling old worked out pits in North and North Eastern part of lease area. Back filling will also be done in worked out pits after full exploitation of limestone to the deepest possible level. Back filling will continue beyond the completion of this scheme.

Year	Approx Area(Ha)	Approx Qty (Tns)	Plan/Sheet
2013-14	0.139	25000 (Back fill)	Plate-VI, Sheet-1
2014-15	1.33	72230 (Dumping)	Plate-VI, Sheet-2
2015-16	0.19	57000 (Back fill)	Plate-VI, Sheet-3
2016-17	0.21	70500 (Back fill)	Plate-VI, Sheet-4
2017-18	0.21	70500 (Back fill)	Plate-VI, Sheet-5

Extent of Proposed Land Reclamation and Rehabilitation : Quantification on Yearly basis (Scheme period):

The mining lease area of Nandini Khundini Limestone mine is 53.57 Ha. At the time of final closure of mines, approx area of worked out pit will be around 48.77 Ha. The reclamation and rehabilitation will be done in a phased manner between 2013 to 2058. Part of the worked out pit will be converted into water reservoir and part will be back filled by OB generated due to extraction activity. Accordingly plantation will be done on this back filled area. Rehabilitation of all external OB dumps will be done by spreading a layer of top soil and then by carrying out plantation. The details of proposals made for reclamation and rehabilitation of mined out land for the period beyond 2013 to 2058 is shown in Conceptual Plan & Sections **(Plate – VII)**.

For extraction activity, the broken area will be 48.77 Ha. Out of which, 33.97 Ha area will be backfilled/ reclaimed by waste material generated from mining activity and 14.8 Ha will be converted as water reservoir to improve the water table in the area. The detailed working details as proposed upto life of the mine is shown in Conceptual plan and Sections, **(Plate – VII)**.

Year	Approx Area(Ha)	Approx Qty (Tns)	Plantation (no of saplings)	Plate/Sheet
2013-14	0.139	25000 (back fill)	300 nos	Plate-VI, Sheet-1
2014-15	1.33	72230 (Dumping)	300 nos	Plate-VI, Sheet-2

2015-16	0.35	17000 (back fill)	300 nos	Plate VI, Sheet 4
2016-17	0.21	10000 (back fill)	300 nos	Plate VI, Sheet 4
2017-18	0.21	10000 (back fill)	300 nos	Plate VI, Sheet 4

Justification: As per the conditions stipulated back filling as proposed in this scheme of mining is as per the conditions of Environment Clearance granted by MOEF for Nandini Khurdini Limestone mine. As per land use pattern of mining lease area, North and north eastern side of lease boundary is very near to public road and village dwellings. It is already disclosed in this scheme of mining that mining lease of Nandini Khurdini limestone mine was earlier worked by Bhilai Steel Plant and then it was surrendered in the year 1999. BSP has already excavated the north and north eastern side of lease area. Old pits were created due to working done by BSP. As per conditions of EC granted by MoEF, development of green belt of 30 meter width in north and north eastern side of lease is mandatory. As this area is already worked out, back filling and waste dumping is proposed in this area. After completion of back filling and waste dumping, green belt of 3 tier nature will be developed in this area.

(d) Height of individual dumps

Maximum height of the dump will be less than 30 mts and same is benched in 9 metres bench with gentle gradient. The general slope of the dumps will be maintained well within the safe angle of repose.

(e) Precaution/protective works

The dumps will be made strictly as per guidelines providing proper drainage, access. A parapet wall of sufficient height, inside boundary material will be surrounded to these dumps to prevent any erosion and runoff. To stabilize the slope of the dump, trees have been planted on top and slope.

6.2 Sub-grade ore

The average quality of Limestone found in Nandini Khurdini is either Cement grade or High grade which is used by blending marginal grade Limestone from Jamul for manufacture of Clinker and Cement. The required quality of limestone is directly raised and blended proportionately with limestone of Jamul mines before feeding to crusher.

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7.0 USE OF MINERALS

7.1 Changes proposed in use of Mineral

In the present scenario, Jamul cement works operate 2 semi-dry kilns and 1 dry kiln. The semi dry LEPOL grade kiln require a kiln feed of 42.0% CaO whereas dry process kiln require a slightly higher kiln feed of about 43.0% CaO. The quality of Nandini Khandini Limestone Mine is of higher grade which, after blending with marginal grade Limestone of Jamul Mines, can be utilized for clinker production. The quality of Jamul Limestone is below the kiln feed requirement.

RAW KILN FEED

COMPOSITION	LEPOL KILN FEED	TARACLDT KILN FEED
SiO2	12.4	11.4
Al2O3	3.7	3.7
Fe2O3	1.9	1.3
CaO	43.2	44
MgO	2	2.2
LOI	35.4	35.6
Na2O	0.15	0.10
K2O	0.15	1.06
AM	1.1	1.06
SM	1.35	2.48
LSF	1.35	1.07

7.2 Changes in Specification - If any, imposed by Buyers / consuming industries.

NIL

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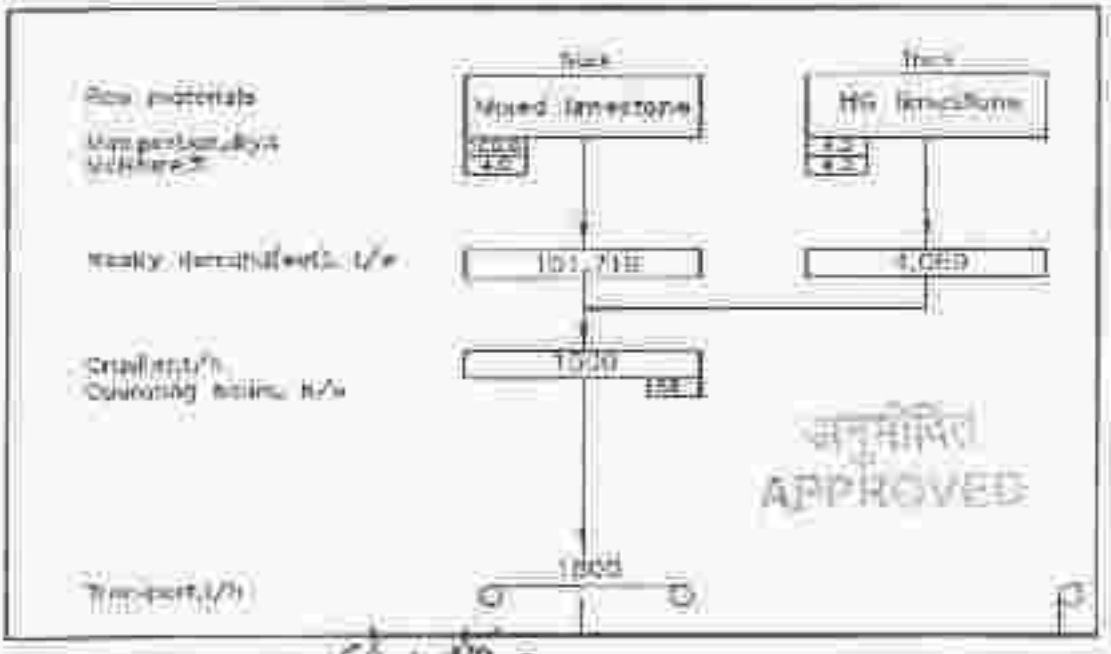
8.0 MINERAL BENEFICIATION

The quality of limestone won from Nandini Khundini Mine is adequate to meet the kiln feed requirements. Limestone from Nandini Khundini mine is already of high grade and it will be beneficial when blended with limestone of Jamul Mine. In the present system, limestone from Jamul and Pathariya mines is blended in limestone gantry in plant. In working any material encountered above 35 % CaO is not rejected and since there is a possibility to blend the same with Pathariya mines stone, the material is also sent to crusher at plant. The average run of mine quality of limestone encountered from Jamul Mine as well as Pathariya and Nandini Khundini mine are as under:

AVERAGE LIMESTONE (R.O.M) QUALITY

COMPOSITION	NANDINI KHUNDINI MINE	JAMUL MINE	PATHARIYA MINE
SiO_2	2.20	2.43	2.03
Al_2O_3	2.62	2.7	3.1
Fe_2O_3	1.60	2.06	2.7
CaO	<3.99	48.3	44.8
MgO	2.99	1.43	2.1
LOI	38.69	43.0	37.8

New Proposal: It is proposed to install a new screening and crushing unit within Jamul mines lease area. ROM of Jamul, Pathariya and Nandini Khundini mine will be crushed by this new crusher. Mass flow diagram is attached below for reference.



CHAPTER IX :ENVIRONMENT MANAGEMENT PLAN

[illegible]	[illegible]	[illegible]
TOP SOIL MANAGEMENT		
[illegible]	[illegible]	[illegible]
LAND RECLAMATION AND REHABILITATION		
[illegible]	[illegible]	[illegible]

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WASTE DUMP MANAGEMENT

PROPOSED AS PER APPROVED MINING PLAN / MODIFIED MINING PLAN APPROVED (2008) (0.10 MTY EC)	POSITION AT THE END OF 5TH YEAR OF APPROVED MINING PLAN / MODIFIED MINING PLAN	REMARKS FOR THE DEVIATIONS IF ANY
The waste will be dumped within the limits of the area applied for ML. Efforts will be made to dump the waste in the mined out pits wherever possible. Top soil from the dump will be stacked separately. Proper benches will be maintained while dumping the waste. Retaining walls will be constructed wherever necessary. Garland drains will be constructed around the dumps to prevent run off water.	Waste dumping is not envisaged in the Mine Quarry as mining is done in hilly terrain.	Mining activities are carried as per mine plan approved by IBM. Waste dumping will be done in the mined out pits only. Top soil from the dump will be stacked separately. Retaining walls will be constructed wherever necessary. Garland drains will be constructed around the dumps to prevent run off water.

AFFORESTATION PROGRAMME WITH PRECAUTION PROPOSED FOR PROTECTION OF PLANTATION

Proposed Afforestation target in the year	Plantation carried out in the year	Name of Afforestation scheme & No. of trees to be planted
1st Year 1000 trees 2nd Year 400 trees 3rd Year 300 trees 4th Year 300 trees 5th Year 300 trees Total 2300 trees	Waste dumping is not envisaged in the Mine Quarry as mining is done in hilly terrain.	2015-16 500 saplings 2016-17 500 saplings 2017-18 500 saplings 2018-19 400 saplings 2019-20 400 saplings Total 2300 saplings Financial Feasibility (Rs. Lakhs) (Enclosed)

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QUALITY OF AIR		
PROFORMA AS TO BE APPENDED TO THE CONSENT FOR GRANT OF APPROVAL 2016 AS TO 2018 (1)	FORMAT AS TO BE USED BY THE OCCUPIER OF THE INDUSTRY FOR SUBMISSION OF THE REQUEST FOR GRANT OF APPROVAL	ENDORSEMENT BY THE DEPARTMENT OF ENVIRONMENT
To, [illegible] Sir/Madam, With reference to your application for grant of approval for the [illegible] I/We hereby submit the following information:		[illegible]
Dual fuel operation boiler and		
whenever the diesel generator set is in operation, the following will be provided:		
Will it be ensured that [illegible]		

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QUALITY AND MAKE UP OF WATER INCLUDING SURFACE AND GROUND WATER

PROPOSAL AS PER APPROVED EIA/EMP (IF ANY) OF MINE/ PROJECT APPROVED EARLIER TO 2012 (IF)	FOR THAT THE END OF FIVE YEARS OF MINING LEASE OR MINING JAPE HOW IT IS ENVISAGED	PRESENT POSITION AFTER THE STARTED EXECUTED
Water sprinkling will be done on haul roads, loading and unloading points and other dusty areas to suppress dust. Adequate drainage facility will be provided in the mine pit. Proper water quality will be carried out in the mine pit. Proper water quality will be carried out in the mine pit.	Water sprinkling on haul roads, loading and unloading points and other dusty areas to suppress dust. Adequate drainage facility will be provided in the mine pit.	Water sprinkling on haul roads, loading and unloading points and other dusty areas to suppress dust. Adequate drainage facility will be provided in the mine pit. Proper water quality will be carried out in the mine pit.

NOISE LEVEL

PROPOSAL AS PER APPROVED EIA/EMP (IF ANY) OF MINE/ PROJECT APPROVED EARLIER TO 2012 (IF)	POSITION AT THE END OF FIVE YEARS OF MINING LEASE OR MINING JAPE HOW IT IS ENVISAGED	PRESENT POSITION AFTER THE STARTED EXECUTED
Controlled blasting will be adopted. Use of the noise generating machinery will be regularly maintained. Personal protective equipment will be provided to the workers.	Controlled blasting will be adopted. Use of the noise generating machinery will be regularly maintained. Personal protective equipment will be provided to the workers.	Controlled blasting will be adopted. Use of the noise generating machinery will be regularly maintained. Personal protective equipment will be provided to the workers.

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GROUND VIBRATIONS

REGIONAL AS PER APPROVED MINING PLAN (INCLUDING APPROVAL DATE TO BE GIVEN)	LOCAL (WITH IN 10 KILOMETRE FROM BOUNDARY OF MINE LEASE AREA AND ITS CLASSIFICATION FOR EXAMINATION)	PROPOSAL FOR THE NEXT FIVE YEARS (IF ANY)
Blasting will be carried out * With the help of short delay detonators controlled blasting. * Only 1 to 2 rows of holes will be blasted in each blast round. * Number of 3 to 4 holes will be kept minimum. * Blasting will be done during working hours only. * Maximum possible number of holes will be blasted in a single blast. * Blasting will be carried out in such a way that the direction of blast will be towards the mined out area. * Secondary blasting will be done in the mine.	Vibration monitoring is carried out by Geo Consultant, Bhubaneswar	Blasting will be carried out * With the help of short delay detonators controlled blasting. * Only 1 to 2 rows of holes will be blasted in each blast round. * Number of holes will be kept minimum. * Blasting will be done during working hours only. * Maximum possible number of holes will be blasted in a single blast. * Blasting will be carried out in such a way that the direction of blast will be towards the mined out area. * Secondary blasting will be done in the mine. * Hydraulic rock breaker will be used for boulder shattering. Ground vibration data will be recorded on yearly basis Strict traffic movement will be followed. The haul roads will be maintained.

TREATMENT OF WATER FROM BENEFICIATION PLANT

There is no beneficiation plant in the mining lease area.	There is no beneficiation plant in the mining lease area. not applicable	There is no beneficiation plant in the mining lease area. not applicable

RECIRCULATION OF TREATED WATER

This is not applicable	This is not applicable	This is not applicable

Details as mentioned above is well described in Environment Plan Point - VIII of this Scheme of Mining.

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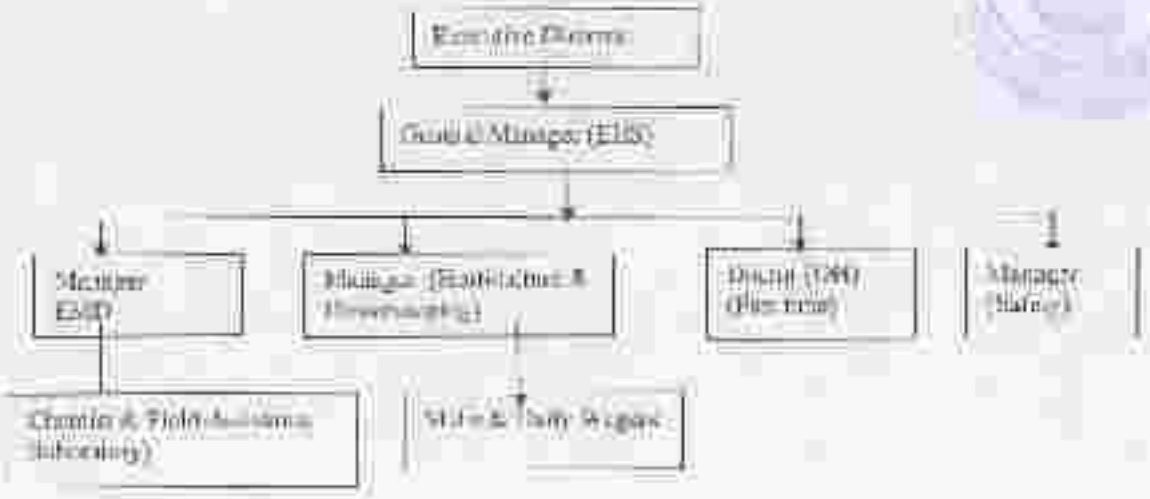
ENVIRONMENT MANAGEMENT PLAN

(As per FIA Report of Nandini Khundini Limestone Mine)

7.1 Environmental Management System

❖ Structure of Environment Management Department

The organizational structure of Environment Management Department (EMD), suitable for routine environmental monitoring of the project, implementing the recommendations of Environment Management Plan and complying with the conditions stipulated by SEIAA and MOEF is given below. EMD will be created by recruiting qualified and experienced staff.



❖ Function of EMD

The EMD shall thoroughly study each process and activities and suggest additional mitigation measures for improvement of environment performance, if necessary. EMD shall co-ordinate all related activities such as safety of plant, workers health, and health of surrounding community and prepare statistical records. EMD shall constitute Working Group by involving responsible citizens from the surrounding community and develop action plans to address any grievances of the public related to environmental performance of the project and develop targets for remediation of the grievances.

Other recommended functions of the EMD are given below.

- Develop and maintain Environment Management System in line with ISO 14000.
- Regular monitoring of ambient air quality around the mines and work environment monitoring inside the mines.
- Regular monitoring of water quality of the storage pits, ground water quality of surrounding villages and surface water quality of rivers, streams and canals.
- Regular noise monitoring of the mining zone and surrounding villages.
- Report any abnormalities found during monitoring results for immediate corrective measures.
- Green belt plantation, maintenance, development of other forms of vegetation inside the mines on priority and towards the human habitation and [illegible]
- Regular monitoring of overburden quantity.

In addition to above the EMD shall estimate the following performance indicators.

- Annual mass emission of all (fugitive dust).
- Annualized overburden generation.

All the above observations will be compiled and documented to serve the following purposes.

- Identification of any environmental problems that has occurring in the area.
- Initiating or providing solution to these problems through designated channels and verification of the implementation status.
- Controlling activities until the environmental problem has been corrected.
- Suitability responds to emergency situation.

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◊ Training Requirements

Training systems, covering the following items, shall be in place for all staff of EMD, which covers the following:

a) Awareness about the regulatory implications of the Environment Permits for the activity;

b) Awareness of all potential environmental effects from operation under normal and abnormal circumstances;

c) Awareness of the need to report deviation from the conditions mentioned in the permit;

d) Prevention of accidental emissions and action to be taken when accidental emissions occur.

The staff of the EMD shall be trained every year by arranging in house training programs by inviting experts or faculty members from reputed institutes. All staff of EMD shall understand the environmental laws and regulations. O&M of pollution control systems, pollution monitoring systems and new developments in the field of pollution control, instrumentation and analytical techniques.

7.2 Environment Management Plan

On the basis of environment impact assessment, Environment Management Plan is drawn to restrict and control the impact of mining on the environment, details of which are described below. The environment plan showing contours of the mining lease area, location of surrounding agriculture land, wasteland, greenery development, water bodies created and environmental monitoring locations is shown in Figure 7.1.

7.2.1 EMP for Air Pollution Control

Drilling, Blasting, Excavation, Loading and Transportation are the potential source of air pollution. To minimize the dust generation during drilling operation wet drilling technology

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shall be ensured. Water required for this activity shall be sourced from the site. Before drilling, dust masks shall be distributed among employees working there. Supervisor shall ensure the distribution of dust masks among drill workers.

To minimize the level of dust generated during blasting operation, latest blasting technology (NONEL) shall be used. An expert shall be appointed for supervising the blasting operation who will ensure the spacing of drill holes, use of explosive quantity, time, duration & interval of the blasting. Before blasting, siren shall be given to caution employees, visitors and neighbors about the blasting event. To prevent unauthorized entry, guards shall be posted at all access points leading to the blast area. Guards shall physically remain at their duty stations until an 'all-clear' signal is sounded.

To minimise the fugitive emissions, water shall be sprinkled over the blast area before blasting. A person shall be appointed to ensure water sprinkling during loading operation. Truck mounted water sprinklers shall be deployed for the work.

In order to reduce air pollution in the surroundings, greenery shall be developed on waste dump yard and along mine boundary. 30 m wide greenbelt shall be developed between the mine boundary and Nandini Khurdini village. 5 tier plantation shall be done. Since the soil strata near the mine boundary is poor top soil and manure shall be spread and herbs and shrubs planted here. Soil strata near the village are good and at this location medium height and tall trees shall be planted. The name of the herbs, shrubs and trees properly grow local the site are as follows.

Plantation shall be done on the overburden dump places, to make it more stable. Top soil (at least 10 cm) and manure needs to be spread over the overburden. The name of plants that could properly grow on the dump and type of manure that are useful is listed below.

Horticulture expert shall be appointed, who shall ensure the suitable floral species needed to be grown for green belt. Two gardeners and 10-12 workers shall be appointed to maintain the green belt area. A supervisor shall be appointed who will supervise the greenbelt and greenery.

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To control gaseous pollution from Heavy Earth Moving Machines proper maintenance shall be done. PUC testing of the HEMM shall be regularly done at the interval of three month for the exhaust emissions. Necessary overhauling/ servicing shall be done if the limits are found exceeding the standards.

7.2.3 EMP for Noise Pollution & Vibration Control

Noise levels from HEMM shall be controlled using silencers. Servicing of vehicles and machines shall be carried out at regular interval.

The noise levels generated during blasting is intermittent but the peak levels are high upto 145 dB(A). The Leq is about 100 dB(A) at about 50 m distance from the blasting site. Delay detonating techniques shall be followed to avoid excessive peak noise and to control blast waves. Workers near the blasting site shall wear ear plugs as a precautionary measure.

7.2.4 EMP for Water Pollution Control

Water for drilling machine, dust suppression, gardening, sanitation will be drawn from pit. Toilet wastes shall be treated in septic tanks. Similarly the water used in the workshop shall be sent to oil water separator. The oil shall be skimmed off daily and stored in drums. Used oil and spent lubricants from HEMM and other machinery shall be collected in drums and stored at earmarked place. When significant quantity of spent oil and lubricants are accumulated, then EVD head shall call CECB authorized re-processors for selling it.

Rain water from overburden area and other mine surface shall be collected in the mined out pit inside the mining lease area. Water analysis of the rain water accumulated in mine pits shall be done monthly.

7.2.5 EMP for Top Soil Conservation

The organic top soil (whatever available) shall be collected carefully and stacked along the periphery at eastern, southern and western sides of the mining area. The stacking shall be

used latterite and waste for plantation systems. The soil shall be analyzed for pH, moisture, organic carbon, nitrogen, phosphorus, calcium, magnesium etc. According to the quality of soil, organic manure shall be added to increase the fertility of soil.

7.2.6 EMP for Slope Stabilization and Mine Reclamation

Trenches/ garland drains shall be constructed at foot of dumps. To arrest silt coco fibers mat will be installed at regular intervals and replaced annually. The waste coco fiber mats shall be dumped with overburden. Silt removal from runoff collection pit shall be done regularly.

Proposed Year Wise Plantation (Stabilization of OB dumps)

Year	Area (Ha)	No. of Plants	Expenditure	Location
First Year	0.120	300	42000	Eastern Lease Boundary
Second Year	0.120	300	42000	Eastern Lease Boundary
Third Year	0.120	300	42000	Southern Lease Boundary
Fourth Year	0.120	300	42000	Southern Lease Boundary
Fifth Year	0.120	300	42000	Southern-Western Lease Boundary
Total	0.60	1500	210000	

Attempts will also be made to stabilize the reserved mines for development of agro-forestry cum recreational parks. Case studies on dump stabilization in the country have revealed that within 2-3 years the plants get chlorotic, stunted or copper colored and eventually did not survive beyond 3 years. In one reasonably successful operation, where a variety of trees grew normally for 5-6 years, two drawbacks were observed, the tall trees (4-5m) started lodging and soil between the tree roots blew away. Hence the emphasis will be made on planned landscaping of dump, plantation of grasses, herbs, shrubs and trees, taking adequate care for survival and monitoring stabilization effort to convert the area into recreational park.

Limestone overburden is deficient in plant nutrients like nitrogen and phosphorus and also contains some heavy metals. Amendments of overburden with nutrients will, therefore, be essential for covering it with plants. Some less expensive soil additives and commonly used

nutrients based organic manure will be used. The names are listed in Table below. The nutrient content of certain common organic manure is presented in Table. Mixing of farmyard manure in 1:4 proportion with overburden top portion upto 15 cm) will be suitable for growing variety of grasses. Growing grasses with a shedding habit will stabilize the ash surface effectively. Cultivation of herbaceous legumes in the ash dump will enrich the ash stratum with nitrogen. The stabilized ash will then form suitable ground for other planted duties. List of plants that will be considered for growing on dumps is also given. The plants listen are grasses, legumes and multi purpose trees forming an agro-forestry system.

The list of plants species has been considered from the angle of species combination, in conformity with local horticultural/forestry conditions. While for tree seedings, pits of suitable dimensions (60 x 60 x 60 cm or 90 x 90 x 90 cm) will be made and filled with mixture containing flyash, soil additives and organic manure. Watering regimes will depend upon the climatic conditions, though in initial stages regular watering – daily for grass and 2-3 times a week for trees will be considered. Possibilities for development of further amenities in the stabilized ash dump are numerous, including parks. Continuous monitoring of plant growth, immediate replacement of casualties, supplementation of nutrients, rescheduling of watering regimes will be given top priority.

Soil Additives and their Properties

Material	pH	Durability	C:N	Applicability to Soil per ha		
				While seeding	For erosion control	Established sites
Hay	5.5	1 season	25:1	2	3	4
Manure	6.8	12 months	25:1	15	30	45
Sawdust	5.0 to 7.0	5 years	200:1	1	5	10
Leaves (composted)	6.5	1 season	10:1	3	4	5
Municipal Refuse	7.5	1 season	45:1	20		

Nutrient Contents of Some Organic Manure

Manure Type	Nutrient contents %			Organic matter %
	N	P	K	
Farm yard manure	0.05	0.15	0.45	24
Poultry	0.24	0.10	0.15	5
Poultry manure	2.30	0.80	0.95	55
Sewage sludge	1.62	0.43	0.45	35
Mushroom compost	2.80	0.20	0.80	35

Domestic refuse	0.50	0.20	0.30	60
Straw	0.46	1.82	0.85	95

List of Grasses, Legumes and Trees for Plantation for Mine Reclamation as well as For Growing on Overburden Dumps

Grasses	Herbaceous Legumes	Trees	Trees (for Degraded habitat)
Bothriochloa intermedia Bothriochloa pertusa Brachiaria mutica Cenchrus setigerus Chloris gayana Chrysopogon fulvus Cynodon dactylon Echinochloa colona Eragrostis cynosuroides Heteropogon contortus Paspalidium geminatum Saccharum bengalense Saccharum ravennae Sporobolus arabes Sporobolus coromandelines	Cajanus cajan Crotalaria juncea Crotalaria burhia Desmodium triflorum Medicago sativa Phaseolus mungo Stylosanthes hamata	Acacia arabica Acacia auriculiformis Acacia catechu Acacia holosericea Acacia nilotica Acacia senegal Albizia amara Albizia lebbeck Erythrina variegata Gliricidia sepium Grewia tenax Hardwickia binata Leucaena leucocephala Pithecellobium dulce Ziziphus nummularia	Acacia concinna Acacia leucophloea Albizia procera Dalbergia paniculata Diospyros chloroxylon Gmelina arborea Holoptelea integrifolia Madhuca longifolia Pongamia pinnata Prosopis juliflora Tamarindus indica Terminalia arjuna Ziziphus mauritiana

7.2.7 EMP for Workers Health:

ACC shall arrange for periodical medical examination of the employees at every two years intervals. Awareness programs for workers on impact of mining on health and precautionary measures to be taken by them shall be arranged regularly. Following measures will be taken to ensure health & safety of employees.

- Information regarding health hazards expected to occur during mining shall be given by experts (i.e. Doctors, occupational health experts).
- Information regarding various safety equipments which can be used to minimize the health hazards shall be given.
- Action plan during any risk shall be discussed with the workers.

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- Diagrammatic sketches and slogans shall be used to describe health & safety measures, hazards etc.

7.2.8. Socio-Economic Development Plan.

In general, socio-economic environment will have positive impact due to the mining project in the area. The salient features of the possible likely scope are as follows:

- Mining in the area will create rural employment.
- Social welfare programme like provision of medical facilities, educational facilities, water supply, recreational amenities for the employees as well as for nearby villagers.
- Local people will be taken into confidence for all activities so as to redress their grievances, if any, and to meet their aspirations and thus to make them partner in developmental process.
- In the recruitment process of the organization, local people will be given preference on the basis of their qualification and experience and capacity to requirements of project.

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7.2.9 Greenbelt Development Plan

The plantation scheme broadly covers the following areas:

- Plantation around peripheral portions of mine surrounded by habitation or agriculture fields,
- Development of garland, parks and road plantation and
- Plantation by way of reclamation/rehabilitation of mined out blocks.

The plantation scheme is shown in Figure 7.1. It shall be ensured that no plantation shall be closed for grazing, lopping, quarrying etc. For this purpose fencing may be used if needed. Plants shall be protected till they attain a height which is greater than [illegible]. The plantation shall be 1 feet X 1 feet and spacing shall be around 2.5 X 2.5 m. While selecting the plants, care shall be given to plants which can with stand in the climatic conditions of the area and useful for the local bird life. The pits shall be then filled with top soil and manure in predetermined proportions. Farm yard manure, poultry manure, domestic refuse and straw can be used as organic manure. Saplings planted in the pits shall be watered liberally. The growing plants shall be cared for the first three years under favorable conditions of climate and drainage. Care shall be taken for nutrient supplement (healthy growth), plant protection and absence of water stress (to maintain openness of stomatal apertures and epidermal structures) and exposure to normal atmospheric condition (free air flow). For plantation along approach roads and roadsides, the choice of plants shall be for containment of pollution and for formation of a screen between traffic and other units. The choice of plants shall include shrubs of height 1 to 2 m and trees of 3 to 5 m heights. The intermixing of trees and shrubs shall be such that the foliage area density in vertical is almost uniform.

The list of plant species has been considered from the angle of suitable combination, in conformity with local horticulture/ forestry conditions. Watering regimes will depend upon the climatic conditions, though in initial stages regular watering daily for grass and 2-3 times a week for trees shall be considered. Continuous monitoring of plant growth, immediate replacement of casualties, supplementation of nutrients, readjusting of water regimes shall be given top priority.

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Greenbelt between mines and human habitation / agriculture fields: Greenbelt is a set of rows of trees planted in such a way that they form an effective barrier between the working zone and the surroundings. The main purpose of plantation development is to contribute to the following factors:

- To attenuate noise levels generated from the mine;
- To trap the air pollutants emissions and fugitive dust emissions;
- To maintain ecological homeostasis;
- To prevent soil erosion and to protect the natural vegetation.

Provision of 10 m – 30 m wide plantation (depending upon the area available and topography) between the mine and human habitation and fields has been considered in the environmental plan (Fig 7.1). Plantation of grass, flowers, bushes and trees shall be done.

Plantation Species: Plantation species considered as per following criteria:

- Adapted to the Sub-Climatic conditions of the area;
- Mix of round, spreading, oblong and conical canopies;
- Different heights ranging from 4m to 20m; and
- Preferably evergreen trees.

Plantation areas with good soil cover shall be initially started by direct seeding synchronous with the onset of rains. This involves preparation of local site with regard to water harvesting, soil and water conservation measures, strip cultivation and weeding. It also gives the initial advantage of time saving by eliminating nursery, transport and planting. It also has the advantage of improving the form of the tree and its rooting pattern. Otherwise, the plantation would have been generally done using saplings grown in the nurseries.

Design and selection of plants for greenbelt: The greenbelt would be designed in five tier system. In the first two inner rows facing the mine, flowering plants and herbs shall be planted in 5m width each respectively. Shrubs shall be planted in about 10m width. Trees shall be planted in the outer rows in 10m width, smaller trees in the first few rows followed by taller trees in the last few rows. Adequate space shall be kept between the trees and

Scientific Name	Family	Habit/ Height	Evergreen/ Deciduous	Flowering season	Crown Shape
Murraya paniculata	Rutaceae	Shrub, 5m	E	June-October	Round
Nerium indicum	Apocynaceae	Shrub, 8m	E	All months	Round
Phyllanthus acidus	Euphorbiaceae	Tree, 8 m	D	Feb – May	Oblong
Prosopis chilensis	Mimosoideae	Tree, 10 m	E	Jan-April	Spreading
Prosopis dimerata	Mimosoideae	Tree, 10 m	E	Dec-April	Spreading
Syzygium cumini	Myrtaceae	Tree, 20m	E	Mar-May	Oblong
Tabernaemontana	Caesalpiniaceae	Tree 20 m	E	Apr-Oct	Round
Thevetia peruviana	Loganiaceae	Tree, 8 m	E	All year	Round
Ziziphus mauritiana	Rhamnaceae	Tree, 10m	D	April-J	Round

7.3 Budget for Environmental Management

The capital cost for environmental management of the proposed project is estimated to be Rs 40 lacs. This amount is required for implementing pollution mitigation measures, procurement of pollution control devices such as monitoring devices, strengthening of environment department, occupation Health and safety department, environmental monitoring, green belt and greenery development etc. About Rs 50 lakhs shall be required as annual recurring capitals to meet the EMP.

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10.0 MISCELLANEOUS INFORMATION/ANY OTHER INFORMATION

10.1 Development and Conservation Problems, if any

No such problem neither was faced nor is expected to surface in next five years.

10.2 Scientific investigation carried out on:

(a) Mining Slope stability:

No. As the stratum is adequately strong and there will be no such problem regarding slope stability in Nandini Khandini mine after commencement of Operations.

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PART – III

11.0 PROGRESSIVE MINE CLOSURE PLAN

1. INTRODUCTION:

Jamul Cement Works of ACC Limited is one of the major Cement manufacturing unit in the region. The plant went into production in the year 1966. This plant is unique since inception when M/s ACC Ltd. started using Blast Furnace slag as source of raw material for Cement manufacturing through its R&D. The Blast furnace slag which was a waste for steel making process found its utilization as raw material in Cement manufacture and ACC is pioneer in propagating the usage of Slag cement thereby conserving mineral resource. With the organizational Commitment towards mineral Conservation, sustainable development of mineral resources & environmental protection, the mining activities by ACC in this area have played a vital role in uplifting the standards of living.

Location & extent of lease area:

Nandini Khundini Limestone Mine having lease area of 53.57 Ha is located at Village Nandini Khundini, Tehsil – Dhamda in the district of Durg of Chhattisgarh. The area falls within latitude 21°-22'-40" & longitude of 81° – 20' -00". Nandini Khundini is about 26 Kms. North East of Durg Railway station (situated on Nagpur Howrah Broad Gauge of South Eastern railway). Nandini Khundini is well connected to important cities & towns by a network of National & State Highways. The National Highway No. 6 from Mumbai to Howrah passes through this area and is only 28 Kms away from Mines.

Table showing area covered under Mining Lease (Govt. order no.)	Dist/ Tehsil/ State	Khasra No.	Lease area (Ha)	Ownership
F.1-9 / 4204 / 12, Raipur dated 09/02/2009. Copy of the letter is enclosed in annexure – 1.	DURG/DHA MDA/C.G.	Attached in annexure – 1.	53.57 Ha.	ACC Limited
Details of Lease deed, Khasra details and other Govt Orders provided in annexure – 1 and certified copy of revenue plan attached as Plate – II A)				

Type of lease area (Forest/Non forest): 53.57 Ha. **Non forest**
Land Details - Govt Land: 17.89 Ha, BSP Land: 35.68 Ha

- **The present land use pattern (area put to use at the start of scheme as on 31.03.2012)**
  - **Area already excavated** 11.48 Ha
  - **Overburden dump** 1.65 Ha

The method of mining: The mining operation has not yet started in Nandini (Khurdini) mine. After opening of mine, it will be carried out by Open Cast method of mining with deep hole drilling and blasting and excavation by shovel Upper combination and will be fully mechanised.

1.1 Reasons for closure:
At present the mine has not started. After opening and start of mining operations, it will be continue to operate till the entire mineral is exhausted. With the present reserve, & proposed rate of production i.e 1.03 MTPA, it is presumed that the mining will continue for next 45 years i.e till the year 2058. A PMCP was prepared and get approved for a period from 2008-09 to 2012-13. A new PMCP for the period from 2013-14 to 2017-18 is now prepared for the next five years.

1.2 Statutory obligations:
All the acts, Rules, Regulations & Bye laws as applicable under various Govt. agencies are being followed at mines No specific conditions were imposed while approving the Mine plan. The statutory obligations as stipulated in MOEF clearance letter awarded for 0.15 million tonnes per annum is furnished in **annexure – 7.**

1.3 Closure Plan preparation:
After start of mining, the mine working will continue for another 41 years and more, a progressive closure plan has been prepared for the period 2013-2018 to 2017-2018.

Name of Applicant: ACC Limited

Address of applicant:	
Corporate Office	**Works**
ACC Limited	ACC Limited
"CEMENT HOUSE", 121, M.K.Road, Mumbai 400020	P.O: J.C.Works, District-Durg (CG) , Pin -490024.

Name of Recognised qualified person who prepared the Progressive Mine Closure Plan

Mr. Sanjeev Tripathi, RQP	**Mr. S. K Sharma, RQP**
Chief Manager - Mines	Manager - Mines
P.O: J.C.Works,	P.O: J.C.Works
District- Durg (C.G) 490024	District- Durg (C.G) 490024
Reg. No. RQP/NGP/378/2008/A	Reg. No. RQP/NGP/230/2000/A
Valid upto 05.10.2018	Valid upto 30.04.2020
Mob No - 09752093583	Mob No - 09752093624

Compliance of Circular No 02 / 2010: We have applied Directorate of Mining and Geology, Govt of Chhattisgarh for obtaining Geo – referenced Cadastral Map of the Lease area which is required for EM Purpose. A reference letter of same is attached in **annexure – 1.** Photographs of boundary pillars are enclosed in **annexure – 21**

2. Mines Description

2.1 Geology

The area falls within Longitude E - 81°23'30" & Latitude N - 21°22'30" and is covered by Survey of India Toposheet number 64G/7 . The site is flat and general ground level is 292 m above Mean Sea level.

General Geology:

Nandini Kundini area is located within Chhattisgarh basin. Chhattisgarh basin present at the central part of the Indian peninsula over the Bhandara craton. Rocks present here are of Middle to Upper Proterozoic age. Lithounits present here comprises metasediments, metamorphic rocks. North and west of the basin are faulted contact with Raipur- Bilaspur metamorphic of Satpura belt and Kotri- Dongargarh Volcanics respectively. Gruntinds of Bastar craton and Eastern Ghat mobile belt present at the eastern side of the basin and Sonakhan Greenstone belt present at the south of the basin. Granitic terrain surrounds this basin known to host several kimberlite pipes.

This basin holds 2500mts thick sediments of orthoquartzite- carbonate-pelite suite, deposited in multiple sedimentary cycles, intercalated with minor felsic volcanic and pyroclastics and punctuated by unconformities (Ramakrishnan & Vaidyanadhan, 2010). The entire basin is divided into two sub-basins; Hirri sub-basin in the west and Baradwar sub-basin in the east. The western part of the Chattisgarh Basin (Hirri sub-basin) is dominated by stromatolitic limestones, mature sandstones and shales, and the succession is comparable with that of a stable shelf (Patranabis Deb & Chaudhuri, 2007). The eastern Chattisgarh succession, by contrast, is characterized by a thick sequence of immature to submature sandstones, conglomerates, shales, pyroclastics and limestones. The succession exhibits rapid lithofacies variations, and bears signatures of unstable basin conditions, and deposition in diverse paleo-environments (Patranabis Deb & Chaudhuri, 2007).

Chhattisgarh Supergroup is subdivided into 3 sub-groups, Raipur group, Chandrapur group and Singhora group.

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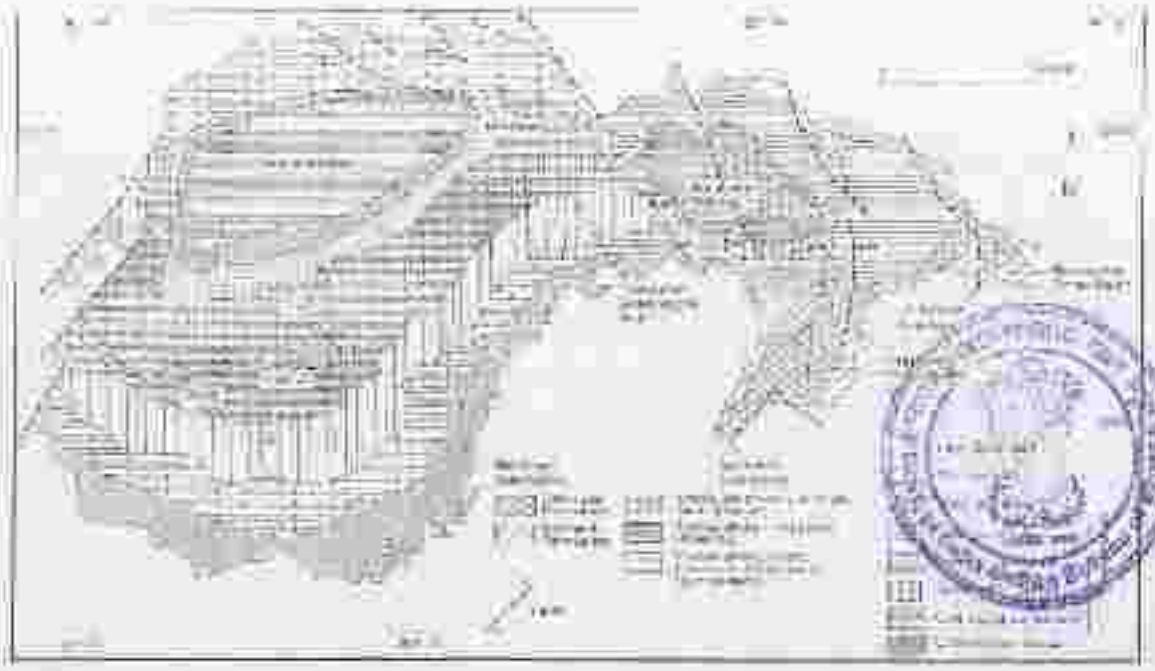

Local Geology:

Lithounits present in the area were limestone, shale and dolomite. Geologically the area comes under Chandi limestone, Raipur group. Chandi limestone formation mainly comprises of stromatolitic limestone, dolomite, siliceous sandstone and shale. Association of limestone-sandstone & shale and undisturbed sequence indicate stable shelf condition. Within the lease area, average thickness of the overburden is 3 meters. Variation on the thickness of this overburden does not have a pattern. Regionally thickness of this overburden loosens more northward. Towards north, at the bank of Sonpath River limestone was exposed at the surface. The rock units present in Nandini area were tectonically undisturbed. Beds are nearly horizontal, dipping about 2 degree towards north. Topography of the area is more or less flat. Minimum and maximum RL of the area was 379mts & 385mts. A local litho-stratigraphic succession within the lease area is as follows.

Overburden	(3 meters)
Limestone Upper	(15 meters)
Mg shaly limestone	(5 meters)
Limestone lower	(15 meters)
Dolomite	(approx 5 meters)

An account of the lithounits present and their typical quality is described below.

Overburden:

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The overburden is dark brown in colour some portions having very few lateritic granules. The average thickness encountered in the boreholes is around 3 mts and the quality is given below:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
0.08	0.00	36.96	12.83	25.37	15.59

Limestone Upper

Limestone upper unit is present below the overburden. This rock is chocolate brown colored, very fine grained, compact and massive. They are stromatolite rich. Small shale patches were present at the surface outcrop of the limestone. Typical average quality of the lithology is as follows:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
47.27	2.18	10.49	2.67	1.56	37.31

Mg Shaly Limestone

It is a fine grained, chocolate brown colored rock and shaly in nature. The rock is less hard because of higher shale content. Band of Mg shaly limestone is relatively thin and present in between the two limestone bands. Patches of Magnesite is also observed within the limestone bands. Contact between Mg shaly limestones with other litho units is very gradational. Typical average quality of the lithology is as follows:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
39.69	5.31	12.53	3.39	1.79	36.21

Limestone Lower

This limestone unit is present below the horizon of MgShale. This is a chocolate brown colored, fine grained, massive and compact stromatolitic limestone. Small shale patches are present within the limestone horizon. Typical average quality of the lithology is as follows:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
46.69	2.38	7.54	1.95	1.03	39.15

Dolomite

Dolomite is present below the horizon of limestone. It is a chocolate brown colored, medium grained rock. Patches of Stromatolites are present in the lithounit. Litho contact between dolomite and limestone or Mg shaly limestone is very gradual. Typical average quality of the lithology is as follows:

CaO%	MgO%	SiO_2%	Al_2O_3%	Fe_2O_3%	LOI%
33.14	11.13	9.81	2.08	1.46	39.23

2.2 Reserves: Quantity Assessment of Resources:

Nandini Khondini Limestone deposit was granted to ACC Limited in the year 2008. In 1960 Bhilai Steel Plant has done some boreholes out of which 06 holes were proved in lease area and 02 along periphery of ease area awarded to ACC Limited. Since then reserves and resources were estimated, under old system of categorization i.e proved, probable and indicated.

As per the UNFC guidelines Nandini Khondini Limestone mines can be categorized as Stratiform, Strata bound and Tabular Deposit of regular habit. After the introduction of UNFC (United Nations Framework for classification of reserves and resources) system and compliance to IBM circular no 03 of 2010, exploration work was done. All drilling data comprising present investigation and those obtained during previous investigations were utilized and Resources are again classified under new classification.

Initially, Resources at Nandini Khondini Limestone Mine is classified under **331 – Measured Mineral Resources**

331 – Measured Mineral Resources: The entire lease area was explored thoroughly by core drilling with smaller grid. The total resources in the lease area work out to be 55.26 million tonnes. Detailed break of resources are given below. Feasibility and economic viability is required to be studied for conversion of these resources into reserves. It covers area of approx 53.57 Ha. Deepest bore hole has reached upto 72.5 m. Average CaO grade ranges from 4.08 % in OB to 46.69% in limestone. MgO grade is < 3% in Limestone.

Category	Lithology	Resources (Mn.t)
Measured Mineral Resources (UNFC Code: 331)	Overburden	3.9
	Limestone upper	19.42
	Mg Shaly Limestone	11.08
	Limestone Lower	20.76
	Total	55.26

A Feasibility study is now applied on the above mentioned resources for assessment of economic and feasible viability of resources and also to convert them to Reserves i.e Proved mineral reserve (111).

Application of Feasibility study and categorization of reserves and resources as per UNFC Guidelines:

Measured (331) mineral resources categories have been considered for feasibility assessment. Above resources will be reducing by non-mineable parts due to statutory obligation and tonnage having grade below cut off grade. Statutorily, some part of area cannot be mined as NE part of lease has to be diverted for plantation purpose. 50 Mtr safety barriers from public road, 7.5 mtr safety barriers from boundary of lease area, 7.5 m left over for development of green belt and ultimate pit slope of 45° for slope stability of pits etc.

In Nandini Khundini Deposit, some quantity of Limestone reserves will be blocked due to 7.5 m safety barrier and green belt along mining lease boundary, 30 m left out for creation of green belt in NE part of lease area and some material will be blocked due to maintenance of ultimate pit slope of 45 to 60 deg all along the mineral blocks.

Conversion of Measured mineral resources (331) to Proved mineral reserves (111) demonstrated through feasibility study:

Category	Lithology	Resources (Mt)
Measured Mineral Resources (UNFC Code: 331)	Overburden	2.52
	Limestone Upper	18.13
	Mg Shaly limestone	13.04
	Limestone Lower	22.23
	TOTAL	53.39

Non mineable part of Measured Mineral Resources (Blocked due to statutory obligation): These are approx losses are estimated due to 7.5 m safety barrier and green belt along lease boundary, 30 m width area left for development of green belt in NE along lease boundary and limestone blocked due to ultimate pit limit at 45 - 60 deg.

Category	Lithology	Resources (Mt)
Feasibility Mineral Resources (UNFC Code: 111)	Limestone Upper	2.88
	Mg Shaly limestone	1.78
	Limestone Lower	5.89
	TOTAL	9.95

The detailed breakup of the reserves spread sheet for various lithologies is given in annexure – 6.

Proved Mineral Reserves (111): Proved mineral reserves are obtained after subtracting feasibility mineral resource from measured mineral resource. Mg Shaly Limestone is also considered under proved category due

to presence of an average CaO % of 38.04%. Break up as per different litho units is tabulated below:

Category	Lithology	Reserve(Mt)
Proved Mineral Reserves (UNFC Code-111)	Limestone Upper	17.56
	Mg Shale/Limestone	0.51
	Limestone Lower	13.0
	TOTAL	31.07

Method of Estimation of Reserves (*Geological Cross-Sectional area Method*)

Reserve estimation is done by geological cross sectional area method. For estimation of resources using cross-sectional area method cross sections were drawn first using borehole logs. Topography of the deposits was located as per detailed topographical survey. Cross sectional area of different lithounits are calculated from all the sections. Between two consecutive sections average cross sectional area is calculated for different lithounits. The average intersectional area was then multiplied by the distance between two sections to arrive at the volume between the two sections. The volume so determined then converted into weight (in tones) by applying 'volume to weight' ratio commonly referred to as 'tonnage conversion factor' (TCF).

TCF for different litho-units were determined from the borehole core by weighing samples and the total volume of NX core was computed using the core length and radius of core samples. TCF thus calculated for different lithologies are tabulated below:

Overburden	1.8
LST_U	2.5
LST_L	2.5

Mining Benches

Following mining benches are proposed are being maintained.

Bench	Level (in metres) Above RMD	Remarks Lithology
I	260 - 277	OB Bench
II	277 - 270	Benches developed in limestone horizon which includes Limestone Upper, Patches of Mg Shaly Limestone and Limestone Lower
III	270 - 263	
IV	263 - 256	

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ESTIMATED RESERVES AND RESOURCES

Classification	Code	Quantity (Mln T)	Grade
(1)	(2)	(3)	(4)
Total Mineral Resources(A+B)			Grade of Mineral is good & it is entirely blendable with Mineral of our other captive Mine (Jamul & Pathariya L/s Mine) and suitable for cement manufacturing
A) Mineral Reserve			
(1) Proved Mineral Reserve	111	43.74	
B) Remaining Resources			
(1) Feasibility Mineral Resource	211	8.95*	
(2) Measured Mineral Resource	331	NIL	
(3) Indicated Mineral Resource	332	NIL	
(4) Inferred Mineral Resource	333	NIL	
(5) Reconnaissance Mineral Resource	334	Nil	
* *Non mineable due to Statutory obligations. Not economical and feasible due to current mineral market scenario & mining technology presently in use.*			

Category wise updated Proved Reserves (111) with weighted average Grade of each radical (as on 31.03.2012):

Lime Unit	UNFC – 111 in Mln Tns	RQM Quality SiO_2 %	Al_2O_3 %	Fe_2O_3 %	CaO %	MgO %	LOI %
Limestone Upper	17.39	5.35-14.81	1.37-3.08	0.71-3.59	39.03-50.24	1.6-4.05	34.77-44.31
Mg Shaly Limestone	9.59	7.8-40.97	1.45-5.53	0.78-4.19	21.58-43.05	2.2-12.7	21.35-41.37
Limestone Lower	17.0%	4.43 15.74	1.07 4.23	0.53 2.37	40.32 50.44	1.54 4.23	33.87 41.18
Total	**43.74**	**9.50**	**2.02**	**1.40**	**43.99**	**2.93**	**38.89**

2.3 Mining Method:

This has already being discussed in chapter no. 5.0 of Scheme of Mining.

Extent of Mechanization:

The mine will be fully mechanized & HEMM along with other machineries are used for drilling, loading, transportation etc. other miscellaneous activities. List of proposed HEMM is described in chapter no 05 of Scheme of Mining.

2.4 Mineral Beneficiation:
Details of mineral beneficiation is described in chapter 8.0 of this Scheme of Mining.

3.0 Review of implementation of mining plan/scheme of mining including five years progressive closure plan upto the final closure of mine:
Mining Plan along with Progressive Mine Closure Plan Was approved for the period of five years i.e from 2008 to 2013. The review of the implementation of Mining Plan is already been discussed in detail in Scheme of Mining, Part – I. The review of closure plan till the final closure of the mine is not applicable.

4.0 Progressive Closure plan:
The Progressive Mines Closure plan with Mining Plan was prepared and got approved for the period from 2008 to 2013. A new PMCP is now prepared for scheme period i.e from 2013-14 to 2017-18 with proposals of increase in production.

4.1 Mined out land:
At present, mining operations are not yet started in Nandini Khundini Limestone mine. After commencement of operations, the limestone will be won up to bottom most layer, then only the mine workings will advance further. As soon as the workings are matured for reclamation / rehabilitation, the shallow excavated areas will be filled up to the extent possible and the remaining portion of excavated area, after completing part reclamation, will be converted into water reservoir. Along the periphery of reservoir tree plantation will be done. This would help in recharging the general ground water in the region. Such stored water can be utilized for agriculture, pisciculture and development of picnic spot. All available land as well as dumps yards will be used for plantation of trees.

Proposal for Post mining use of land (at the time of final closure):

Post Mining rehabilitation land use pattern of ML area (ha)							
Sr. No.	Description	Total Area	Land Use (Ha)				
			Plantation	Water body	Public Use	Construction	Total
1	excavation (parallel)	33.97	33.97	0	0	0	33.97
2	Water Reservoir	14.8		14.8	0	0	14.8
3	External Dump or back fill on North side of Lease	1.79	1.79	0	0	0	1.79
4	Green Belt all along lease boundary	3.01	3.01	0	0	0	3.01
	Total	53.57	38.78	14.8	0	0	53.57

Impact of enhanced production on land use pattern during 5 year scheme period:

Sl No.	Head	Impact of enhanced production	
		Land Use as on date	Land use status as proposed after 5 year scheme period
1	Area to be excavated :	11.48	17.44
2	Storage for top so	0.00	0.00
3	Overburden dump	1.65	2.67
3(i)	Back fill	2.00	0.75
4	Mineral storage	0.00	0.00
5	Infrastructure (Mine office)	0.05	0.08
6	Roads	0.03	0.18
7	Railways	0.03	0.03
8	Green Belt	0.00	0.00
9	Tailing Pond	0.00	0.00
10	Effluent treatment Plant	0.00	0.00
11	Mineral separation Plant	0.00	0.00
12	Township area	0.00	0.00
13	Other to specify(pond, Nala etc)	0.00	0.00
	Total	13.13	20.51

Detailed Proposal for Reclamation and rehabilitation of Mined out pit for future use:

The mining lease area of Nandini Khundini limestone mine is 53.57 Ha. At the time of final closure of mines, approx area of worked out pit will be around 48.77 Ha which the mineralised area is. The reclamation and rehabilitation will be done in a phased manner between 2013 to 2058. Part of the worked out pit will be converted into water reservoir and part will be back filled by OB generated due to extraction activity. Accordingly plantation will be done on this back filled area. Rehabilitation of all external OB dumps will be done by spreading a layer of top soil and then by carrying out plantation. The details of proposals made for reclamation and rehabilitation of mined out land for the period beyond 2013 to 2058 is shown in Conceptual Plan & Sections (**Plate – VII**).

For extraction activity, the proven area will be 48.77 Ha. Out of which, 33.97 Ha area will be backfilled/ reclaimed by waste material generated from mining activity and 14.8 Ha will be converted as water reservoir to improve the water table in the area. The detailed working details as proposed upto life of the mine is shown in Conceptual plan & Sections. (**Plate – VII**)

4.2 Water quality Management:

At present stage, Mining has not yet started in Nandini Khandini Mines. Detailed proposals for Water Quality Management were made during Environment Impact Assessment study of Mine done in 2010. Base line data was collected, impacts were anticipated and mitigation measures were framed during studies done for Nandini Khandini Mine. Details of same are attached as **annexure – 11.**

4.3 Air quality Management:

At present stage, Mining has not yet started in Nandini Khandini Mines. Detailed proposals for Air Quality Management were made during Environment Impact Assessment study of Mine done in 2010. Base line data was collected, impacts were anticipated and mitigation measures were framed during studies done for Nandini Khandini Mine. Details of same are attached as **annexure – 10.**

4.4 Waste Management System:

The management/disposal practice of OB material generated due to mining activity will be same as mentioned in chapter no 06 of this scheme of mining. A part of OB material as generated will be backfilled in the worked out pit and a part will be dumped for development of plantable area in north side of lease. A layer of top soil will be sprayed for doing plantation. Accordingly plantation will also be done on each tiffoc area. It is also proposed to develop a green belt all along lease boundary. Dense plantation will be done to develop this green belt so as to avoid any siltation or soil erosion from stabilised dump yards. The type and quantity as proposed in the scheme of mining is as under:

Year	OB in Tonnes
2013-2014	27010
2014-2015	72220
2015-2016	64756
2016-2017	71601
2017-2018	74055

Proposal for Protective measure to be taken:

During the designing stage of dumps, apart from compaction a parapet wall of mixed material and drain of suitable depth will be made all along the dump periphery and also all along lease boundary, in order to avoid any siltation and soil erosion. This wall will arrest all the loose material coming out of dumps and excess water will be drained out properly. Plantation will be done on this thick parapet wall for stabilization. As the dump reaches its maturity, top soil will be layered and plantation will be done accordingly. This will prevent soil erosion from the dumps. Before start of waste handling and dumping operation, water sprinkling will be done on all dump roads for dust suppression.

4.5 Top Soil Management.
This section is described in Chapter 5.0,, page no 33.

4.6 Tailings Dump Management:
No management of Tailings dump is required as there is no generation of any tailings for the mines nor any mineral beneficiation process is applied in mines.

4.7 Infrastructure:
At present there is no infrastructure available in the mine area. After the start of mining operations, all necessary building will be constructed.

4.8 Disposal of Mining Machinery:
The lessee will operate the equipments till they are economically & technologically viable. Once the equipments become economically unviable they are phased out and depending on the condition the equipments will be disposed.

4.9 Safety and Security:
During the abandonment of the mine, the entrances to the mine will be securely fenced and the entire dangerous inlet will be barricaded. Adequate warning signals and signboards will also be displayed at strategic points. Persons will also be deployed to take the stock of security.

4.10 Disaster Management and Risk Management:
To save the mine from any flood or inundation, A Nallah of adequate size is available in south side of lease area which encircles the quarry. The benches which would be left in the later stage of mining will have a proper angle of repose and would be planted with different species of trees. This would help in avoiding the slope failure. Since the deposit is of limestone which a hard strata, the chances of any slope failure would be minimal. However to meet any disaster, mobile vehicles and arrangement for the first aid will always be available at the mine site all the time. An effective communication system like wireless, mobile phones, land line phones, e-mail etc. facilities will also be available at the mine site at all the time. The Company has sufficient resources to meet disaster. In addition (if required) it can be sought from M/s Bhilai Steel Plant or Durg district authority which is situated quite near. Detailed working of Risk matrix is provided in **annexure – 13**.

4.11 Care and Maintenance during temporary discontinuance.
In the event of temporary discontinuance due to any unforeseen circumstances the following care will be taken:
1) All the approaches to the mine will be maintained in good working condition.

2) Any dangerous opening will be securely fenced and no one will be allowed to go towards the same.
3) Round the clock persons will be deployed to guard the area.

Daily inspection of the discontinued area by the Mine official will be carried out.

5.0 Economic Repercussions of closure of mine and manpower retrenchments:

At present the mine is not yet started operations. No manpower retrenchment will be done at the time of closure of mine. The Cement Plant will be operative. With the proposed reserves & proposed rate of production, it is presumed that the mining will continue till the year 2058. Hence at present **progressive mine closure** plan has been prepared. As the mine is not under operation, local residents are not employed. Manpower retrenchment, compensation to be paid, socio economic repercussions and remedial measures to be taken at the time of closure of mines will be planned accordingly.

6.0 Time scheduling for abandonment:

Nandini Khuridih Limestone Mine will be a captive limestone mine and its production depends upon the requirement of the cement plant and market demand. Though the anticipated life of mine is 45 years using consideration 1.03 million tonnes per annum production which is proposed in this scheme of mining. There can be variation in the life of mine, if there is slack area in market. Reserves are already established upto 210 RL. So at present it is very difficult to specify the time scheduling for abandonment of mines. But as desired, Time scheduling for abandonment of Nandini Khuridih Limestone Mine is enclosed as **annexure – 15.**

Reclamation and Rehabilitation activities for abandonment of mines: (Details shown in Environment Management Plan, Plate – X)

a) **Back Filling and Afforestation of Backfilled areas:** At the time of final closure of mines, approx area of worked out pit will be around 18.77 Ha. The reclamation and rehabilitation will be done in a phased manner between 2013 to 2058. Part of the worked out pit will be converted into water reservoir and part will be back filled by OB generated due to extraction activity. Accordingly plantation will be done on this back filled area.

b) **Converting worked out pit in to water reservoir.** At the time of final closure an area of about 14.8 Ha is planned to be converted into Water reservoir.

c) **Afforestation on Dumps:** This will be a continuous activity and will be done regularly between 2013 to 2058.

c) **Afforestation (Green Belt)**: It is proposed to develop a good green belt along the lease boundary. Around 7.5 m width of land is proposed in this scheme of mining for development of green belt. This will continue upto life of mine.

e) **Protection of water bodies**: This will be done by fencing of water reservoir. This is planned from 2050 to 2058.

f) **Construction of garland drains**: Garland drains are already present on south side of the lease. Only maintenance of these drains will be done in a phased manner upto 2058.

7.0 Abandonment cost:

Nandini Khundini limestone mine is a captive limestone mine and its production depends upon the requirement of the cement plant and market demand. Though the anticipated life of mine is 41 years taking consideration 1.03 million tonnes per annum production as proposed in this scheme of mining. There can be increase in the life of mine, if there is slackness in market. . Reserves are already established upto 210 RL. At present it is very difficult to specify the time scheduling for abandonment of mines and abandonment cost. But as desired, Abandonment cost of Nandini Khundini Limestone Mine is enclosed as **annexure – 16.**

8.0 Financial assurance:

The details of area under use, reclaimed and rehabilitated and proposed to be used as on 31.3.2018 is given in tabular form as **annexure – 17.**
The Area calculated for financial assurance = 20.51 Ha
Amount for financial assurance to be paid as bank guarantee = Rs 512750/-

Once the area calculation is vetted by IBM Nagpur, Financial assurance shall be submitted within three months.

9.0 Certificate

Enclosed before PART I of this scheme of mining.

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10.0 Plan and sections

Plan showing area under use and broken, proposed to be used/broken in scheme period, already reclaimed/rehabilitated for calculating financial assurance is attached as **Plate – IX.**

Prepared by Recognized Qualified Person or a person employed under clause (b) of sub-rule (1) of rule 42 of MCDR, 1988

Sanjeev Tripathi
Chief Manager – Mines
ACC Limited, Jamul Cement Works
PO: J. C. Works, Bhilai, Dist – Durg
Pin-490 024 (C.G)
RQP Reg. No: RQP/NGP/328/2008/A
Valid upto 05.10.2026
Mob No: 09752093583
Email: sanjeev.tripathi@acclimited.com

S.K.Sharma
Manager – Mining
ACC Limited, Jamul Cement Works
PO: J. C. Works, Bhilai, Dist – Durg
Pin-490 024 (C.G)
RQP Reg. No: RQP/NGP/230/2000/A
Valid upto 19.04.2020
Mob No: 09752599824
Email: sanjaykumar.sharma@acclimited.com

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Calculation for Financial Assurance

Name of the Mine :Mandla Khaliari Limestone Mine
Date of Submission Of Progressive Mine Closure Plan : 05.06.2003
Name of Lease : Nandini Khaliari Mining Lease
Mining Lease Area (Ha) :-53.57 Ha
Lease Period - 20 years
Mining Plan Period : 2004-2023
Date of expiry of Mining Plan : 31.03.2013
Scheme of Mining Period : 2013-14 to 2017-2018
Date of expiry of Mining Plan /Scheme of Mining : 31.03.2018

a)Area put to use for mining and allied activities :

Sr. No.	Item	Area in Ha.				
		Area to be put to use as per approved Mining Plan	Additional area to be put to use during the Term of the Plan	Total Area (col. 3+4)	Area (Balance area as on 31.03.2013 as per col. 3 less actual area put to use as on date)	Net area (Net area to be taken for Calculation)
1	2	3	4	5	6	7
1	Area to be excavated	11.98	1.86	13.84	6.66	13.84
2	Storage for top soil	5.00	0.00	5.00	5.00	5.00
3	Overburden dump	1.25	0.82	2.07	0.82	2.07
3(i)	Back Fill	0.00	0.34	0.34	0.00	0.34
4	Mineral storage	0.00	0.00	0.00	0.00	0.00
5	Infrastructure (Mine office)	0.00	0.00	0.00	0.00	0.00
6	Roads	0.59	0.19	0.78	0.00	0.78
7	Railways	0.00	0.00	0.00	0.00	0.00
8	Green belt	0.00	0.00	0.00	0.00	0.00
9	Tailing Pond	0.00	0.00	0.00	0.00	0.00
10	Effluent Treatment Plant	0.00	0.00	0.00	0.00	0.00
11	Mineral separation Plant	0.00	0.00	0.00	0.00	0.00
12	Township area	0.00	0.00	0.00	0.00	0.00
13	Other to specify (Pond,Nala etc)	0.00	0.00	0.00	0.00	0.00
	Total	18.83	7.36	26.91	6.60	20.91

Financial assurance to be paid for the area that shall be under use at the end of the Period
Area put to use :-20.91 Ha
Financial assurance = 20.91 x 25000 = 522750
Financial assurance =Rs.522750 (In words :Rupees Five Lakhs Twelve Thousand Seven Hundred Fifty only)

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खान नियंत्रक (मध्यक्षेत्र)
Controller of Mines (Central Zone)
भारतीय खान ब्यूरो
Indian Bureau of Mines

LIST OF ANNEXURES

Annexure No.1	Copy of Lease Deed in Form K, State Government Consent Letter to grant the Mining Lease on the said area, Khasra Details of land area wise and other related documents of Nandini Khandini Limestone Mine
Annexure No.2	Details of applicant, list of lease held by ACC Limited and attested copy of registration under Company Act
Annexure No.3	Typical borehole Logs done by BSP and ACC, (Result of present and previous investigation) and UNFC guidelines for Limestone deposit
Annexure No.4	Form J submitted for exploration done in Nandini Khandini Limestone Mines in 2011
Annexure No.5	NOC obtained from BSP in 1993 along with documents related to diversion of BSP Land to ACC Limited
Annexure No.6	Reserves calculation as per UNFC guidelines along with Feasibility Report of Nandini Khandini Limestone Mines
Annexure No.7	Letter of Environment Clearance from MOEF and other related documents
Annexure No.8	Proposed Five Year (2013 – 2018) Production Plan
Annexure No.9	Proposed Five Year (2013 – 2018) Development Plan
Annexure No.10	Ambient Air Quality details of Nandini Khandini Mine
Annexure No.11	Water Quality (SW & GW) details of Nandini Khandini Mine
Annexure No.12	Ambient Noise Quality details of Nandini Khandini Mine
Annexure No.13	Risk Assessment and Management Plan of Nandini Khandini Mine
Annexure No.14	Adequacy of Proposed HEMM at Nandini Khandini Mine
Annexure No.15	Time Scheduling for Abandonment – Year wise
Annexure No.16	Abandonment Cost Calculation – Year wise
Annexure No.17	Financial Assurance Calculations of Nandini Khandini Mine
Annexure No.18	Cash Flow Forecast, Sensitivity analysis and UNFC economic analysis of Nandini Khandini Mine
Annexure No.19	Executive Summary of EIA Report of Nandini Khandini Mine
Annexure No. 20	Chemical Analysis Report of Limestone samples
Annexure No. 21	Photographs of Nandini Khandini Limestone Mines including Exploration Activity and Boundary Pillars

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ANNEXURE I

Copy of Mining Lease Deed, Khasra No of land (area-wise) and other related State Government orders of Mining Lease of Nandini Khundini Limestone Mine

SUB REGISTRAR OFFICE
GHAZIABAD
NON JUDICIAL

SPECIAL ADHESIVE

INDIA

FORM B

Model Form of Memorandum

(See rule 21)

When the lessee is only individual

THIS AGREEMENT made this ... day of ... 20... between the President of India (hereinafter referred to as the "said Government" which expression shall where the context so admits or implies include his successors in office and assigns) of the one part and Shri ... (Name of the lessee) son of Shri ... (Father's name) aged about ... years, Occupation ... resident of ... (hereinafter referred to as "the lessee" which expression shall where the context so admits or implies include his heirs, executors, administrators and assigns) of the other part.

When the lessee are more than one individuals

... (Name of parties with address and occupation) and ... (Name of parties who are minors) (hereinafter referred to as "the lessee" which expression shall where the context so admits or implies include their respective heirs, executors, administrators and assigns) of the second part.

When the lessee is a registered firm

... (Name and address of partners) carrying on business as partners under the name and style of ... (Name of the firm) (hereinafter referred to as "the lessee" which expression shall where the context so admits or implies include the partners for the time being of the said firm, their heirs, executors and administrators) of the other part.

When the lessee is a registered company

... (Name of company) a company registered under the Companies Act, 1956 and having its registered office at ... (hereinafter referred to as "the lessee" which expression shall where the context so admits or implies include its successors and assigns) of the other part.

WHEREAS the said Government has agreed to grant to the lessee a lease of the land hereinafter mentioned for the purpose hereinafter appearing at the rent hereinafter reserved and subject to the covenants hereinafter contained.

Sheet - 2

(S.C. TIWARI)
Director Right
ADC Limited
P.O. Jamia Central Works
New Delhi-110 025

Vetting Officer
(For Collector, Urban)

PART I

SUB REGISTRAR OFFICE
DHANDA
NON JUDICIAL

SPECIAL ADHESIVE

INDIA

L.TIWARI.

...further interest in the said lands."

PART II

...Liaison Officers are willing to be considered and engaged by the Corporations subject to the provisions and conditions in Part III.

To enter upon, hold and occupy for, use, work etc.

...

To pay, grant and make all...

...

To enter into and carry...

...

To make roads and bridges etc. and other buildings (roads and work)...

...

To erect machinery and plant etc.

...

To use all existing powers etc.

...

SUB REGISTRAR OFFICE
OKHAMDA
NON JUDICIAL
SPECIAL ADHESIVE
INDIA

J.L. TIWARI
Deputy Port
KASO Limited
Kawas Complex
Hazira

[illegible]

To use land for planting, keeping, depositing produce:-

[illegible]

Development and developing parts of private land:-

[illegible]

To make use of a right of way:-

[illegible]

To obtain assistance and to hold and utilise grants, etc.:-

[illegible]

PART III

Restrictions and Conditions as to the exercise of the Use Rights, Powers and Privileges in Part-II

We declare as follows:-

1. [illegible]

[illegible]

(Contd...)

[illegible]
(C. TIWARI)
Director (Plan)
AAI Limited
Rajiv Gandhi Bhawan
Safdarjung Airport
New Delhi-110003

[illegible]
For Collector, Delhi (UT)

Application for authorisation of a ferry across a navigable river

1. Every party to whom notice of any [illegible] has been given under rule [illegible] and who desires to object to the application shall, within [illegible] days after the publication of the notice in the Official Gazette, send to the Collector a statement in writing of the nature of his objection and the grounds thereof.

2. On the receipt of any such statement, the Collector shall forward a copy thereof to the applicant and shall call upon him to state within [illegible] days after the receipt thereof whether he withdraws his application or desires that it should be proceeded with.

3. If the applicant withdraws his application, no further proceedings shall be taken thereon, but he shall be liable to pay the costs incurred up to the date of withdrawal.

4. If the applicant desires that the application should be proceeded with, the Collector shall, after making such inquiry as he thinks fit, decide whether the objection should be allowed in whole or in part or disallowed.

5. The Collector shall not allow any objection to be raised to the application after the date fixed under rule [illegible] except on the ground that the applicant has, in his notice, omitted to state some material fact, or except on the ground that some material fact has arisen after the date so fixed.

6. Subject to the provisions of rule [illegible], the Collector shall, in deciding whether any objection should be allowed in whole or in part or disallowed, have regard to the following considerations, namely:—

(a) the existence of any public ferry, road or railway crossing, or of any private ferry, within such distance from the proposed ferry as is likely to cause undue interference therewith;

(b) the number of persons likely to use the proposed ferry;

(c) the means available or likely to be available for crossing the river otherwise than by the proposed ferry;

(d) the safety of the public using the proposed ferry, having regard to the nature of the approaches, the stream of the river, the position of the landing places and the means available or likely to be available for rescuing persons in danger;

(e) the convenience of persons residing in the neighbourhood of the proposed ferry;

(f) the interests of the applicant.

7. The Collector may, in deciding any objection, direct that the applicant shall pay the whole or any part of the costs incurred by him in connection with the proceedings, and may fix the amount to be paid.

8. Subject to the provisions of rule [illegible], the Collector may, after hearing the objections, if any, and after making such inquiry as he thinks fit, grant or refuse the application.

9. The Collector shall not grant any application in a manner inconsistent with the provisions of any rule made under section [illegible] of the Railways Administration Act, 1890, or of any condition imposed by the Railway Administration in connection with any railway under section [illegible] of that Act.

10. The Collector may, in granting any application, impose such conditions as he thinks fit for the protection of any railway or railway property, or for the safety of persons using the ferry, and may, for breach of any such condition, withdraw the permission granted.

For working operations within 50 metres of public works etc.

11. The [illegible] shall not work or carry on or allow to be worked or carried on any [illegible] operations within a distance of 50 metres from any railway or canal, or from any [illegible] without the written permission of the Railway Administration concerned or of such officer as it may appoint in this behalf, and such permission may be granted subject to such conditions as the Railway Administration or officer may think fit to impose for the protection of the railway or canal or of the persons employed thereon, and may be withdrawn by the Railway Administration or officer at any time after giving notice in writing of not less than [illegible] days of its intention to withdraw the same.

12. The Collector may, on the application of any person desiring to work or carry on any [illegible] operations within the limits mentioned in rule [illegible], grant him permission to do so, subject to such conditions as the Collector may think fit to impose for the protection of the railway or canal or of the persons employed thereon, and may withdraw the permission at any time after giving notice in writing of not less than [illegible] days of his intention to withdraw the same.

13. Any person working or carrying on any [illegible] operations within the limits mentioned in rule [illegible] without the permission required by rule [illegible] or rule [illegible], or after the withdrawal of such permission, or in contravention of any condition imposed by the Railway Administration or officer or by the Collector, shall be liable to pay to the Railway Administration concerned such compensation as the Collector may award.

14. Any officer empowered by the Railway Administration concerned in this behalf, or any officer empowered by the Collector in this behalf, may enter upon any land or premises where any [illegible] operations are being carried on, and may remove any [illegible] or other things which have been placed in contravention of these rules or of any condition imposed thereunder, and may stop any [illegible] operations which are being carried on in contravention of these rules or of any condition imposed thereunder.

15. Any person who contravenes any of these rules shall be liable to pay to the Railway Administration concerned such compensation as the Collector may award.

16. Any person who, without the permission required by rule [illegible] or rule [illegible], or after the withdrawal of such permission, or in contravention of any condition imposed by the Railway Administration or officer or by the Collector, shall be liable to pay to the Railway Administration concerned such compensation as the Collector may award.

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19. Any person who, without the permission required by rule [illegible] or rule [illegible], or after the withdrawal of such permission, or in contravention of any condition imposed by the Railway Administration or officer or by the Collector, shall be liable to pay to the Railway Administration concerned such compensation as the Collector may award.

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Middle Office
For Collector Dung (O.D.)

(6)

...ment for agreement between Government Servants and Servants...

...Government Servants of all kinds employed in the State Railways of Government Servants employed in connection with any land which is required or is likely to be required by the State Government for the purposes of Government Servants...

...Government Servants employed in connection with any land required by such Servants of Government or which is in the occupation of the Government Servants under these presents and for which rent is payable by the Government Servants to the State Government at the rate of ... per annum or such other rent as may be fixed by the State Government and the Government Servants shall pay the rent so fixed by the State Government and the Government Servants shall not be entitled to claim any compensation or damages for the acquisition of such land or for the termination of the tenancy of such land or for the eviction of the Government Servants therefrom.

PART II

Liberties, Powers and Privileges reserved to the State Government

To work other minerals.

AND the State Government shall also have the liberty and power to enter upon the said lands and to search for, win, work, dig for, carry away, get and dress any minerals other than the said minerals and any other substances and for such purposes to make, sink, erect, construct, maintain and use such pits, shafts, adits, drifts, levels and other necessary works, roads, railways, tramways, buildings, machinery, engines, plant, buildings and other conveniences as may be deemed necessary or convenient and to carry away and dispose of the said minerals and substances and other the premises hereby demised and to do all other acts and things which may be necessary or convenient for the purpose aforesaid.

PROVIDED THAT in the exercise of such liberty and power no damage shall be caused to or with the further power and privilege of the Government Servants to enter upon the said lands and to make good any damage caused to the Government Servants by reason of the exercise of such liberty and power.

To make railways and roads.

7. AND it is hereby agreed that the State Government or any person or persons authorised by it or them shall have the right and liberty for the purpose of and to make good ways through the said lands and railways, tramways, roadways or pipelines for any purpose other than those hereinbefore mentioned and it shall be lawful for the State Government or any person or persons authorised by it or them to set from time to time and at all times, gravel, drain and take materials for making, making, altering and repairing such railways, tramways and roads or any existing railways and roads and to and repass at all times with or without horses, cattle or other animals, carts, wagons, carriages, motor cars or other vehicles either loaded or unloaded, tramways, railways, rail lines and other wagons for all purposes and for such purposes aforesaid, provided that in the exercise of such liberty and power by the State Government or person or persons authorised by it or them as aforesaid no unnecessary damage shall be caused to the Government Servants by reason of the exercise of such liberty and power.

Contd...P...

A.C. TIWARI
Director
ACC Limited
(Cement Concrete Works
Post Dumka (Santhal Parganas)

Mining Officer
For Collector Dumka (S.P.)

PART-II

[illegible]

[illegible]

[illegible]

[illegible]

PART-III

[illegible]

[illegible]

[illegible]

Cont. 2-

J.L. TIWARI
[illegible]
[illegible]
T.O. (Central Excise) Korba
Dist. Durg (C.G.) 4[illegible]

Mining Officer
For Collector Durg (C.G.)

(6)

J.L. TIWARI
Director Plant
ACC Limited
P.O. Jamul Cement Works
Distt. Durg, C.G. 490024

For Collector Duty (C.G.)

1572

[illegible] clause 12 [illegible] any [illegible] of the [illegible] for the purposes of this lease [illegible]

To indemnify Government against all claims:

4. The lessee/lessees shall [illegible]

To restore land back to good condition etc.:

5. The lessee/lessees [illegible]

To strengthen and support the mine or reasonably [illegible]:

6. The lessee/lessees shall strengthen and support [illegible] the State Government [illegible]

To allow inspection of workings:-

7. The lessee/lessees shall allow any officer authorised by the Central Government or the State Government [illegible]

To report accidents:-

8. The lessee/lessees shall without delay send to the Deputy Collector [illegible] any accident causing death or serious bodily injury [illegible] this lease.

(Contd...10)

S.L. TIWARI
Director(Plant)
ACC Ltd.
P.O. Jamul Cement Works
Distt. Durg (C.G.) 490024

Mining Officer
For Collector Durg (C.G.)

To report accuracy of other accounts

[illegible]

To keep records and accounts regarding production and employment etc.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

To examine plant, etc.

[illegible]

Cont...11

V.L. TIWARI
[illegible]
P.O. [illegible]

Mining Officer
For Collector Duty (C.G.)

(c) The [illegible] which [illegible]

(d) [illegible]

(e) [illegible] the Central Government [illegible] case may be [illegible]

The lessee shall [illegible] of the Central Water [illegible] Government [illegible] to the Central Government, as [illegible] the Collector [illegible] the [illegible] the [illegible] Geological Survey of India or Director General, Indian Bureau of Mines a complete plan of [illegible] showing [illegible] and all the [illegible] as the case may be [illegible] territories.

11A. The lessee will [illegible] which [illegible] by the Central Government [illegible] time.

11B. The lessee shall comply with provisions of the Mines Act, 1952 and the rules made there-under.

11C. The lessee shall not [illegible] for the purpose of [illegible] of [illegible] without the [illegible] of petroleum (other [illegible] and shall [illegible] as may be [illegible] by the Deputy Director of State Government from time to time of the said [illegible].

11D. The lessee shall [illegible] to the holders of the [illegible] the rate and [illegible] the [illegible] as may be [illegible] time.

11E. [illegible] in the matter of [illegible] and in the [illegible] of the lessee [illegible] of the [illegible] operations.

Act of 1959.

12. The [illegible] shall be found at such [illegible] may be [illegible] by the [illegible] of the Central Government [illegible] Act, 1957 (Act 66 of 1957) and shall not apply to [illegible] the [illegible] Act, 1957 (Act 66 of 1957) and [illegible] any other [illegible] for the time being in force.

To provide weighing machine:

13. Lessee [illegible] by the said [illegible] a [illegible] of all [illegible] as at the said [illegible] the [illegible] of each of the oil fields [illegible] to be brought to [illegible] conveyed and [illegible] and what weight is [illegible] be weighed thereon at the said [illegible] and time to time, brought to [illegible] and [illegible] and also the [illegible] products and also the [illegible] of each [illegible] the said weights, [illegible] as such means of the said [illegible] and products used, and [illegible] and whether during the [illegible] twenty-four hours to be entered in the [illegible] books of account. The lessee [illegible] shall permit the State Government at all times during the

Cont...13

(S.C. TIWARI)
Director/Asst.
Addl. Director
Petroleum Secretariat/Mines
Govt. Deptt. [illegible]

Mining Officer
For Collector Dang (D.G.)

[illegible] ... Deputy Commissioner/Collector ... [illegible]

To allow test of weighing machine:-

14. [illegible] ... State Government ... [illegible] ... weighing machine ... [illegible] ... accordingly.

To pay compensation for injury of third parties:-

15. [illegible] ... State Government ... [illegible]

Not to obstruct working of other minerals:-

16. [illegible] ... prospecting licences ... [illegible]

[illegible]

17. [illegible] ... the previous consent in writing of the State Government ... [illegible]

Contd...3

TIWARI
[illegible]
Limited
[illegible] Cement Works
[illegible]

Mining Officer
For Collector Durg (C.G.)

(iii)

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Provided that [illegible]

Provided further that [illegible]

(iv) The State Government [illegible]

[illegible]

Not to be transferred or controlled by a Trust, Corporation, Firm or person

[illegible]

Contd....(4)

J.L. TIWARI
Director (Fuel)
ACC Limited
[illegible]
[illegible]

For Collector Durg (C.G.)

J.L. TIWARI
Deputy Plant
ACC Limited
P.O. Jamul Dist. Giridih (Jharkhand)
Pin-825301

Mining Officer
For Collector Duty (D.G.)

[illegible]

[illegible]

Employment of foreign experts –

22. The Government shall not employ, in connection with the mining operations, any foreign expert or technical assistant except with the previous approval of the Central Government.

Recovery of expenses incurred by the State Government –

23. If any of the terms or conditions of lease are not complied with, the Government of the State may, without prejudice to the rights of the lessee under section 111 of the Act, by notice in writing, determine the lease as to the whole or any part thereof. The State Government may, by notice in writing, require the lessee to pay, within such time as may be specified in the notice, all sums due to the State Government under the lease or any agreement relating thereto and the lessee shall, on the determination of the lease, be liable to pay to the State Government royalty in respect of any minerals which may be removed or which have been removed by him from the leased area after the determination of the lease and which he has not been prevented from removing by reasonable cause, as well as compensation for any damage caused to the State Government by any breach of the terms or conditions of the lease.

Forfeiture of property, etc. –

24. The Government shall have the

(a) power to enter upon the land in which any mineral or prospecting licence has been granted or any land which is reasonably required for any purpose connected therewith and to remove therefrom any property of the holder of such licence, and

(b) right to purchase or acquire at a valuation all machinery, plant, buildings, tramways, railways, aerial ropeways, roads, bridges and other immovable property belonging to the holder of such licence and used for the purposes of mining operations in the leased area or in connection therewith.

Date of commencement of lease.

25. The lease shall commence from the date of execution of the lease deed or from the date of publication in the Official Gazette of the notification referred to in clause 1 of these rules, whichever is later.

Duration of lease.

26. The lease shall be granted for a period not exceeding thirty years and may be renewed for a further period not exceeding thirty years at a time on such terms and conditions as may be agreed upon between the lessee and the State Government and specified in the lease deed.

Provided that the lease shall not be renewed except on an application made not less than twelve months before the date of expiry of the lease.

Provided further that the lessee shall not be entitled to claim renewal of the lease as a matter of right.

Surrender of lease.

27. The lessee may, at any time during the currency of the lease, with the previous consent in writing of the State Government, surrender the lease in respect of the whole or any part of the leased area on payment of all dues payable under the lease or any agreement relating thereto and on such conditions as may be specified by the State Government.

Provided that the lessee shall not be entitled to claim refund of any money paid as royalty, dead rent or surface rent or any other payment made by him under the lease or any agreement relating thereto.

Power to make rules.

28. The State Government may, by notification in the Official Gazette, make rules for the purpose of carrying out the provisions of these rules.

Power to relax.

29. Where the State Government is of opinion that exercise of any power conferred by these rules in particular case would cause undue hardship to any person, it may, by order in writing, relax the rigour of any rule in such manner as may be specified in the order.

Power to remove difficulties.

30. If any difficulty arises in giving effect to any of the provisions of these rules, the State Government may, by order published in the Official Gazette, make such provisions not inconsistent with the provisions of these rules as appear to it to be necessary or expedient for removing the difficulty.

Transitional provisions.

31. Notwithstanding anything contained in these rules, the State Government may, in respect of any area in which any mining operations were being carried on immediately before the commencement of these rules, by order in writing, direct that such mining operations may be carried on subject to such conditions as may be specified in the order.

Secretary to the Government of [illegible]
Department of Mines and Geology
[illegible]

Minister of State
For Mines and Geology (C.S.)

PART VII

The Covenants of the State Government

Lessee/lessees may hold and enjoy rights quietly:-

1. The lessee/lessees paying the rents, [illegible] hereby reserved and observing and performing all the covenants and agreements herein contained and on the part of the [illegible] shall and may [illegible] the said premises [illegible].

Acquisition of land of lessee/lessees and compensation thereof:-

2. [illegible]

To renew:-

3. The said [illegible]

Provided that [illegible] State Government [illegible]

[illegible] Central Government.

If the [illegible]

Contd...12

J.L. TIWARI
Director(Plant)
ACC Limited
P.O. Jamul Cement Works
Distt-Durg(C.G.)-490024

Mining Officer
For Collector Durg (C.G.)

[illegible] the Land Acquisition Officer may, with the previous approval of the Collector, direct that any of the powers which may be exercised by him under this Act may also be exercised also by such other officer subordinate to him as may be specified in the direction.

Power to call for records.

5. The Collector may call for and examine the record of any proceeding under this Act in order to satisfy himself as to the legality or propriety of any order passed by the Land Acquisition Officer, and may make such order in the case as he thinks fit.

Power to take possession.

6. (1) Subject to the provisions of section 7, the Collector may, at any time after the publication of a declaration under section 4, sub-section (1), in respect of any land, by notice in writing, order the owner thereof to surrender or deliver possession thereof to the Collector or any person duly authorised by him in this behalf within such period as may be specified in the notice.

(2) If the owner fails to comply with any order made under sub-section (1), the Collector may cause him to be summarily evicted and may use such force as may be necessary for the purpose.

(3) No order under sub-section (1) shall be made in respect of any land unless the compensation to be awarded for such land has been deposited in the Treasury under section 31, sub-section (2), or unless the Collector with the consent of the person interested has taken possession of any building or part thereof under sub-section (2) of section 36.

Power to enter upon land for purposes of survey, etc.

7. (1) Subject to the provisions of section 6, the Collector may, after the publication of a declaration under section 4, sub-section (1), in respect of any land, by order in writing, authorise any person to enter upon such land and to perform such acts or do such things as may be necessary for the purposes specified in section 4, sub-section (1), or to ascertain whether such land is adapted for such purposes, or to determine the area of such land or the boundaries thereof, or to set out the intended line of any work proposed or made for such purposes, or to mark such levels, boundaries or line by placing marks and cutting trenches, or where the land is waste or unoccupied, to dig or bore into the subsoil, or to do any other act or thing necessary to be done for such purposes.

(2) Before any person is authorised under sub-section (1) to enter upon any land which is in the occupancy of any person other than the owner, the Collector shall give such occupier at least seven days' notice in writing of his intention to do so.

(3) Before any person is authorised under sub-section (1) to enter upon any land, the Collector shall tender payment for all damages which may be done in pursuance of such authority, and in case of dispute as to the sufficiency of the amount so tendered, he shall direct that the amount be paid into the Court of the District Judge, and such amount shall be paid into Court before the person is authorised to enter.

(4) Nothing shall be done under this section in respect of any building which is the dwelling-house of any person, or which is ordinarily used as a place of worship or as a sepulchre, or which is attached to the dwelling-house of any person and is necessary to the convenient use thereof, or in any garden, orchard or court attached to any such building, without the consent of the occupier thereof.

(5) In this section, the expression "land" does not include any standing crop or fruit upon the land.

Consent or award not to be questioned.

8. No consent given under section 7, sub-section (1), and no proceeding or act done under that sub-section, and no award or agreement made under section 11, shall be called in question in any Court, and no person who has given such consent or has made such agreement or award shall be entitled to maintain any claim to compensation other than the amount of such award or agreement, and no person who has done any such act or thing shall be liable to any suit or other proceeding in respect thereof.

Provided that nothing in this section shall prevent the Court from awarding compensation in addition to the amount of any award made under section 11, if the award has not been made at the date of the Collector's taking possession of the land.

Provided also that nothing in this section shall prevent any person from recovering damages for any act not authorised by this Act or from recovering compensation for any damage sustained by him which is not due to his consent or to the want of power to do the act for which the award was made.

PART II

Acquisition

Preliminary investigation.

9. (1) Whenever it appears to the Collector that land in any locality is needed or is likely to be needed for any public purpose, he may cause it to be marked out and measured, and a plan to be made of the same, and may cause such levels to be taken, and such other acts to be done, as he may consider necessary to ascertain whether the land is adapted for such purpose.

(2) For the purposes of this section, the Collector may enter upon and survey and take levels of any land in any locality, and dig or bore into the subsoil, and do all other acts necessary to ascertain whether the land is adapted for such purpose, after giving to the occupier thereof at least seven days' notice of his intention to do so.

(3) The Collector shall, at the time of entering upon any land for the purposes of this section, pay or tender payment for all damages to be sustained by the occupier by reason of such entry.

Public notice of intended acquisition.

10. (1) Before the Collector proceeds to take order for the acquisition of any land under this Act, he shall cause public notice to be given at convenient places in the locality in which the land is situate that the land is needed or is likely to be needed for a public purpose.

(2) Such notice shall state the particulars of the land needed or likely to be needed, and shall require all persons interested in the land to appear personally or by agent before the Collector at a time and place mentioned in the notice (such time not being earlier than fifteen days after the publication of the notice), and to state the nature of their respective interests in the land and the particulars of their claims to compensation for the interests, and their objections (if any) to the measurements made under section 9.

Cont...4

A.C. TIWARI
Design Engr
ACC Limited
P.O. Jamul Cement Works
Distt. Durg (C.G.) 490001

Mining Officer
For Collector Durg (C.G.)

[illegible]

Penalty in case of default in payment of royalty and dead rent of stone quarry :-

[illegible]

Penalty for unauthorised breaches of covenants :-

[illegible]

Power to enter the demised premises :-

[illegible]

Lessee's covenant to indemnify the Government against claims for accidents :-

[illegible]

J.L. TIWARI
Deputy Point
Govt. College
P.O. Kotma Sonwani (Madya
Distt. Durg (C.G.) 484334

Nursing Officer
Govt College Durg (C.G.)

Forfeiture of property left more than six months after determination of lease :-

[illegible]

Notices :-

[illegible]

Immunity of State Government from liability to pay compensation :-

[illegible]

[illegible]

[illegible] State of Chhattisgarh [illegible]

Contd...19

J.L. TIWARI
Director Plant
ACC Limited
Jamul Cement Works
Distt. Durg (C.G.) [illegible]

For Collector Durg (C.G.)

(20)

Signature

Witness:-

1) Name

Address

2) Name

Address

Mining Officer
For Collector, Dausa (C.G.)

3.L. TIWARI
Director Plant
ACC Limited
P.O. Jamul, Dausa (Rajasthan)

छत्तीसगढ़ शासन के [illegible] स्वीकृति आदेश क्र. [illegible] 3 – 16/2008/12
रायपुर दिनांक 18.6.2009 में उल्लेखित अतिरिक्त शर्तें।

1. [illegible] किया जायेगा।

2. [illegible] किया जायेगा।

3. [illegible]

4. [illegible]

5. [illegible] ACC Ltd. [illegible] 2005-MCCM (C.G.) [illegible]

ii. This Mining plan is approved without prejudice to any other laws applicable to the [illegible] from time to time whether made by the Central Government, State Govt. [illegible] or any other authority.

iii. It is further clarified that the approval of mining plan does not in any way imply the approval of the Government in terms of any other provisions of the Mines & Minerals (Development & Regulation) Act, 1957 or the Mineral Concession Rules, 1960 and any other laws including the Forest Conservation Act, 1980.

iv. It is further clarified that this approval of mining plan is under Rule 22 of MCR 1960 [illegible] subject to the provisions of Forest Conservation Act, 1980, Forest Conservation Rules [illegible] and other relevant statutes, orders and guidelines as may be applicable to the lease area from time to time.

v. The provisions of Mines Act, 1952 and Rules and Regulations made there under including submission of notice of opening, appointment of Manager and other statutory officials as required by the Mines Act, 1952 shall be complied with.

J.L. TIWARI
[illegible]
ACC Limited
P.O. Jamul Cement Works
Distt. Durg (C.G.) 490024

Mining Officer
for Collector Durg (C.G.)
[illegible]

v) This mining plan is approved without prejudice to any other statutory clearances required for operating the mine.

vi) This approval is given in the Supreme Court Order in W.P.(C) No. 202 dated 12.12.96 for compliance. The approval of mining plan is subject to the guidelines provided in the said directions of the Supreme Court as explained.

vii) The lessee is granted this lease for the State Govt. is not otherwise bound to grant any further lease to the Applicant. Consultant / Mines Manager / Bureau of Mines / Others.

viii) The lessee shall fix mining mile stones and accomplish activities as mentioned in the mining plan and shall not deviate from the approved plan.

ix) A copy of Environmental Impact Assessment / Environment Management Plan / EIA-EMP as approved by MOEF (Ministry of Environment & Forest) and submitted to DM shall be strictly observed and copy of the approval given.

x) Anything found be concealed as required by the Mines Act in the course of the mining lease and there is provision for restoration if not done, the lessee shall be liable as per rules / provisions with penalties etc.

xi) The department reserves the right to modify / amend any terms and conditions of the lease as the case may be on the grounds of public interest.

xii) The lessee shall comply with the provisions of Mines Act, 1952 and the Rules framed thereunder from time to time.

xiii) The lessee shall pay royalty, dead rent, surface rent and other charges as may be prescribed by the Govt. from time to time.

xiv) The lessee shall not assign, sublet or part with the possession of the whole or any part of the mining lease without the previous consent in writing of the Govt.

xv) The lessee shall not use explosives in the mining operations without the previous permission in writing of the competent authority.

xvi) The lessee shall not undertake any mining operations in the forest area without obtaining prior approval of the Govt. of India under the Forest (Conservation) Act, 1980 and the Forest (Conservation) Rules, 1981.

xvii) The lessee shall not undertake any mining operations in the area falling within the prohibited area / regulated area as notified by the Govt. of India under the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986.

xviii) The lessee shall not undertake any mining operations in the area falling within the ecologically fragile area as notified by the Govt. of India under the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986.

xix) The lessee shall not undertake any mining operations in the area falling within the ecologically fragile area as notified by the Govt. of India under the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986.

xx) The lessee shall not undertake any mining operations in the area falling within the ecologically fragile area as notified by the Govt. of India under the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986.

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cc) The lessee shall not undertake any mining operations in the area falling within the ecologically fragile area as notified by the Govt. of India under the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986.

cci) The lessee shall not undertake any mining operations in the area falling within the ecologically fragile area as notified by the Govt. of India under the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986.

ccii) The lessee shall not undertake any mining operations in the area falling within the ecologically fragile area as notified by the Govt. of India under the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986.

ccciii) The lessee shall not undertake any mining operations in the area falling within the ecologically fragile area as notified by the Govt. of India under the Environment (Protection) Act, 1986 and the Environment (Protection) Rules, 1986.

ccciv) The lessee shall

(iv) The Environmental Clearance shall be subject to the conditions that the project proponent shall abide by the commitments made in the application and during the meeting of the Committee. Any deviation from the commitments made in the application and during the meeting of the Committee will be treated as violation of the Environmental Clearance and action will be taken against the project proponent under the provisions of the Environment (Protection) Act, 1986.

2. कंपनी को पर्यावरण प्रबंधन योजना के अनुसार कार्य करना होगा। किसी भी प्रकार के परिवर्तन के लिए पर्यावरण विभाग, उत्तर प्रदेश से अनुमति लेनी होगी।

3. [illegible] के लिए अनुमति [illegible] प्राप्त करनी होगी।

4. खनिज क्षेत्र के लिए भूमि [illegible] से अनापत्ति प्रमाण पत्र [illegible] प्रस्तुत करना होगा।

5. [illegible] के लिए [illegible] से अनापत्ति प्रमाण पत्र [illegible] प्रस्तुत करना होगा।

10. अतिरिक्त शर्तों का पालन जिला खनन अधिकारी द्वारा कराया जायेगा।

(P.L. TIWARI)
Deputy Plant
ACC Limited
P.O. Jamul Cement Works
Dist. Sonbhadra (U.P.)

For Collector [illegible] (S.D.)

खाता - डेढ़ी

1	2	3	4	5	6
1	नदनी खुदनी	916	0.10	1941	0.30
2		917	0.18	1942	20.52
3		918	0.44	—"—	
4		919	0.12	—"—	
5		920/1	1.25	—"—	
6		920/2	1.25	—"—	
7		921	0.12	—"—	
8		922	0.00	—"—	
9		923	4.08	—"—	
10		924	3.09	—"—	
11		925	1.89	—"—	
12		926	3.10	—"—	
13		927	2.70	—"—	
14		928	0.00	—"—	
15		929	2.00	—"—	
16		930	2.79	—"—	
17		930/1	1.73	—"—	
18		931/2	1.70	—"—	
19		932	21.30	1933	11.10
20		935/1	5.52	1942	
21		935/2	3.33	—"—	
22		936	2.19	—"—	
23		937	5.51	1946	16.26
24		939	2.33	—"—	
25		939/1	1.54	—"—	
26		939/2	1.96	—"—	
27		940/1	1.36	—"—	
28		940/2	28.95	1921	12.09
29		940/3	2.65	1945	2.26
30		940/5	0.55	1943	1.79
31		940/6	0.99	1946	
32		940/7	1.01	" —	
33		944	2.26	1946	
34		945	1.34	" —	
35		946	1.07	1946	
36		947/1	0.43	—"—	
37		947/2	0.43	—"—	
38		947/3	0.80	—"—	
39		948	1.00	—"—	
40		949	1.34	—"—	
41		950	0.55	—"—	

47		651/1	1.57	1946	
44		651/2	1.57	-"-	
45		651/3	1.57	-"-	
43		651/4	1.57	-"-	
42		652	1.32	-"-	
48		653	0.05	"	
49		654	2.05	1946	
50		656	2.55	-"-	
		658	1.25	-"-	
		1444	1.1.0	"	
		कुल	134.40		

1.5702 more

देखो: अं० = 1140/7, 1145, 953, 1034 का
अनावश्यक-सूची के कुलांक नहीं हैं
और उनका नाम केवल जमाबन्दी
की ओर से संकेत करने के लिए
53·37 है।

1947-48

छत्तीसगढ़ शासन
खनिज साधन विभाग
दाऊ कल्याण सिंह भवन, मंत्रालय, रायपुर

क्रमांक एफ 3-18/2004/12 रायपुर, दिनांक

प्रति,

कलेक्टर
जिला दुर्ग,
छत्तीसगढ़ ।

विषय :- जिला दुर्ग के ग्राम नंदिनी खुर्द की रकबा 54.40 हेक्टेयर क्षेत्र का पुनर्मुल्यांकन सहित स्वीकृति अनुरोध पत्र मेसर्स एसीसी कंक्रीट लिमिटेड।

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जिला दुर्ग के ग्राम नंदिनी खुर्द की रकबा 54.40 हेक्टेयर पर स्थित अनुसूची अन्य खनिज लिमिटेड (पूर्वतः इस्पात प्राधिकरण) के पक्ष में खनिज पुनर्मुल्यांकर की सिफारिश सहित पत्र लिखे जाने के उपरांत इस क्षेत्र को मध्यवर्ती घोषणा में प्रकाशित अधिसूचना दिनांक 5.6.1992 द्वारा पुनः अनुज्ञप्ति हेतु खुला घोषित किया गया। क्षेत्र खुला घोषित होने के उपरांत उक्त क्षेत्र पर अभि विन्यास की स्वीकृति हेतु निम्नानुसार अनुरोध पत्र प्राप्त हुए.

क्रमांक	आवेदक का नाम	आवेदन पत्र दिनांक एवं खनिज विन्यास का प्रकार	खदान स्वरूप	आवेदित क्षेत्र का विवरण (हेक्टेयर में)
1	2	3	4	5
1	मै. आर्य साहस	6.7.92 / पी.एल.	1921, 1941, 1942, 1945, 1946, 1953	54.40 (134.40 एकड़)
2	मै. सिंघानिया सिमरिया	6.7.92 / पी.एल.	1921, 1941, 1942, 1945, 1946, 1953	54.40 (134.40 एकड़)
3	श्री सिंघल सिंघानिया	6.7.92 / पी.एल.	1921, 1941, 1942, 1945,	24.77 (61.25 एकड़)
4	श्री डी.पी. सिंघानिया	6.7.92 / पी.एल.	1941, 1942, 1945, 1953,	22.529 (55.679 एकड़)
5	मै. इंडियन रेअर्थ एंड केमिकल्स लिमि. नेमानी चामली सीमेंट (इंडिया रेअर्थ) एवं इंडस्ट्रीज लिमिटेड	6.7.92 / पी.एल.	1921, 1941, 1942, 1945, 1946, 1953	54.40 (134.40 एकड़)
6	सिरोंज पी.एल.सी.	6.7.92 / पी.एल.	1921, 1941, 1942, 1945, 1946, 1953	54.40 (134.40 एकड़)

2/ पूर्वोक्त मध्यप्रदेश शासन के पत्र क्र. एफ 4-146/65/12/4/1, दिनांक 22.1984 द्वारा ग्राम नवियो पुरुदनी के 54.40 हेक्टर क्षेत्र पर स्थित चूनाकंकर का खनिपट्टा मेसर्स ए सी सी लिमिटेड के पक्ष में स्वीकृत करते हुये उक्त आवेदन पत्र निरस्त किये जाने का निर्णय लिया जाकर एतदर्थ अक्ट 1957 की धारा 5(1) के अंतर्गत भारत सरकार के खान मंत्रालय के अनुमोदन हेतु प्रस्ताव भेजा गया था। तत्पश्चात भारत सरकार, खान मंत्रालय द्वारा को गई दृष्टा के क्रम में पूर्वोक्त मध्यप्रदेश शासन के पत्र दिनांक 8.8.1987 एवं 13.11.1998 द्वारा राज्य सरकार को यह लेख किया गया कि एसीसी लिमिटेड के कगवा जामुल जिला दुर्ग एवं कोम्हार सिमरिया, दो को पृथक-पृथक खोट है तथा दोनों खोट के लिए खनिपट्टा के अंतर्गत सम्मिलित क्षेत्र की सीमा रेखा एम एम की ओर एक 1000 के तहत लिखित 200 हेक्टर की सीमा से अधिक होने के फलस्वरूप उक्त अधिनियम की धारा 5(1) (बी) के तहत अनुमोदन की आवश्यकता होगी। उक्त संबंधित प्रस्ताव को भारत सरकार के खान मंत्रालय के पत्र क्रमांक 4/288/97-MEV, दिनांक 7.12.1999 द्वारा अनुमोदन दिया गया, किन्तु वर्ष 2000 में छत्तीसगढ़ राज्य का गठन हो जाने से उक्त प्रकरण छत्तीसगढ़ राज्य को अंतरित हो गया तथा तत्पश्चात राज्य ने प्रकरण में एसीसी लिमिटेड के पक्ष में खनिपट्टा को स्वीकृति हेतु अंतिम आदेश अभी नहीं किए जा सके। इसी क्षेत्र के विभाजित क्षेत्र के लिए निम्नानुसार और संशोधन पत्र जारी हुए:-

क्रमांक	आवेदक का नाम	आवेदन पत्र दिनांक एवं खनिज दिवस का अक्षर	स्वीकृत पत्र	अनुमोदित क्षेत्र का विवरण खसरा (हेक्टर में)
1	2	3	4	5
7	मे. मुकेश कोठी	16.2.95 / एम.एल.	1953	11.10
8	मे. खाकसा माइनिंग कार्पोरेशन, 36 सीपिट, ऑम्बोआ (ईस्ट) मेहल्ल नगर, मिलाड़े	24.4.96 / एम.एल.	1945, 1944, 1948 1921	1.79 0.51 2.26 13.89 18.45
9	श्री रघुवंश साहू ग्राम सिरसदी, जिला दुर्ग	16.2.96 / एम.एल.	1953	11.10
10	श्री सत्यम सर्वसेवा गंज पाटा, दुर्ग	15.11.99 / पी.एल.	1948 1947, 1948	1.13 1.42 4.17 6.72
11	मे. सिंघानिया सिमरसा	16.11.99 / पी.एल.	पेंडिंग ग्रांट	(1054.45 एकड़)
12	श्री रघुवंश साहू ग्राम सिरसदी, जिला दुर्ग	4.12.96 / एम.एल.	1953	11.10

1	2	3	4	5
13	श्रीमती रजनी सिंह सुपेला, भिलाई, दुर्ग	4.12.99 / एम.एल.	1942 मार्च 1945,	6.05 2.25 8.26
14	श्रीमती गायत्री मिश्रा प्लाट–1, वृन्दा नगर, भिलाई (दुर्ग)	4.12.99 / एम.एल.	1942 मार्च,	14.52
15	श्री सुनील कुमार मिश्रा 48 / 5, नेहरूनगर, ईस्ट, भिलाई (दुर्ग)	4.12.99 / एम.एल.	1946 मार्च	8.76
16	श्रीमती मीरा अग्रवाल 58 / 4, नेहरूनगर, ईस्ट, भिलाई (दुर्ग)	4.12.99 / एम.एल.	1946 मार्च	8.03
17	श्रीमती सावी सेन रामनगर, सुपेला, भिलाई	6.1.2000 / एम.एल.	1941, 1942, 1945, 1946, 1947, 1948	0.5 20.52 2.25 16.76 1.47 4.17 45.63
18	श्रीमती कमलाबाई पटवेल तेलिबांधा, दुर्ग	11.2.2000 / एम. एल.	1944, 1945	2.28
19	श्री अब्दुल रऊफ कुरैशी लोकेशवारा, दुर्ग	11.2.2000 / एम. एल.	1923, 1940, 1941, 1947, 1948	8.03
20	अब्दुल रऊफ कुरैशी	30.1.02 / सी.एल.	1943, 1944, 1945	1.79 0.51 2.26 4.56
21	श्री शिवो राम साहू 14, दीपक नगर, दुर्ग	22.02 / सी.एल.	1941 1942 1945 1946 1947 1948	0.50 20.52 2.25 16.76 1.47 4.17 45.68
22	श्री भो. जामीस मंडिगो माइंस, दुर्ग	26.2.02 / सी.एल.	1953	11.10

12.0

1	2	3	4	5
23	श्री रविन्द्र चौहदार नगर निगम कालोनी सलाना आरती-II, भाठापुर	2.8.04 / पी.एल.	1934, 1935 1936, 1937 1938, 1939 1940, 1941 1942, 1943, 1945, 1946 1953	00.01 01.53 09.14 00.20 02.055 00.18 01.16 20.55 20.52 01.79 02.26 16.78 11.10
24	श्री शैलेन्द्र सिंह पलिका नगर सुपेला, भिलाई, दुर्ग	3.8.04 / पी.एल.	1953	56.775 11.10
25	श्री शशिकांत सिंह पलिका नगर सुपेला, भिलाई, दुर्ग	3.8.04 / पी.एल.	1953	11.10
26	श्री सुनिल कुमार प्रधानकर मोती मुच्चला, जिला दुर्ग	6.7.04 / पी.एल.	1953	5.10
27	मै. मेसर्स निलिमा कोलारी बिल्डिंग, कानिन्दरी कालास, दुर्ग	7.10.04 / पी.एल.	1953 पार्ट	5.50
28	मै. सहकारी मिनरल्स जैलरी चाला, दुर्ग	1.10.04 / पी.एल.	1953 पार्ट	5.55
29	मै. अजय मिनिरल्स धमाहर चौक, दुर्ग	1.10.04 / पी.एल.	1953 पार्ट	5.00
30	मै. अरुण मिनरल्स पोलसाय चाला दुर्ग	1.10.04 / पी.एल.	1953 पार्ट	6.50
31	श्री नरेन्द्र कुमार यादव अहिवारा, जिला दुर्ग	6.1.05 / एम.एल.	1921 / 1 1941, 1942, 1945, 1946, 1953	12.03 एकड़ 0.80 एकड़ 22.52 एकड़ 2.25 एकड़ 18.46 एकड़ 11.10 एकड़ 134.40 एकड़ (54.20 हे.)

1	2	3	4	5
32	श्री हेमन्त सिंघल पोस्ट ऑफिस- सिलवानी, दुर्ग	15.6.06 / सी.एस.	1953	17.10
33	श्री उदयलाल कुमार साहू	25.12.06 / एम.एल.	1921, 1941, 1942, 1945, 1946, 1953	134.40 एकड़ (54.40 है.)
34	मै. पीजीआन्त इन्फ्रास्ट्रक्चर प्रा.लि., दुर्ग	08.02.07 / एम.एल.	1945, 1953	2.26 11.10 13.36
35	श्री भावेश पुनाराम पैद्य, राजनांदगांव	19.04.07 / एम.एल.	1920, 1921, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1953	74.54

3/ एमसीआर, 1993 के नियम 12 एवं 28 के प्रावधान की अनुपालन में दिनांक 10.10.07 को सुनवाई की गई। उक्त तिथि को सुनवाई में अनुपस्थित आवेदकों को दि-नांक 23.10.07 को पुनर्सुनवाई हेतु पुनः पंजीकृत डाक द्वारा सूचना भेजा गया। सुनवाई के दौरान आवेदकों से उनके प्रस्तावों की आर्थिक एवं तकनीकी सक्षमता यथा स्थापित किए जाने संबंधित सम्यक जानकारी निम्नलिखित बिन्दुओं पर जानकारी प्रस्तुत करने हेतु कहा गया था।

1. कंपनी का गठनकर्ता नियमों, वर्ष दिनांक 31.12.2006 तथा 31.3.2007 की समाप्ति पर
2. कंपनी की पूर्वदेयों एवं चलत पूंजी के संबंध में अनुभव
3. प्रस्तावित खनिज संसाधन की उपलब्धता एवं विवरण
4. प्रस्तावित खनिज संसाधन की क्षमता एवं विवरण
5. प्रस्तावित खनिज संसाधन परियोजनाओं हेतु की गई व्यवस्था

4/ आदेशक क्र. 4 एवं 5 की मंगाई गयी सूचना एवं दिये गये तर्क में दूसरा नहीं उक्त कार्य एवं प्रावधानों नहीं है, की टीकाणी के साथ संलग्न किया हुआ। आदेशक क्रमांक 6 की सूचना हेतु में कार्यालय भेज दी गया. तिरावकर आपत्ति आ गया आदेशक क्र. 1, 3, 7, 10, 13 से 17, 21, 22, 25, 26, 31, 32 को पंजीकृत डाक द्वारा सूचना पत्र भेजा गया था जो दिनांक में वापस प्राप्त नहीं हुआ है और न ही आवेदकगण सुनवाई तिथि एवं उपस्थित हुए सुनवाई उक्त आवेदकों के बारे में यह अवधारणा कि जाएगी कि उन्हें सूचना प्राप्त नहीं हो सका है तथा उन्हें अपने आवेदन पत्रों में आगे कोई रुचि शेष नहीं रह गई है। इसके बावजूद भी उक्त आवेदकों के आवेदनों पर नियम-23 में वर्णित तथ्यों को परिप्रेक्ष्य में विचार किया जाए तो उनकी आवेदनों की स्थिति में स्टीलो मैसेंस लिमिटेड की तुलना में बेहतर नहीं है। आदेशक क्र. 2, 11, 20, 24, 27, 28, 29, 30 के द्वारा पैरा-3 के अनुसार विधिसम्मत जानकारी प्रस्तुत नहीं किया गया है, जबकि इन कंपनी के द्वारा पूर्वेक्षण अनुज्ञप्ति हेतु आवेदन पत्र प्रस्तुत किया गया है, अन्यथि विधासनीय क्षेत्र पर पूर्व से

खनिपट्टा स्वीकृत का लाभ उक्त क्षेत्र सुनिश्चित होने से खनिपट्टा स्वीकृत किया जा सकता अतएव इन आवेदनों का आदेश पक्ष लिखाते पारित है ।

5/ सुनवाई में मेसर्स एसीसी लिमिटेड मेसर्स मोनीबाद इन्फ्रास्ट्रक्चर प्राइवेट लिमिटेड, मेसर्स उमा मिनरल्स, श्री नादेव कुमार पैका, मेसर्स सिंघानिया मिनरल्स, श्री अब्दुल रहमान कुरैशी, श्रीमती फरजाना परवीन, श्री शशिकांत सिंह, मेसर्स राजयोग मिनरल्स, मेसर्स अंजना मिनरल्स, श्री उत्तम कुमार साहू, श्री अकरम शाह, अधिवक्तागण हुए जिसमें से मेसर्स एसीसी लिमिटेड, मेसर्स मोनीबाद इन्फ्रास्ट्रक्चर प्रा.लि., मेसर्स उमा मिनरल्स की ओर से श्री महेश कुमार जैन, मेसर्स सिंघानिया मिनरल्स श्री उत्पल कुमार साहू, श्री अकरम शाह, अधिवक्तागण के द्वारा लिखित तर्क प्रस्तुत किया गया है, जिसमें मेसर्स ए सी सी लिमिटेड के प्रतिनिधि द्वारा आवेदकों ने खनिज के उपयोग अपने द्वारा स्थापित उद्योगों में करने एवं अन्य उद्योगों को लिंकेज करने की बात कही है । उक्त विभागीय आवेदकों में से मेसर्स एसीसी लिमिटेड ही एकमात्र ऐसी कंपनी है जिसका पिछले दो वर्ष का खान वापसी में 0.76 मिलियन टन प्रतिवर्ष क्षमता का सीमेंट संयंत्र स्थापित एवं कार्यान्वित है । कंपनी द्वारा अपने वर्तमान सीमेंट संयंत्र के विस्तार हेतु राज्य शासन के साथ दिनांक 23.03.2007 को एम.ओ.यू. हस्ताक्षरित किया है जिसके अनुसार उनके द्वारा मौजूदा संयंत्र के विस्तार हेतु रूपये 460 करोड़ का निवेश प्रस्तावित करते हुए आदुर सीमेंट संयंत्र की वर्तमान क्षमता 0.76 मिलियन टन प्रतिवर्ष क्लिंकर (1.28 मिलियन टन सीमेंट) से बिढ़ाकर करते हुए 1.25 मिलियन टन क्लिंकर (2.50 मिलियन टन सीमेंट) की अतिरिक्त क्षमता में वृद्धि किये जाने की परियोजना है जिसके संचालन में आवश्यक कोल की खपत है। मेसर्स ए सी सी लिमिटेड वर्तमान एवं भविष्य में स्वीकृत खनिपट्टा क्षेत्र से लगभग 35.40 मिलियन टन स्वीकृत भूतात्विक का संकेत वर्तमान में है जोकि उनके 45 वर्ष की अवधि के लिये संयंत्र की आवश्यकता की पूर्ति हेतु 106.60 मिलियन टन स्वीकृत भूतात्विक की आवश्यकता को दर्शाया गया है । मेसर्स एसीसी लिमिटेड द्वारा विचाराधीन आवेदित क्षेत्र में निलाई स्टोन खनन से प्राप्त अंश को आधार पर तैयार किए गए पूर्वेक्षण प्रतिवेदन के अनुसार 18.9 मिलियन टन खनिज भूतात्विक के भण्डार होना अनुमानित किया गया है।

6/ उपर्युक्त वर्णित तथ्यों से यह स्पष्ट है कि विचाराधीन क्षेत्र पर आवेदन प्रस्तुत करने वाले समस्त आवेदकों में मेसर्स एसीसी लिमिटेड वित्तीय व तकनीकी पूर्ति से सम्बन्धित प्रारूप एवं सीमेंट उत्पादन में एक अग्रणीय है, जिसके द्वारा खनिज के उपयोग हेतु खनिपट्टा चाहा गया है । खनिज रियायत नियम, 1960 के नियम 35 में वर्णित के एक मुश्त हेतु खनि रियायत स्वीकृति हेतु निम्नानुसार अधिमानी अनुज्ञप्ति दिये जाने का प्रावधान किया गया है :—

[35. Preferential rights of certain persons - Where two or more persons have applied for a reconnaissance permit or a prospecting license or a mining lease in respect of the same land, the State Government shall, for the purpose of sub-section (2) of section 11, consider, besides the matters mentioned in clauses (a) to (c) sub-section (3) of section 11, the end use of the mineral by the applicant.]

7/ प्रकरण में अंकेक्षण की दिशानिर्देश/मार्गदर्शी सिद्धान्त एवं प्राविधि के एक मूल्य को ध्यान में रखते हुए साथ ही विद्युत(संशोधन) अधिनियम 2003 की धारा 11(1) एवं 3) सहपठित छत्तीसगढ़ विद्युत नियामक नियम, 2009 के नियम 36 के प्रावधानानुसार आवेदित क्षेत्र में से उपलब्ध क्षेत्र 35.57 हेक्टेयर (संलग्न मेमोरेण्डम-1 अनुसार) मे. नवरत्न एनर्जी लिमिटेड के पक्ष में आवंटन पूर्व अस्थाई या सशर्त पट्टा 30 वर्ष की अवधि हेतु निम्नांकित शर्तों के अधीन स्वीकृत करने का सैद्धान्तिक निर्णय लिया जाता है:-

7.1 यदि पट्टा क्षेत्र से लगे हुये भूमालिकों तथा आसपास भूमि धारकों के साथ मे बैलाडीला सीमेंट वर्क्स एवं सीमेंट संयंत्र के संचालन विस्तार हेतु किया उपयोग एवं आवेदित के क्षेत्र से संबंधित पुनर्वास का अन्यत्र निर्णय नहीं किया जायेगा।

7.2 यदि आवंटिती द्वारा स्वीकृति जारी होने से संबंधित हेतु प्रभावी कार्यवाही नहीं किया जाता अथवा लिया जाता पाया जाता है तो सभी भारत सरकार की 60 दिवस की अवधि देते हुए कारण बताओ नोटिस जारी किया जाकर समुचित प्रमाण किया जायेगा एवं प्राप्त स्पष्टीकरण संतोषजनक नहीं पाए जाने पर आवंटन शासन द्वारा सभी किसी भी समय निरस्त किया जा सकेगा।

7.3 यदि आवंटिती द्वारा की स्वीकृति के अन्तर्गत जारी दी जाने वाली प्रकार आदेश के अनुपालन में सामयिक लीज का अनुबंध निष्पादित की जाने के बाद भी सामयिक लीज की स्वीकृति के बारे में आदेशानुसार दी गई सहमति से मुक्त किए जाने के उपरान्त सामयिक लीज निरस्त करने की स्थिति बनती है तो कम्पनी द्वारा किए गए किसी प्रकार की गलपाट हेतु राज्य शासन की कोई जिम्मेदारी नहीं होगी।

8/ मेसर्स ए सी सी लिमिटेड द्वारा उपरोक्त कंडिका 7.1 से 7.3 की शर्तें मानने करने का पालनार्थ निर्देशित किया जाता है कि सामयिक लीज की स्वीकृति हेतु सशर्त स्वीकृत पत्र प्राप्त होने की 6 माह के भीतर प्रस्तुत करें। पत्र के 7 पर की गई निवेदना के परिप्रेक्ष्य में मेसर्स ए सी सी लिमिटेड के पक्ष में आवंटित की स्वीकृति हेतु उपलब्ध 35.57 हेक्टेयर क्षेत्र पर अन्य शर्तों, जो समस्त सामान्यतः में अंतर्गत पत्र पत्रों द्वारा निरस्त किया है।

संलग्न- उपरोक्तानुसार।

छत्तीसगढ़ के राज्यपाल के नाम से
तथा आदेश नुसार

(संजय अग्रवाल)
अवर सचिव
छत्तीसगढ़ शासन
वाणिज्य उद्योग विभाग

क्रमांक एफ 3-18/2004/12 रायपुर, दिनांक

प्रतिलिपि–

1. शासकीय गोपनीयी एवं तकनिकी, छत्तीसगढ़, भाठागुर
2. मे0 ए.सी.सी. लि.(ओ), जामुल सीमेंट वर्क्स, जिला दुर्ग (छ.ग.) 5 FEB 2008
3. मे0 इण्डियन रेयान एण्ड इन्डस्ट्रीज लिमिटेड, ऑफिस एम.आई.जी.सी–20, डोंगरेन नगर रायपुर (छ.ग.)
4. मे0 ओमर गार्डनर्स श्री लालित राजकरेरिया, गवर्नर दुर्ग (छ.ग.)
5. मे0 सिंघानिया मिनरल्स श्री ओ.पी. सिंघानिया, 12 गरेवा वार्पिंग कम्पलेक्स सिर्वा रिंग्सी सहित रायपुर सिलाई(छ.ग.)
6. मे0 डी.सी. सिंघानिया, 12 गरेवा वार्पिंग कम्पलेक्स, सिर्वा रिंग्सी सहित रायपुर सिलाई(छ.ग.)
7. मे0 सिंघिन सिमानिया, अजोला गेंगा, सी.पी. नगर, रायपुर(छ.ग.)
8. श्री पुर्वेश ढोली, 4 शासकीय क्वार्टर, दुर्ग (छ.ग.)
9. मे0 अपना माइनिंग कार्पोरेशन लिमिटेड, 31/सिन कॉम्प्लेक्स, नेहरू नगर, सिलाई (छ.ग.)
10. श्री रवीन्द्र साहू, 3/10 सेक्टर 4/6, दाऊ बिल्डिंग, पं. नेहरू सिलाई, जिला दुर्ग (छ.ग.)
11. श्री सुधाम बाजपेयी, नंदनवन, दुर्ग (छ.ग.)
12. श्री सुनील कुमार सिंह, मकान नंबर 4/1 /6, नेहरू नगर, वेस्ट सिलाई (छ.ग.)
13. श्रीमती मीना अग्रवाल, पति श्री रमाकांत अग्रवाल, मकान नंबर 3/4 /4, नेहरू नगर, सिलाई (छ.ग.)
14. श्रीमती गायत्री सिंह, पति श्री नरेन्द्रपाल सिंह, कुटा नगर वार्ड 1, सिलाई (छ.ग.)
15. श्रीमती शशी दोषी, पति श्री भानुप्रताप दोषी, महावीर विल्डिंग के पास, सेक्टर नगर, सुपेला सिलाई (छ.ग.)
16. श्री दिनेश राम साहू, दाऊ श्री रतीराम साहू, मकान नंबर 14, दीनदयाल नगर, दुर्ग (छ.ग.)
17. श्री अब्दुल रफीक कुरैशी, उ/ओ श्री अब्दुल रशीद कुरैशी, लक्ष्मी गंज, दुर्ग (छ.ग.)
18. श्रीमती मेहजबीन रफीक पति अब्दुल रफीक कुरैशी, लक्ष्मी गंज, दुर्ग (छ.ग.)
19. श्री विनय गोदवानी, 4 नगर निगम आलोपी, सामने कार्यालयी श्री ए.के. रायपुर (छ.ग.)
20. मे0 जयश्री, ओ0 मे0 दुलहार, महमो मार्केट, 100 ट्रांसिट मलाहर क्वेरास, सिर्फ मकान जिला दुर्ग (छ.ग.)
21. श्री मनोकांत सिंह ओ0 किशन देव सिंह, बंगला नंबर 21 /8, पंचशील नगर, सिलाई (छ.ग.)
22. श्री सुनील कुमार चन्द्राकर, आर श्री आलम कुमार अग्रवाल, राज कॉलेज चुकड़ा जि0 दुर्ग (छ.ग.)
23. मे. रत्न मिनरल्स, द्वारा श्री प्रमोद मालेश्वर, कोटा श्री सिल्लिगा, हसनियरी रायपुर दुर्ग (छ.ग.)
24. मे0 सहयोग मिनरल्स, प्रो0 श्रीमती पुष्पा मिनरल्स, मून मार्केट के पास पोनभाठा रायपुर दुर्ग (छ.ग.)
25. मे0 भैरव मिनरल्स, प्रो0 बालाप्रसाद, जयप्रकाश चौक, दुर्ग (छ.ग.)
26. मे0 अरुणा मिनरल्स, प्रो0 अरुणा सिंघा, सोसायटी पारा, दुर्ग (छ.ग.)
27. श्री राकेश कुमार यादव, आर श्री शिवराम यादव, पुरा अहिवारा, तहसील धमधा, जिला दुर्ग (छ.ग.)
28. श्री हेमन्त कुमार निगम, आर श्री दशरथ राम निगम, मकान नंबर 3/2 स्ट्रीट नंबर 4 सेक्टर 2 सिलाई (छ.ग.)
29. श्री अनिल कुमार साहू, एम.आई.जी. सी–30 सेक्टर–1, डोंगरे नगर, रायपुर (छ.ग.)

की ओर सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

उपसचिव
छत्तीसगढ़ शासन
भूविज्ञान खनिज विभाग

कार्यालय कलेक्टर (खनि शाखा) जिला दुर्ग
छत्तीसगढ़

क्रमांक 239 / खनि.वि. / खनिज / 2011 दुर्ग, दिनांक– 29/4/11

प्रति,

मेसर्स एसीसी. सीमेंट लिमि.
जामुल सीमेंट वर्क्स, सिलाई,
जिला दुर्ग (छ.ग.)

विषय : जिला दुर्ग के ग्राम नंदनीडुबरी के रकबा 53.57 हे0 क्षेत्र पर खनिज चूनाकंकर का स्वीकृत अनिवार्यता।

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मेसर्स एसीसी. सीमेंट लिमि. के श्री ग्राम नंदनीडुबरी के कुल रकबा 53.57 हे0 क्षेत्र पर खनिज चूनाकंकर का खनि पट्टा दिनांक 02.12.2008 से 01.12.2038 तक की अवधि के लिए स्वीकृत है। स्वीकृत खनिज क्षेत्र के नीचे दर्शायी गई भाखडीय भूमि पर म.प्र. राजस्व संहिता 247(ड) के अंतर्गत उत्खनन कार्य प्रारंभ करने हेतु भू–अर्जन की अनुमति कलेक्टर महोदय के आदेश दिनांक 25.04.2011 द्वारा प्रदान की जाती है।

खसरा नंबर	रकबा	भूमि का प्रकार
1871/1	7.12 हे0	शासकीय भूमि (नाला)
1941	0.50 हे0	शासकीय भूमि (नाला)
1945	2.25 हे0	शासकीय भूमि (नाला)
1953	0.10 हे0	शासकीय भूमि (रास्ता)
योग :–	09	12.97 हे0

पर्यावरण की दृष्टि से स्वीकृत क्षेत्र के चारों ओर भूतारोपण कर रोपित पौधों का सुरक्षित ढंग से रख रखाव किया जावे।

(अनिल अग्रवाल)
खनि अधिकारी
कृते कलेक्टर दुर्ग (छ.ग.)
दुर्ग, दिनांक–

क्रमांक /खनि.वि./खनिज/2011 दुर्ग, दिनांक–

प्रतिलिपि :– 1. तहसीलदार धमधा जिला दुर्ग।
2. श्री बी.डी.मेश्राम, सहा.खनि अधिकारी जिला दुर्ग।
3. श्री एम.एल.साहू, प्रभारी खनि निरीक्षक जिला दुर्ग।
4. राजस्व निरीक्षक धमधा जिला दुर्ग।
की ओर सूचनार्थ।

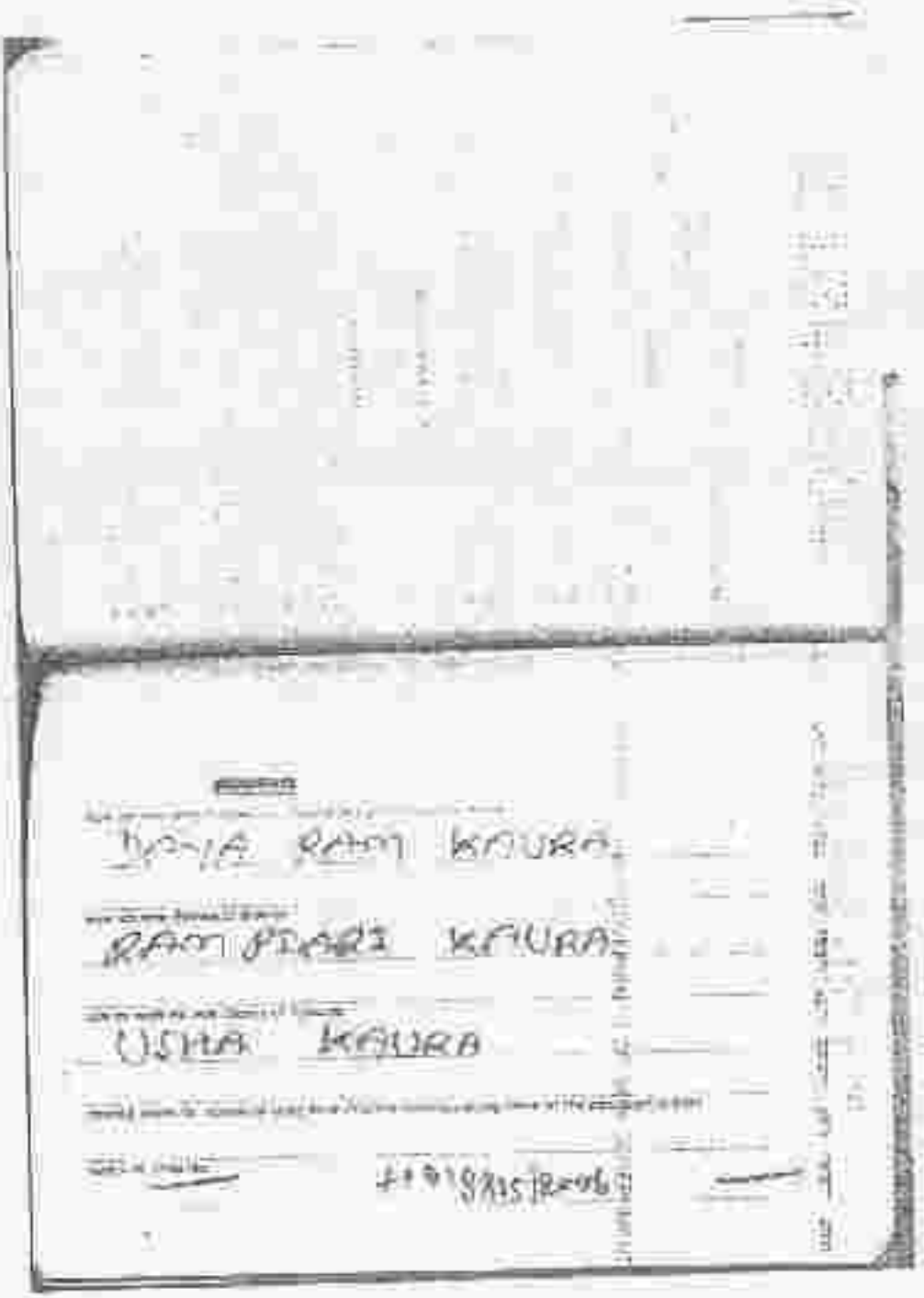
खनि अधिकारी
कृते कलेक्टर दुर्ग (छ.ग.)

ANNEXURE 2

Details of applicant, list of lease held by ACC Limited and attested copy of registration under Company Act


KAURA
KULDIP KUMAR
M
TARAN TARAN - PUNJAB
UDAIPUR


07 JAN 2011
3 JAN 2011



KAVITA RANI KAURA

RANI PIARE KAURA

USHA KAURA

The details of Mining Leases (state wise) already held by ACC Limited are tabulated below –

S No.	Lease Reference No & Date	Area (Hectare)	Postal address/ Location	Mineral	Remarks
1	Ref. No. 427 dt.06.01.2003 as transfer of ML	446.392	Bargarh Cement Works, Cement Nagar, PO Bamal-768038 Dist.Bargarh (Orissa)	Limestone	
2	Ref. No. MMN 1058/91/7558(41)/IND & Dtd. 17.11.1999	640.83	Chanda Cement Work, PO Cement Nagar - 442 502 Dist Chandrapur Maharashtra	Limestone	
3	Ref. No. MMN 1095/C.R.0006/Ind - 3 & Dtd. 06.12.2004	582.0	Chanda Cement Works, PO Cement Nagar - 442 502 Dist-Chandrapur Maharashtra	Limestone and shale	
4	Ref. No 2092 Dtd 13/09/1955	83.87	Chaibasa Cement Works, PO Jhinkpani - 833 215 Dist-West Singhbhum Jharkhand	Limestone	
5	Ref. No. 912 Dtd. 18.03.1971	588.88	Chaibasa Cement Works, PO Jhinkpani - 833 215 Dist-West Singhbhum Jharkhand	Limestone	
6	Upyog Bhoomi-I Mega-4758-1.7558 dated 29.01.2003	231.25	Gagal Cement Works, PO Baimana – 174 013 Dist- Bilaspur Himachal Pradesh	Limestone Quartzite & Shale	
7	Upyog Bhoomi-I Mega-7158-1017 dated 26.06.2003	1.36	Gagal Cement Works, PO Baimana - 174 013 Dist- Bilaspur Himachal Pradesh	Shale & Quartzite	
10	Ref. No. 7388 & Dtd. 06.04.1988	299.05	Jamul Cement Works, PO Jamul Cement Works Dist- Durg - 490 024 Chhattisgrah	Limestone	
11	Ref. No F.3-11/2001M Raipur Dtd.07.06.2001	36.01	Jamul Cement Works, PO Jamul Cement Works Dist- Durg - 490 024 Chhatisgrah	Limestone	
12	Ref. No. 1833 & Dtd. 04.02.2005	31.85	Jamul Cement Works, PO Jamul Cement Works Dist- Durg - 490 024 Chhatisgrah	Limestone	

13	Ref. No. 1571/8 Dtd 04.12.2008	83.47	Jamul Cement Works, PO Jamul Cement Works Dist- Durg - 490 024 Chhattisgarh	Limestone
14	Ref. No F 3-59/2007/12(1) Raipur Dtd.10.8.2009	382.982	Jamul Cement Works, PO Jamul Cement Works Dist- Durg - 490 024 Chhattisgarh	Limestone
15	Ref. No. 4114/Khanij/(U.P.)/2007 & Dtd. 08.10.2007	1570.22	Kymore Cement Works, P.O. Kymore - 483 880 Dist- Katni, Madhya Pradesh	Limestone and clay
16	Ref. No. F- 3 - 75 / 2002 / 12 / 2 dated 22.09.03 Vide Order of the Department of Mineral Resources , Govt of M.P.	1.083	Kymore Cement Works, P.O. Kymore - 483 880 Dist- Katni, Madhya Pradesh	Limestone
17	Ref. No. F- 3 - 55 / 2000 / 12 / 2 dated 04.10.06 Vide Order of the Department of Mineral Resources , Govt of M.P	6.76	Kymore Cement Works, P.O. Kymore - 483 880 Dist- Katni, Madhya Pradesh	Limestone
18	Ref. No. 3- 99 / 97 / 12 / 2 dated 12.02.2000 Vide Order of the Department of Mineral Resources , Govt of M.P	1.121	Kymore Cement Works, P.O. Kymore - 483 880 Dist- Katni, Madhya Pradesh	Limestone
19	Ref. No. F - 3 - 104 / 97 12 / 2 dated 26.08.08 Vide Order of the Department of Mineral Resources , Govt. of M.P	31.43	Kymore Cement Works, P.O. Kymore - 483 880 Dist - Katni, Madhya Pradesh	Limestone
20	Ref. No. F - 3 - 105 / 2000 / 12 / 2 dated 26.08.08 Vide Order of the Department of Mineral Resources , Govt. of M.P	6.01	Kymore Cement Works, P.O. Kymore - 483 880 Dist- Katni, Madhya Pradesh	Limestone
21	Applied for renewal, Dtd receipt in form - D G.No. 51 dated 21.07.92. The ML is under deemed renewal	1516.88	Lakheri Cement Works, P.O. Lakheri - 323 603 Dist- Bundi, Rajasthan	Limestone, building and other stone
22	Ref. No. G.O. 574 & Dtd 22.08.1989	138.5	Madukkarai Cement Works, Madukkarai , P.O. 641 105 Dist-Coimbatore, Tamil Nadu	Limestone
23	Ref. No. 643. 7702/Mis/08 Dated 04/01/2010	14.51	Madukkarai Cement Works, Madukkarai , P.O. 641 105 Dist Coimbatore,	Limestone

			Tamil Nadu	
24	Ref. No. GO. 2383/MM1/98 Dated 04/01/2010.	2.711	Madukkarai Cement Works, Madukkarai P.O. 641 105 Dist-Coimbatore, Tamil Nadu	Limestone
26	Ref. No. G.O. 725 & Dtd. 12.10.1999	25.72	Madukkarai Cement Works, Madukkarai, P.O. 641 105 Dist-Coimbatore, Tamil Nadu	Limestone
25	Ref. No. G.O. 220 & Dtd. 12.06.2006	[illegible]	Madukkarai Cement Works, Madukkarai, P.O. 641 105 Dist Coimbatore, Tamil Nadu	Limestone
27	Ref. No. C - 258 & Dtd. 27.02.1992	471.00	Wadi Cement Works, P.O. Wadi- 585 228 Dist-Gulbarga Karnataka	Limestone, clay and shale

The details of Mining Leases (state wise) applied for by ACC Limited are tabulated below :-

S. No.	Lease Reference no. & date / Date of Application	Area (Hectare)	Location	Type of Mineral	Remarks
1	August 24, 1995	583.96	Bargarh, Orissa	Limestone	
2	December 26, 2007	500	District Mallkangiri, Orissa	Limestone, quartzite, shale and laterite	
3	December 24, 2001	116.38	Dist West Singhbhum, Jharkhand	Limestone, quartzite, and shale	

4	June 30, 1995	118.69	District Durg, Chattisgarh	Limestone	
5	August 17, 2005	147.9	District Durg, Chattisgarh	Limestone	
6	August 19, 2004	624.24	District Gulbarga, Karnataka	Limestone, Shale and Clay	
7	August 26, 2009	408.5	District Chitradurga, Karnataka	Limestone & Dolomite	
8	August 26, 2009	302.34	District Chitradurga, Karnataka	Limestone & Dolomite	
9	August 11, 2010	1992.10	District Bagalkot, Karnataka	Limestone	
10	October 7, 2009	41.79	District Ariyalur, Tamil Nadu	Limestone, marl, shale, sandstone	
11	June 7, 2011	963.69	District Satna, Madhya Pradesh	Limestone, shale, dolomite, clay	
12	August 5, 2008	307.2	District Katni, Madhya Pradesh	Limestone	
13	August 5, 2007	997	District Nagaur, Rajasthan	Limestone	
14	August 2, 2007	994	District Nagaur, Rajasthan	Limestone	

18	February 1, 2010	1920	District Ajmer, Rajasthan	Limestone, dolomite, shale
16	27.01.2010	750	District Nagaur, Rajasthan	Limestone
17	08.02.2011	731.435	District Chittaurgarh, Rajasthan	Limestone
19	08.02.2011	980.5	District Chittaurgarh, Rajasthan	Limestone
49	31.01.2011	632	District Jaisalmer, Rajasthan	Limestone
20	31.01.2011	1040	District Jaisalmer, Rajasthan	Limestone
21	31.01.2011	912	District Jaisalmer, Rajasthan	Limestone
22	31.01.2011	949	District Jaisalmer, Rajasthan	Limestone
23	31.01.2011	700	District Jaisalmer, Rajasthan	Limestone
24	31.01.2011	700	District Jaisalmer, Rajasthan	Limestone
25	March 4, 2010	552.0375	District Kachchh, Gujarat	Limestone
26	March 4, 2010	1048.289	District Kachchh, Gujarat	Limestone

27	March 4, 2010	299.0116	District Kachchh, Gujarat	Limestone	
28	March 4, 2010	275.8870	District Kachchh, Gujarat	Limestone	
29	March 4, 2010	349.139	District Kachchh, Gujarat	Limestone	
30	March 4, 2010	606.1852	District Kachchh, Gujarat	Limestone	
31	April 27, 2010	11357	District Porbandar, Gujarat	Limestone	
32	April 28, 2010	720.151	District Junagadh, Gujarat	Limestone	

GOVERNMENT OF INDIA
MINISTRY OF COMPANY AFFAIRS

Maharashtra, Mumbai

Everest, 100, Marine Road, , Mumbai - 400002, Maharashtra, INDIA

Corporate Identity Number: L26940MH1936PLC002515

Fresh Certificate of Incorporation Consequent upon Change of Name

IN THE MATTER OF M/s. THE ASSOCIATED CEMENT COMPANIES LIMITED

I hereby certify that THE ASSOCIATED CEMENT COMPANIES LIMITED which was originally incorporated on FIRST day of AUGUST NINETEEN THIRTY SIX under the Companies Act, 1913 (No. 1 of 1913) as THE ASSOCIATED CEMENT COMPANIES LIMITED having duly passed the necessary resolution in terms of Section 21 of the Companies Act, 1956 and the approval of the Central Government signified in writing having been accorded thereto under Section 21 of the Companies Act, 1956, read with Government of India, Department of Company Affairs, New Delhi Notification No. C.S.R. 507 (E) dated 21/06/1995 vide SRN A01822865 dated 01/09/2006 the name of the said company is this day changed to ACC Limited and this Certificate is issued pursuant to Section 23(1) of the said Act.

Given under my hand at Mumbai this FIRST day of SEPTEMBER TWO THOUSAND SIX.

(MILIND VITTHALRAO CHAKRANARAYAN)
Maharashtra, Mumbai

CERTIFIED TRUE COPY
For ACC LIMITED

BURJOR D. MAHYAR
COMPANY SECRETARY & HEAD-COMPLIANCE

TRUE COPY
ATTESTED BY ME

Rajani Pathak
B.Sc., LL.M.
NOTARY & ADVOCATE
1st Floor, Vision Building Centre,
Bhiwandiwala Terrace,
Adjacent to Court, Thane.
Ph.: 2532 0825, 9821126768, 9869836868

ANNEXURE 3

Typical Borehole Logs (Old done by BSP and Exploration done by ACC in 2011) & UNFC guidelines for Limestone Deposit

C. FIELD GUIDELINES FOR ADOPTION OF UNITED NATIONS FRAMEWORK CLASSIFICATION

1. Stratiform, Stratabound and Tabular Deposits of Regular Habit

Characteristics of deposits

Principal kinds of minerals

GEOLOGICAL AXIS

G1 (Reconnaissance)	G2 (Prospecting)	G3 (General Exploration)	G4 (Detailed Exploration)
1.Aerial reconnaissance; for ore zones, volcanic rocks, strata etc.	1.Geological survey: (i) Mapping on 1:50,000 to 1:25,000 scale for coal, lignite exploration mapping on 1:10,000; (ii)Marking of areas as covered with exposed; (iii)Assessment of lithology, structure, ore mineralisation, analysis of ore history of district.	1.Geological survey: (i)Mapping on 1:25,000 to 1:5,000 scale with interpretation, plans, sections, if any, also for coal, explore on 1:10,000 scale (ii) Laying of lines as parallel with regional (iii)Assessment of lithology, ultimate, surface mineralisation, analysis of ore from exposures	1.Geological survey (i)Mapping on 1:2,000 and mapping 1:500 scale when minerals in bed (ii)Preparation of detailed topographical-cum-geological map showing all surface geological features, extent of deposit, structure, lithology in boreholes, assay plan, all sections of exploratory mine development and borehole data; (iii)Topographical lines and contour (final) should belong to the map.
2.Geophysical survey: Geophysical survey.	2.Geochemical survey: Geochemical samples, rock specimens and if necessary, rock specimen, thermal self-potential tests for all metallic mineral exploration)	2.Geophysical survey: (i)Area of the geophysical control testing for coal exploration mapping; (ii)Recording of selective elements, likely to produce element (i.e. Co to bauxite, Ni, PGE in ferruginous, Pb in Fe ore, etc.) for metallic exploration; (iii)Any other exploration, geophysical sensible at coal and metals to be done by economical limit).	2.Geophysical survey: (Metals) and quality borehole geophysical surveys.
3.Geophysical: (i)Trenching, pitting, shallow drilling, adits, shafts, etc. for coal exploration mapping; (ii)Trenching, pitting, shallow drilling, adits, shafts, etc. for coal exploration mapping; (iii)Trenching, pitting, shallow drilling, adits, shafts, etc. for coal exploration mapping.	3.Geophysical: (i)Trenching, pitting, shallow drilling, adits, shafts, etc. for coal exploration mapping; (ii)Trenching, pitting, shallow drilling, adits, shafts, etc. for coal exploration mapping; (iii)Trenching, pitting, shallow drilling, adits, shafts, etc. for coal exploration mapping.	3.Geophysical survey: (i)Borehole geophysical surveys.	3.Geophysical: (i)Trenching - 2 to 3 per sq. km. for shallow deposits.

4. Petrographic and micropaleontological studies: Determination of primary and secondary porosity, permeability, mineralogical composition of clastic and carbonate rocks, textural characteristics of clastic rocks, diagenetic transformations of minerals and rocks, fossil assemblages, paleoecological interpretations, paleoenvironmental reconstructions, and biostratigraphic correlations. 5. Synthesis of all available data to prepare a comprehensive report on the hydrocarbon prospects of the basin.	(a) Total depth: 1000 to 2000 meters. (b) Diameter: 200 to 300 mm. (c) Inclination: 0° to 5°. (d) Casing: 150 mm diameter, 300 m. (e) Drilling fluid: Water-based mud. (f) Core barrel: 100 mm diameter, 3 m length. (g) Sampling: 5 samples per day. (h) Safety: Blowout preventer, fire extinguishers, first aid kit. (i) Environmental: Waste disposal, noise control. (j) Personnel: 10 workers, 2 supervisors. (k) Equipment: Drilling rig, pumps, generators. (l) Maintenance: Daily checks, weekly servicing. (m) Logistics: Transportation, accommodation, food. (n) Communication: Radio, telephone. (o) Emergency: Evacuation plan, medical kit. (p) Training: Safety and operation training. (q) Documentation: Daily reports, weekly summaries. (r) Budget: Estimated cost, funding sources. (s) Timeline: 6 months. (t) Permits: Drilling permit, environmental clearance. (u) Insurance: Coverage for personnel and equipment. (v) Waste management: Disposal of drilling mud and cuttings. (w) Water supply: Source and quality. (x) Power supply: Generators, backup. (y) Lighting: Adequate for night operations. (z) Miscellaneous: Any other relevant information.	(a) Core diameter: 100 mm. (b) Core length: 3 m. (c) Core orientation: Oriented using a core orientation tool. (d) Core description: Lithology, color, texture, structure, fossils, and other features. (e) Core photography: Photographs of each core box. (f) Core sampling: Samples for petrographic, geochemical, and petrophysical analysis. (g) Core storage: Stored in a core shed. (h) Core transportation: Transported to the laboratory. (i) Core analysis: Porosity, permeability, and fluid saturation measurements. (j) Core interpretation: Integration with other data. (k) Core reporting: Detailed report. (l) Core archiving: Long-term storage. (m) Core disposal: Disposal of unused core. (n) Core safety: Safety procedures. (o) Core quality control: Quality checks. (p) Core training: Training for personnel. (q) Core budget: Budget for coring. (r) Core timeline: Timeline for coring. (s) Core permits: Permits for coring. (t) Core insurance: Insurance for coring. (u) Core waste management: Waste management for coring. (v) Core water supply: Water supply for coring. (w) Core power supply: Power supply for coring. (x) Core lighting: Lighting for coring. (y) Core miscellaneous: Miscellaneous for coring. (z) Core conclusion: Conclusion for coring.	(a) Outcrop description: Detailed description of outcrops, including lithology, structure, and fossils. (b) Sample collection: Collection of samples for laboratory analysis. (c) Petrographic analysis: Thin section analysis of rock samples. (d) Biostratigraphic analysis: Identification of fossils and determination of age. (e) Paleoenvironmental interpretation: Interpretation of depositional environments. (f) Correlation: Correlation of outcrops with subsurface data. (g) Reporting: Preparation of a detailed report. (h) Presentation: Presentation of findings. (i) Publication: Publication of results in a scientific journal. (j) Data management: Management of data. (k) Quality control: Quality control of data. (l) Safety: Safety procedures for fieldwork. (m) Permits: Permits for fieldwork. (n) Insurance: Insurance for fieldwork. (o) Budget: Budget for fieldwork. (p) Timeline: Timeline for fieldwork. (q) Equipment: Equipment for fieldwork. (r) Transportation: Transportation for fieldwork. (s) Accommodation: Accommodation for fieldwork. (t) Food: Food for fieldwork. (u) Communication: Communication for fieldwork. (v) Emergency: Emergency procedures for fieldwork. (w) Waste management: Waste management for fieldwork. (x) Water supply: Water supply for fieldwork. (y) Power supply: Power supply for fieldwork. (z) Lighting: Lighting for fieldwork.
5. Petrographic and paleontological study: Petrographic study of rocks of the deposit and its surroundings, identification of organic remains, correlation. (f) Determination of the age at which mineral deposits occur. (g) Stratigraphic and tectonic relations, paleogeography, the influence of one of these factors on the formation of the deposit, the conditions for the occurrence of mineral deposits.	(a) Total depth: 1000 to 2000 meters. (b) Diameter: 200 to 300 mm. (c) Inclination: 0° to 5°. (d) Casing: 150 mm diameter, 300 m. (e) Drilling fluid: Water-based mud. (f) Core barrel: 100 mm diameter, 3 m length. (g) Sampling: 5 samples per day. (h) Safety: Blowout preventer, fire extinguishers, first aid kit. (i) Environmental: Waste disposal, noise control. (j) Personnel: 10 workers, 2 supervisors. (k) Equipment: Drilling rig, pumps, generators. (l) Maintenance: Daily checks, weekly servicing. (m) Logistics: Transportation, accommodation, food. (n) Communication: Radio, telephone. (o) Emergency: Evacuation plan, medical kit. (p) Training: Safety and operation training. (q) Documentation: Daily reports, weekly summaries. (r) Budget: Estimated cost, funding sources. (s) Timeline: 6 months. (t) Permits: Drilling permit, environmental clearance. (u) Insurance: Coverage for personnel and equipment. (v) Waste management: Disposal of drilling mud and cuttings. (w) Water supply: Source and quality. (x) Power supply: Generators, backup. (y) Lighting: Adequate for night operations. (z) Miscellaneous: Any other relevant information.	(a) Core diameter: 100 mm. (b) Core length: 3 m. (c) Core orientation: Oriented using a core orientation tool. (d) Core description: Lithology, color, texture, structure, fossils, and other features. (e) Core photography: Photographs of each core box. (f) Core sampling: Samples for petrographic, geochemical, and petrophysical analysis. (g) Core storage: Stored in a core shed. (h) Core transportation: Transported to the laboratory. (i) Core analysis: Porosity, permeability, and fluid saturation measurements. (j) Core interpretation: Integration with other data. (k) Core reporting: Detailed report. (l) Core archiving: Long-term storage. (m) Core disposal: Disposal of unused core. (n) Core safety: Safety procedures. (o) Core quality control: Quality checks. (p) Core training: Training for personnel. (q) Core budget: Budget for coring. (r) Core timeline: Timeline for coring. (s) Core permits: Permits for coring. (t) Core insurance: Insurance for coring. (u) Core waste management: Waste management for coring. (v) Core water supply: Water supply for coring. (w) Core power supply: Power supply for coring. (x) Core lighting: Lighting for coring. (y) Core miscellaneous: Miscellaneous for coring. (z) Core conclusion: Conclusion for coring.	(a) Outcrop description: Detailed description of outcrops, including lithology, structure, and fossils. (b) Sample collection: Collection of samples for laboratory analysis. (c) Petrographic analysis: Thin section analysis of rock samples. (d) Biostratigraphic analysis: Identification of fossils and determination of age. (e) Paleoenvironmental interpretation: Interpretation of depositional environments. (f) Correlation: Correlation of outcrops with subsurface data. (g) Reporting: Preparation of a detailed report. (h) Presentation: Presentation of findings. (i) Publication: Publication of results in a scientific journal. (j) Data management: Management of data. (k) Quality control: Quality control of data. (l) Safety: Safety procedures for fieldwork. (m) Permits: Permits for fieldwork. (n) Insurance: Insurance for fieldwork. (o) Budget: Budget for fieldwork. (p) Timeline: Timeline for fieldwork. (q) Equipment: Equipment for fieldwork. (r) Transportation: Transportation for fieldwork. (s) Accommodation: Accommodation for fieldwork. (t) Food: Food for fieldwork. (u) Communication: Communication for fieldwork. (v) Emergency: Emergency procedures for fieldwork. (w) Waste management: Waste management for fieldwork. (x) Water supply: Water supply for fieldwork. (y) Power supply: Power supply for fieldwork. (z) Lighting: Lighting for fieldwork.
6. Petrographic and micropaleontological studies: Determination of primary and secondary porosity, permeability, mineralogical composition of clastic and carbonate rocks, textural characteristics of clastic rocks, diagenetic transformations of minerals and rocks, fossil assemblages, paleoecological interpretations, paleoenvironmental reconstructions, and biostratigraphic correlations. 7. Synthesis of all available data to prepare a comprehensive report on the hydrocarbon prospects of the basin.	(a) Total depth: 1000 to 2000 meters. (b) Diameter: 200 to 300 mm. (c) Inclination: 0° to 5°. (d) Casing: 150 mm diameter, 300 m. (e) Drilling fluid: Water-based mud. (f) Core barrel: 100 mm diameter, 3 m length. (g) Sampling: 5 samples per day. (h) Safety: Blowout preventer, fire extinguishers, first aid kit. (i) Environmental: Waste disposal, noise control. (j) Personnel: 10 workers, 2 supervisors. (k) Equipment: Drilling rig, pumps, generators. (l) Maintenance: Daily checks, weekly servicing. (m) Logistics: Transportation, accommodation, food. (n) Communication: Radio, telephone. (o) Emergency: Evacuation plan, medical kit. (p) Training: Safety and operation training. (q) Documentation: Daily reports, weekly summaries. (r) Budget: Estimated cost, funding sources. (s) Timeline: 6 months. (t) Permits: Drilling permit, environmental clearance. (u) Insurance: Coverage for personnel and equipment. (v) Waste management: Disposal of drilling mud and cuttings. (w) Water supply: Source and quality. (x) Power supply: Generators, backup. (y) Lighting: Adequate for night operations. (z) Miscellaneous: Any other relevant information.	(a) Core diameter: 100 mm. (b) Core length: 3 m. (c) Core orientation: Oriented using a core orientation tool. (d) Core description: Lithology, color, texture, structure, fossils, and other features. (e) Core photography: Photographs of each core box. (f) Core sampling: Samples for petrographic, geochemical, and petrophysical analysis. (g) Core storage: Stored in a core shed. (h) Core transportation: Transported to the laboratory. (i) Core analysis: Porosity, permeability, and fluid saturation measurements. (j) Core interpretation: Integration with other data. (k) Core reporting: Detailed report. (l) Core archiving: Long-term storage. (m) Core disposal: Disposal of unused core. (n) Core safety: Safety procedures. (o) Core quality control: Quality checks. (p) Core training: Training for personnel. (q) Core budget: Budget for coring. (r) Core timeline: Timeline for coring. (s) Core permits: Permits for coring. (t) Core insurance: Insurance for coring. (u) Core waste management: Waste management for coring. (v) Core water supply: Water supply for coring. (w) Core power supply: Power supply for coring. (x) Core lighting: Lighting for coring. (y) Core miscellaneous: Miscellaneous for coring. (z) Core conclusion: Conclusion for coring.	(a) Outcrop description: Detailed description of outcrops, including lithology, structure, and fossils. (b) Sample collection: Collection of samples for laboratory analysis. (c) Petrographic analysis: Thin section analysis of rock samples. (d) Biostratigraphic analysis: Identification of fossils and determination of age. (e) Paleoenvironmental interpretation: Interpretation of depositional environments. (f) Correlation: Correlation of outcrops with subsurface data. (g) Reporting: Preparation of a detailed report. (h) Presentation: Presentation of findings. (i) Publication: Publication of results in a scientific journal. (j) Data management: Management of data. (k) Quality control: Quality control of data. (l) Safety: Safety procedures for fieldwork. (m) Permits: Permits for fieldwork. (n) Insurance: Insurance for fieldwork. (o) Budget: Budget for fieldwork. (p) Timeline: Timeline for fieldwork. (q) Equipment: Equipment for fieldwork. (r) Transportation: Transportation for fieldwork. (s) Accommodation: Accommodation for fieldwork. (t) Food: Food for fieldwork. (u) Communication: Communication for fieldwork. (v) Emergency: Emergency procedures for fieldwork. (w) Waste management: Waste management for fieldwork. (x) Water supply: Water supply for fieldwork. (y) Power supply: Power supply for fieldwork. (z) Lighting: Lighting for fieldwork.

FEASIBILITY AXIS

P3 (Geological Study)	P2 (Pre-feasibility study)	P1 (Feasibility Study)
1.Geological and scope of study (i) Geological, environmental and chemical analysis data. (ii) Tectonic, hydrological and mineral of land. (iii) Geomorphology. (iv) Mineralogy, soil and physiography analysis data if possible. 2. The activities or steps or task like techniques for P3.	1. Geology: Local geology, mineralogy, composition of ore, type and geometry. 2. Mining: Methods, pre-production plan, development, excavation, drilling, blasting etc. 3. Environment: Base studies on environment. 4. Processing: Detailed laboratory analysis and bench scale test, investigation etc. Flow sheet finalization. 5.Infrastructure and services, establishment facilities: Detail study 6. Costing: Capital and operating cost - more estimates based on similar existing operations. 7.Marketing: Overview like, historical situation, demand supply, national, policy etc. 8. Economic viability: Preliminary study of cash flow forecasts. 9. Other factors: Statutory permissions relating to labour, land, water, pollution, etc.	1. Geology: Geology of mineral, mine, detailed exploration, coal, quality and reserves, rock type, strength, bulk sample for beneficiation, geotechnical and ground water studies, however for coal, benefit after studies of the coal is depending over the qualities. 2. Mining: Mining plan, mine economics, different methods, equipment selection, analysis, investment. 3.Environment: EIA studies and EMP including socio economic impact, sensitivities of project affected persons, public hearing/clearance, land use data. 4. Processing: Pilot scale/commercial scale investigations, list of equipment, equipment and process control considerations like, type, capacity of tanks, etc. 5. Infrastructure and services, construction activities, facilities 6. Costing: Detailed breakup of capital cost, operating cost, details of working capital. 7.Marketing: Overview, detailed market reports. 8. Economic viability: Cash flow forecasts, financial effects, sensitivity studies. 9. Other factors: Statutory permissions relating to labour, land, water, pollution, etc.

ECONOMIC AXIS

E3 (Intrinsically Economic)	E2 (Primarily Economic)	E1 (Economic)
1. Procreation is central, guiding principle; single exception of grandparents who are infertile, elderly, etc. Clear cut distinction between male and female.	1. Optional marriage/family structure.	1. Detailed regulations
2. Prescriptions or duties of the family required by ICS.	2. Specific role-specific guidance/norms/rules or compensation for future economic benefit/profit.	2. Time period stating [illegible]
	3. Optional encouragement of procreation and other functions.	3. Specific reference to [illegible]
		4. Specific functions of [illegible] and other functions.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
4	137-274	384.75-384	–	–	–	–	–	30.96	22.60		363.50	381.89	
		[illegible]	–	–	–	–	–						
		282-280	17.35	2.70	5.57	36.65							
		280-278	16.09	1.94	5.80	[illegible]							
		278-276	13.95	3.16	6.40	38.41							
		276-274	16.76	2.48	5.85	37.05	35.72						
			16.22	2.73	5.07	37.64	36.72						
	274-262	274-272	16.07	2.16	4.84	34.71	37.20						
		272-270	15.30	2.70	10.90	22.17	37.58						
		270-268	16.30	2.50	4.94	33.88	38.00						
		268-265	16.74	3.96	6.00	37.50	35.90						
		265-264	18.10	3.10	4.58	30.75	34.80						
		264-262	14.31	2.20	5.75	28.01	31.50						
			14.05	3.30	7.06	35.00	35.55						
	262-247	262-260	21.00	3.60	4.51	22.51	32.40						
		260-258	13.74	2.50	6.01	29.86	38.15						
		258-256	8.20	1.30	4.35	45.32	40.10						
		256-254	7.90	1.70	5.95	43.58	41.44						
		254-252	16.00	2.00	7.71	38.5	38.50						
			14.35	2.34	5.90	30.35	37.53						

/K.Gangadharan/

(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
285-274	284.75-284	-	-	-	-	-	27.[illegible]	21.00		282.25	277.31	
	284-282	-	-	-	-	-						
	282-280	-	-	-	-	-						
	280-278	-	-	-	-	-						
	278-276	-	-	-	-	-						
	276-274	15.90	2.60	7.71	28.51	30.66						
		15.90	2.60	7.71	28.51	30.55						
274-262	274-272	10.17	3.37	12.13	31.98	27.58						
	272-270	20.74	3.36	10.61	28.00	26.57						
	270-268	17.80	2.60	11.12	31.88	35.00						
	268-266	21.00	3.00	8.70	31.82	34.50						
	266-264	29.40	3.65	6.48	32.46	30.30						
	264-262	30.60	4.10	8.79	25.74	31.60						
		21.66	3.21	9.12	30.34	30.59						
262-247	262-260	21.50	2.50	7.89	33.02	36.10						
	260-258	12.70	1.80	8.72	34.32	38.80						
	258-256	12.90	1.90	11.14	25.84	39.10						
	256-254	-	-	-	-	-						
	254-252	-	-	-	-	-						
	252-250	-	-	-	-	-						
	250-247	-	-	-	-	-						
		15.70	1.90	9.25	33.34	37.33						

contd..(2)

(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1- 207-214	214.75-224	-	-	-	-	-			27.83	30.91		283.80 252.25
	231-253	-	-	-	-	-						
	218-260	-	-	-	-	-						
	260-270	13.80	1.07	5.44	38.36	35.0						
	270-275	17.85	1.56	6.70	40.78	36.6						
	275-274	14.97	2.15	6.97	38.60	37.5						
		16.24	1.25	6.50	38.49	36.70						
2-1-2-53	27+-277	16.50	1.34	6.64	38.78	37.0						
	278-280	16.80	1.10	6.25	38.47	37.1						
	270-278	17.64	2.03	7.03	39.70	36.7						
	281-286	10.64	2.03	6.34	38.72	36.34						
	286-264	15.85	2.45	6.06	39.53	36.80						
	265-268	18.85	2.42	6.16	39.94	36.20						
		16.43	2.78	6.82	38.38	36.65						
2-1-4-57	268-280	27.45	1.65	4.82	35.37	31.05						
	280-288	25.30	3.74	5.53	35.32	31.76						
	288-296	24.36	3.76	6.80	41.06	37.61						
	296-284	10.26	1.25	5.50	45.48	39.46						
	284-302	33.10	1.30	5.05	38.18	33.80						
	302-308	11.37	1.30	6.80	41.85	38.62						
		16.62	2.45	5.83	32.89	38.37						

Contd...13

- 01 -

(1)	(3)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
102-224	224/25-234	-	-	-	-	-	39.16	36.44	50.85	241.82	200.80
	234-252	-	-	-	-	-					
	252-261	9.82	1.76	2.06	47.08	39.20					
	261-272	10.45	1.74	1.44	50.80	35.80					
	272-276	21.69	3.26	1.52	46.91	26.62					
	276-274	2.89	2.16	1.76	46.88	37.52					
		11.69	2.23	1.93	46.67	37.30					
121-264	274-272	15.66	2.71	2.53	41.99	36.04					
	272-271	13.26	2.74	2.49	45.88	37.03					
	271-262	17.29	3.10	1.46	42.96	35.03					
	262-255	14.01	2.42	2.01	38.04	32.57					
	255-251	24.07	3.38	2.41	43.67	36.73					
	251-242	16.51	3.48	3.52	34.99	31.70					
		16.28	3.41	3.43	40.53	36.84					
101-247	242-241	20.27	3.02	2.12	35.24	34.34					
	241-238	5.04	2.36	6.42	30.72	30.04					
	238-235	21.21	1.76	5.71	43.07	30.37					
	235-254	11.71	1.51	12.05	39.76	30.16					
	254-252	3.42	1.77	11.81	47.47	40.81					
	252-247	8.63	2.34	11.11	38.40	41.35					
		7.31	1.62	11.16	41.30	41.34					
		10.33	2.23	8.31	38.65	34.05					

Contd./-

(1)	(2)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
[illegible]	[illegible]	-	-	-	-	-						
	[illegible]	-	-	-	-	-						
	[illegible]	-	-	-	-	-						
	[illegible]	11.[illegible]	1.60	1.15	14.38	32.35						
	[illegible]	13.50	2.30	1.71	16.68	34.20						
	[illegible]	12.10	1.90	2.71	14.85	32.56						
		12.27	1.93	1.91	15.97	32.72						
[illegible]	[illegible]	11[illegible].00	2.62	1.35	12.85	30.72						
	[illegible]	14.80	2.30	1.29	15.10	33.50						
	[illegible]	13.75	1.80	1.80	15.08	33.43						
	[illegible]	13.65	2.00	1.73	15.12	32.50						
	[illegible]	13.[illegible]	1.60	1.60	15.83	32.83						
	[illegible]	13.00	2.00	1.85	15.00	32.50						
		13.01	1.99	1.76	15.11	33.27						
[illegible]		[illegible]										

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
11.	270~274	256,75~288	-	-	-	-	-	31.38	29.10		90~76	25.5	
		700~701	-	-	-	-	-						
		240~250	-	-	-	-	-						
		250~258	10.80	1.35	3.00	12.75	37.5						
		258~270	13.50	2.15	3.90	19.30	30.5						
		270~274	14.00	2.50	4.15	13.75	37.5						
			13.75	2.43	3.69	13.50	37.5						
	274~282	274~278	17.30	2.95	3.45	21.85	35.2						
		278~270	17.10	2.20	3.25	12.55	35.5						
		270~286	16.10	2.25	3.15	20.05	35.5						
		286~285	14.25	1.90	2.17	14.20	35.4						
		285~254	20.30	3.00	1.00	10.90	31.4						
		254~262	23.50	4.10	2.25	17.10	30.5						
			5.05	2.49	2.11	17.93	34.9						
	282~287	262~270	25.00	3.01	0.50	35.07	27.1						
		270~275	18.10	3.75	2.30	39.70	21.2						
		275~285	8.74	1.40	1.50	17.14	40.5						
		285~294	8.90	1.70	1.69	47.20	39.0						
		294~251	15.05	3.30	4.73	42.43	36.2						
		251~250	-	-	-	-	-						
		250~247	-	-	-	-	-						
			17.05	3.32	2.71	41.24	36.7						

cont'd page 12

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1.	250-274	261.75-284	-	-	-	-	-	31.25	30.95	96.80	254.75	
		284-292	13.72	1.75	3.65	43.73	47.00					
		288-293	10.04	1.80	3.75	47.30	35.45					
		290-278	9.25	1.70	3.40	47.60	37.31					
		278-276	11.00	2.20	3.85	49.99	38.42					
		275-274	10.80	1.94	3.68	50.30	38.67					
			11.03	1.76	3.14	48.26	35.77					
	274-300	271-275	13.90	2.50	3.64	46.00	38.65					
		278-270	11.20	1.90	3.36	46.00	38.60					
		270-269	10.44	1.00	3.50	45.05	38.10					
		268-264	14.76	2.65	3.64	50.67	37.00					
		266-261	12.40	2.24	3.36	45.25	37.05					
		264-262	14.32	2.22	3.15	49.67	39.00					
			14.55	1.9-	3.44	48.55	38.67					
	252-277	252-250	27.50	4.95	3.35	32.05	30.35					
		250-253	20.44	3.05	3.75	35.31	25.70					
		253-255	14.30	1.45	3.30	42.70	35.90					
		255-259	8.30	1.45	3.50	42.07	39.80					
		259-262	8.00	1.74	3.70	46.07	39.30					
		262-260	-	-	-	-	-					
		260-267	-	-	-	-	-					
			15.77	2.85	3.50	41.13	30.75					

(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	259-274	241.75-199	-	-	-	-	-	40.80	2.90	1005	294.90	211.52
		265-283	-	-	-	-						
		279-280	19.20	8.40	1.82	64.84	96.25					
		280-278	18.42	8.50	1.85	64.76	97.34					
		278-276	19.80	8.80	1.44	60.66	97.20					
		276-274	19.70	8.40	2.20	46.00	96.73					
			19.90	8.50	1.88	46.95	98.71					
	274-269	274-272	19.70	8.78	1.98	48.80	98.98					
		272-270	18.80	8.80	1.97	46.72	97.00					
		270-268	-	-	-	-	-					
		268-266	-	-	-	-	-					
		266-264	-	-	-	-	-					
		264-262	-	-	-	-	-					
			19.75	8.68	1.98	48.76	98.44					

ocntd.2e

Sl No	Bore Hole No	R.L in Metres	Depth drilled in metres	Thickness overburden in metres	Thickness of Laterites															
					1st bench	2nd bench	3rd bench	AVERAGE CHEMICAL COMPOSITION												
								1st bench				2nd bench				3rd bench				
								Al2O3	CaO	MgO	Al2O3	CaO	MgO	Al2O3	CaO	MgO	Al2O3	CaO	MgO
1		277.20	9.70	0.30	2.98	3.01	N.L	14.08	2.22	43.16	3.43	3.26	2.58	41.02	1.00	1				
2	2	284.60	32.47	NIL	10.00	12.00	8.47	8.75	3.60	45.33	1.77	4.06	3.34	42.83	1.07	1.35	8.55	43.63	4.08	
3	3	283.75	31.50	3.15	3.50	12.00	11.65	15.25	2.62	42.50	2.94	10.48	2.22	41.76	1.05	1.30	2.57	40.33	2.58	
4	4	281.25	33.48	1.00	6.20	12.00	13.13	23.07	5.65	35.05	1.87	12.05	1.50	10.73	1.35	1.34	2.83	44.11	1.38	
5	5	270.00	30.50	2.00	5.00	12.00	10.60	21.40	2.70	34.50	1.59	27.82	2.50	20.77	1.45	1.17	2.07	43.04	2.00	
6	6	277.50	36.75	NIL	3.50	12.00	14.67	12.50	1.19	46.07	2.13	10.01	1.53	45.10	1.63	1.42	2.12	44.01	2.01	
7	7	276.75	39.75	0.31	3.67	12.00	14.07	14.97	2.10	42.03	2.80	16.03	2.10	43.74	1.72	1.48	1.31	45.11	1.33	
8	8	279.90	36.00	2.80	2.58	12.00	10.67	20.80	3.76	37.04	1.19	19.45	2.50	41.40	1.62	1.39	2.71	42.00	2.58	
9	9	285.25	34.00	4.00	3.25	12.00	14.75	22.00	5.30	30.32	1.00	14.00	2.12	44.98	2.01	1.24.47	2.24	40.92	2.09	
10	10	282.75	39.47	1.80	3.75	12.00	9.72	8.18	4.18	47.02	1.47	6.93	4.78	47.02	1.47	5.93	3.53	47.02	1.47	
11	11	282.70	3.90	2.75	6.03	12.00	5.77	13.25	3.09	49.20	2.06	12.05	2.42	48.40	2.10	1.24.47	2.82	49.34	2.42	
12	12	281.35	37.45	1.54	5.71	12.00	7.30	12.25	1.83	40.87	1.68	13.41	1.92	46.44	1.76					
13	13	270.50	38.81	0.50	4.70	12.00	13.00	13.20	2.66	45.22	1.84	14.55	2.51	45.7	1.79	15.16	2.04	41.56	1.35	
14	14	276.00	32.91	2.20	7.20	12.00	10.50	12.60	2.60	45.26	1.65	12.72	1.79	46.75	2.03	16.62	2.01	40.00	2.16	
15	15	279.60	18.51	6.80	3.00	12.00	1.01	NIL	NIL	NIL	NIL	12.72	1.81	39.05	2.77	12.00	.30	47.22	1.57	
16	16	278.75	31.60	4.11	7.24	12.00	13.50	3.91	0.55	46.34	2.18	12.28	1.55	46.76	2.21	4.61	3.04	40.48	5.01	
17	17	281.50	36.00	7.60	6.8	12.00	10.00	NIL	NIL	NIL	NIL	10.72	2.42	40.92	2.08	12.44	2.00	39.66	4.40	
18	18	283.25	37.83	2.82	6.88	12.00	10.00	10.00	2.28	35.40	6.50	10.46	2.78	35.12	2.33	16.87	2.48	35.26	5.22	
19	19	283.25	36.00	1.85	8.70	12.00	13.25	11.42	1.73	46.15	2.10	16.85	2.04	47.09	2.16	14.53	2.27	34.07	5.12	
20	20	282.25	27.00	5.00	3.85	12.00	6.75	10.00	2.00	38.34	7.71	21.88	3.21	39.76	5.02	15.63	1.93	34.28	9.95	
21	21	281.50	35.14	0.75	9.00	12.00	15.00	11.68	1.09	45.67	1.63	15.95	2.45	42.56	2.41	12.43	2.06	38.10	5.01	
22	22	282.00	30.38	2.25	2.25	12.00	9.38	14.17	2.17	44.02	2.66	12.59	1.88	45.27	2.23	15.29	2.05	36.00	5.91	
23	23	284.75	13.50	2.00	3.00	2.50	NIL	13.00	1.30	44.63	1.88	14.15	1.85	53.36	1.17					
24	24	281.75	31.25	1.00	2.75	12.00	12.00	11.33	1.73	45.26	3.14	12.55	1.64	43.06	2.44	15.77	2.02	41.03	3.12	
25	25	283.50	29.64	0.50	6.05	12.00	11.20	14.62	2.79	37.16	6.07	18.25	3.10	35.00	1.80	14.58	2.24	39.35	5.55	

TABLE SHOWING THECEMENT GRADE LIMESTONE RESERVES AND GRADE OF ORE IN DETAILED BLOCKS (1st BENCH)

Block No	Surface area	Computed D	Volume in M3	Tonnage	Al2O3	R2o3	CaO	MgO	Al2O3 Tonnes	R2O3 Tonnes	CaO Tonnes	MgO Tonnes
1	2007	8.00	16060	46577	10.67	3.41	44.55	2.25	5000	1588	20724	1047
2	2484	7.40	18375	41838	10.47	1.92	44.66	1.78	4380	803	18681	744
3	2168	9.00	19525	31860	13.75	3.58	43.68	1.77	4382	1141	13919	564
4	2000	6.00	10680	25156	22.62	3.11	35.06	1.51	5500	782	8822	379
5	4600	3.77	16002	37703	21.81	3.71	36.53	3.40	8225	1398	13774	1282
6	1512	3.94	5954	13816	22.54	2.31	45.05	2.01	3114	319	6224	278
7	3640	2.91	10591	24601	12.10	3.56	41.48	1.00	2977	875	10205	246
8	20000	5.10	69830	162000	17.23	2.40	45.61	1.30	27908	3888	73872	2106
9	4000	4.00	15300	35500	16.93	2.70	43.06	1.06	6012	958	15285	376
10	17210	6.67	98218	241522	12.72	3.42	46.13	1.61	30722	8260	111402	3888
11	18500	5.48	86833	214833	11.42	3.10	42.89	2.17	24536	6660	91844	4662
12	4200	3.81	12600	31500	14.20	2.30	43.31	3.81	4473	724	13639	1200
13	4000	2.54	8150	20132	7.64	1.76	47.92	2.08	1538	354	9648	419
14	4300	1.91	5040	14662	11.38	1.72	41.49	2.67	1669	252	6084	391
15	2000	0.70	1554	3800	11.46	1.79	44.23	3.57	436	68	1681	136
16	2942	4.40	13142	32881	11.44	1.66	45.11	2.68	3763	545	14833	881
17	22700	3.16	78538	193990	11.23	1.82	43.59	1.63	21784	3530	84551	3162
18	93000	0.45	50000	235000	11.00	1.62	42.39	2.01	25850	3807	99616	4724
19	46000	2.88	115200	284544	12.13	1.69	42.10	4.33	34511	4807	119797	12322
20	29000	4.53	122500	315500	12.93	2.28	41.50	4.40	40804	5731	130933	13884
21	18000	5.53	92800	232200	14.14	2.43	40.84	4.32	32838	5640	94824	10032
22	13000	7.48	93884	229712	12.75	2.14	42.99	3.02	29281	4917	98760	6938
23	13200	7.65	100980	253500	12.70	1.94	45.20	2.39	32195	4917	114606	6060
24	22840	6.53	149187	372300	10.18	2.10	46.28	1.86	37900	7815	172242	6925
	324200			840000					85533	14531	194000	15000

Grade of the bench

Block No 1 to 3 has three seams

Thickness is computed by using the formula $\frac{1}{3}(D1 + D2 + D3)$

Block No 4 to 24 has four seams

Thickness is computed by using the formula $\frac{1}{4}(D1 + D2 + D3 + D4)$

TABLE SHOWING THE CEMENT GRADE LIMESTONE RESERVES AND GRADE OF ORE IN DETAILED BLOCKS (2nd BENCH)

Block No	Surface area	Mean thickness	Volume in M3	T.F. Tonnage	Tonnage	Al2O3	Fe2O3	CaO	MgO	Al2O3 Tonnes	Fe2O3 Tonnes	CaO Tonnes	MgO Tonnes
1	23910	11.00	227448	2.6	553030	1.52	4.17	14.74	1.23	8405.9560	23063.9540	81533.5820	6804.7690
2	22484	12.00	259568		673920	12.89	3.71	43.07	1.70	86871.2880	25003.1920	290346.7440	11459.6640
3	22484	12.00	269568		673620	14.30	3.03	44.27	1.76	96361.8660	20419.7760	298234.3440	11857.7520
4	20000	12.00	240000		660000	18.00	2.10	44.12	1.13	32340.0000	13800.0000	291720.0000	10360.0000
5	40360	12.00	484320		1200000	16.55	2.08	41.58	1.77	224960.0000	31680.0000	2493600.0000	85344.0000
6	39117	12.00	469404		782340	16.85	2.80	41.90	1.00	131827.3680	47185.2720	3278139.6000	78234.0000
7	38400	2.00	316800		792000	16.95	2.28	42.68	2.02	134276.4000	36137.2760	3380256.0000	160056.0000
8	20000	12.00	240000		600000	15.67	2.47	40.92	1.71	94020.0000	17820.0000	2455200.0000	102600.0000
9	43000	11.50	494500		1290000	16.72	2.20	43.19	1.78	215730.0000	28380.0000	3571410.0000	229620.0000
10	17469	11.42	117231		164544	12.80	2.80	45.50	1.76	82408.9160	32256.9824	4748472.0000	289584.0000
11	15926	11.421	174411		455616	14.35	3.00	42.96	1.79	65676.0480	13663.2480	1957152.1600	81552.1584
12	43000	2.05	422400		1056000	18.51	2.42	43.601	3.98	195457.6000	25872.0000	4605120.0000	420288.0000
13	40020	11.50	460405		1150500	17.04	1.69	44.40	2.76	196152.4800	29150.8000	5108322.0000	317538.0000
14	40000	12.00	480000		1200000	12.16	1.53	46.23	2.89	145920.0000	21360.0000	5546760.0000	346680.0000
15	20300	12.00	243600		609000	11.27	1.66	44.55	2.45	68643.0000	10104.9000	2712495.0000	149205.0000
16	38264	12.00	459168		1034160	11.01	1.64	45.09	3.56	113848.0160	16960.3240	4663189.4400	379230.9696
17	22704	12.00	272448		681120	13.65	4.06	42.50	5.30	92968.2480	27647.2560	2894376.0000	360993.6000
18	20030	12.00	240360		600900	13.91	2.38	46.06	6.57	83580.0000	12493.0000	2768160.0000	394944.3600
19	40530	12.00	486360		1215900	18.14	2.61	37.41	5.94	220590.0000	31020.3060	4548219.0000	722046.0000
20	20300	12.00	243600		608700	19.20	2.86	38.22	6.55	116880.0000	17400.0000	2326230.0000	398682.0000
21	16696	12.00	200352		501060	16.30	2.39	40.11	5.67	81674.4000	19065.9000	2009750.0000	284153.4000
22	13200	12.00	158400		396000	15.98	2.80	41.071	4.26	63295.6800	10132.6400	1626145.2000	168645.6000
23	12500	12.00	150000		375000	14.00	2.10	43.54	2.64	49280.4900	8265.0000	1398618.2500	74801.1000
24	22911	11.02	252438		515286	13.75	2.14	44.08	2.44	85037.6550	20416.7546	3299691.1210	194450.0010
Reserves			17786741 Cu.ft @ the Bench							2967781.8174	427650.0104	71150.8200	5248.2.8000
										14.61	2.41	41.10	3.51

TABLE SHOWING THE CEMENT GRADE LIMESTONE RESERVES AND GRADE OF ORE IN DETAILED BLOCKS (3rd BENCH)

Block No	Surface area	Mean thickness	Volume in M3	T.F. Tonnage	Tonnage	Al2O3	R2O3	CaO	MgO	Al2O3 Tonnes	R2O3 Tonnes	CaO Tonnes	MgO Tonnes
1	2973	2.07	615		1660	16.32	2.02	45.07	2.67	270	335	7481	443
2	22464	9.26	208044		561720	13.48	4.09	47.98	2.40	75721	22970	269525	13485
3	33564	11.78	395420		1067634	15.39	2.73	49.21	2.33	164307	29150	525400	24882
4	22008	2.05	45116		121813	16.16	2.48	47.86	1.57	19681	3020	58294	1912
5	4329	4.46	19309		52134	13.56	2.60	42.15	2.03	7069	1355	21975	1058
6	28114	14.73	414102		1117876	13.56	2.60	42.15	2.03	151559	29068	471161	22688
7	26400	2.07	54648		147550	13.20	2.17	43.57	1.88	19471	3202	64277	2774
8	30079	15.00	450000		1215000	16.05	2.25	44.80	2.04	195075	27337	544320	24786
9	25000	7.46	186500		503550	15.81	2.04	41.80	2.41	79597	10273	209709	12135
10	17250	2.72	46920		126684	12.48	2.29	44.73	2.09	15813	2900	56669	2648
11	11360	2.80	31808		85882	13.56	2.60	42.15	2.03	11645	2233	36196	1743
12	12500	5.82	72800		196560	12.09	2.32	44.73	2.09	23767	4560	87923	4109
13	43750	8.75	382812		1033591	11.56	2.69	39.21	4.56	119481	27803	405187	47133
14	4800	11.50	55200		149040	11.56	1.63	43.57	4.00	17230	2429	64942	5962
15	23700	8.10	192000		518400	12.70	2.75	43.42	3.82	65837	14256	225101	19807
16	2475	14.29	35378		95520	10.24	1.45	43.16	3.62	9781	1385	41230	3458
17	27704	10.25	283946		766654	10.08	1.33	41.93	6.94	77273	10196	321450	53208
18	20023	9.75	195226		527110	9.49	1.58	41.21	7.87	50021	8329	217241	41486
19	8750	11.27	98612		266252	10.79	1.75	41.94	6.73	28726	4659	111685	17919
20	23000	10.55	242650		655155	16.62	2.43	37.55	6.90	108882	15918	246048	45191
21	5600	9.12	51072		137894	14.65	2.32	37.16	7.95	20198	3199	51248	10965
22	16500	12.88	212520		573804	13.79	2.16	39.21	8.1	79127	12397	224966	45650
23	10230	7.32	74884		202187	12.09	2.15	37.65	8.35	24447	4348	76135	16886
24	2646	3.09	8176		22075	14.80	2.01	40.14	3.55	3267	443	8861	783
										1163.384	339136.8	6203850	881170.4
Reserves					1508130	Grade of the bench				14.25%	2.25%	41.14%	5.84%

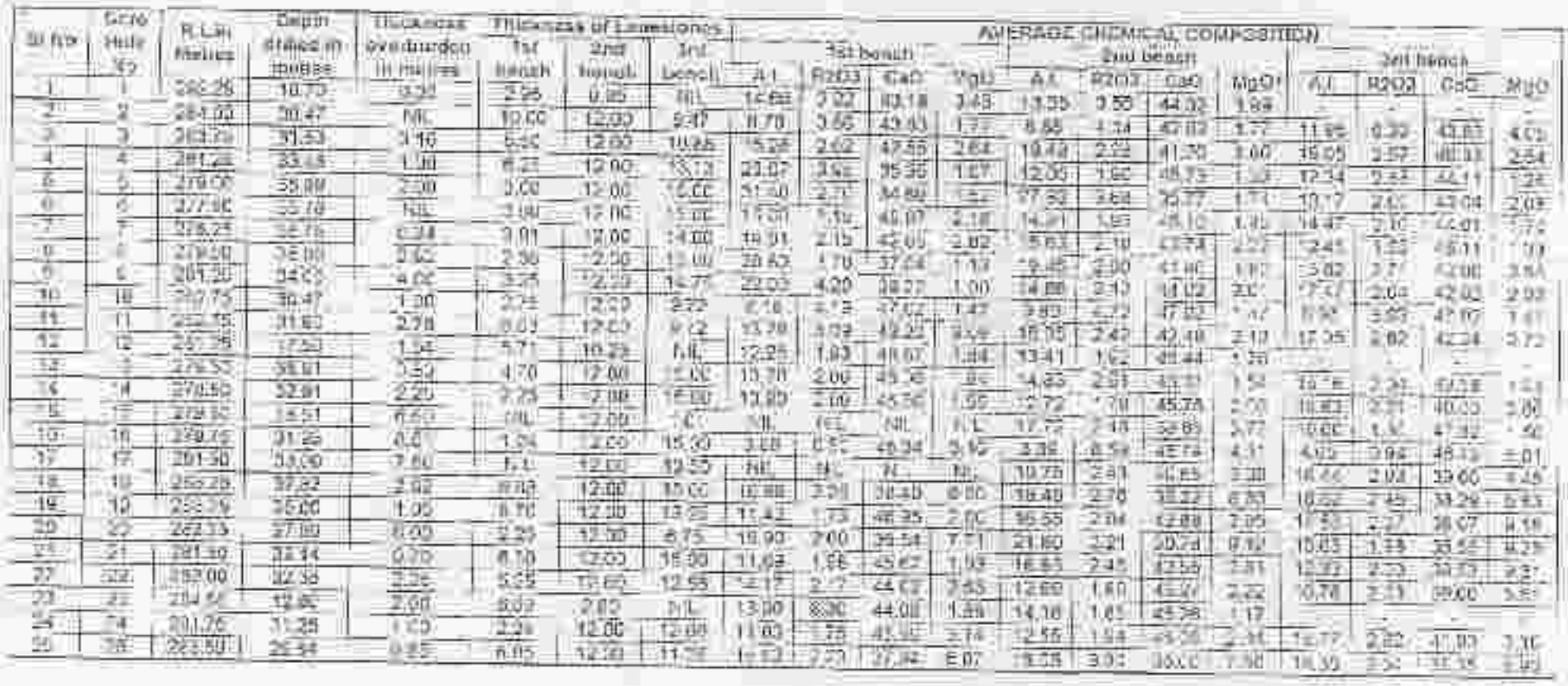


TABLE SHOWING THE CEMENT GRADE LIMESTONE RESERVES AND GRADE OF ORE IN TABULATED BLOCKS (1st BENCH)

Block No	Surface area	Computed D	Volume in M3	Tonnage	A.I.	R2o3	CaO	MgO	A.I Tonnes	R2O3 Tonnes	CaO Tonnes	MgO Tonnes
1	20276	8.60	1858.8	4007.2	10.67	3.41	44.24	2.72	42761.6231	13674.6676	177274.2670	10907.7744
2	27466	7.16	607357	4159302	10.47	1.90	44.51	1.90	43560.8436	8033.1284	1855[illegible].530	363.6662
3	22462	5.53	124226	310565	13.75	3.68	43.05	1.77	4270[illegible].6516	1142.6759	13355.4670	5497.3005
4	20760	5.00	103800	*251,900	22.02	1.01	39.00	1.86	5538[illegible].2030	8827.6800	98[illegible].9300	4728.2000
5	80300	3.77	150800	*577300	27.23	3.71	38.53	1.46	10,5[illegible].7697	2[illegible].7[illegible]	*327.[illegible]	82.78[illegible]
6	26117	2.26	58854	*212160	22.34	2.21	40.50	2.01	47306.5940	4630.8360	85[illegible].5200	4264.4260
7	26400	2.51	75824	192360	18.13	3.56	41.40	1.99	34820.4760	4618.7360	79[illegible].0760	3829.9640
8	24880	2.73	53600	159300	17.27	2.28	43.01	1.39	27459.3000	3643.0200	68[illegible].5300	2547.2670
9	40000	4.08	152400	406300	10.98	2.73	43.53	1.56	44596.8630	9650.0300	*784[illegible].0300	6333.9000
10	12200	5.57	66246	240552	17.72	3.42	46.15	1.12	42637.1852	8226.2724	*[illegible]2[illegible]	2693.8772
11	15360	6.46	86187	244312	11.39	3.14	46.10	2.07	25530.8960	7673.7405	*[illegible]5402.1648	5160.8251
12	43000	3.00	129000	306300	14.30	2.30	43.2	3.56	43799.3000	7173.9000	1[illegible]5[illegible].0300	16[illegible].3600
13	42960	2.05	91630	204300	11.54	1.76	47.81	2.49	23[illegible]1[illegible].6200	3590.4030	3[illegible]4.2300	5089.2600
14	42000	1.46	59450	140300	11.65	1.72	45.42	2.67	1[illegible]609.3300	2511.0[illegible]	6[illegible]7.[illegible]	3[illegible].2500
15	23300	0.76	15630	3[illegible]0	11.56	1.73	44.62	3.37	4477.2200	5727.3000	*7401.3000	1752.3000
16	29172	4.40	531445	3266[illegible]2	21.43	1.05	45.11	2.63	5[illegible]6[illegible].3516	6070.3222	14[illegible]8.2732	8543.9[illegible]
17	22200	3.46	76858	*96300	*1.30	1.22	43.56	3.68	2264[illegible].6870	3[illegible]1.2153	8[illegible].4[illegible]	77[illegible]
18	20700	0.45	09003	3[illegible]20	11.00	1.05	143.39	7.01	24750.0300	3712.5000	9[illegible]7.5000	16772.5005
19	40000	2.66	115500	2[illegible]30	14.06	1.55	42.19	4.35	4[illegible]54.5000	8751.2[illegible]	12[illegible]4.4[illegible]	2[illegible].2[illegible]
20	26000	6.33	164[illegible]	3[illegible]500	13.93	2.26	41.14	4.40	4[illegible]5.4500	7[illegible].[illegible]	10[illegible].[illegible]	13[illegible].[illegible]
21	13800	6.53	82904	*232760	14.28	2.42	42.54	6.32	3[illegible]8.7300	5[illegible].[illegible]	9[illegible].[illegible]	[illegible]
22	*2[illegible]4	7.63	103684	2[illegible]712	12.78	2.14	[illegible].98	3.62	22[illegible].[illegible]	[illegible].[illegible]	11[illegible].[illegible]	[illegible]
23	12200	7.28	108620	2[illegible]083	12.13	1.98	41.23	5.39	5[illegible].[illegible]	5[illegible].[illegible]	11[illegible].[illegible]	[illegible]
24	23648	6.53	46187	372962	13.14	2.11	44.23	1.50	[illegible]211.1[illegible]	[illegible].[illegible]	16[illegible].[illegible]	[illegible]
	616353			6450[illegible]					85[illegible].[illegible]	[illegible].[illegible]	2702[illegible].[illegible]	[illegible]
					Grade of the block:				N= 5[illegible]	3.11%	42.13%	2.72%
	Block 1 mining from assay			Tonnage is computed by substituting the formula					10621 × 07 × [illegible]			
	Block 1 mining four assay			Tonnage is computed by substituting the formula					10621 × 07 × [illegible] × [illegible]			

TABLE SHOWING THECEMENT GRADE LIMESTONE RESERVES AND GRADE OF ORE IN DETAILED BLOCKS (2nd BENCH)

Block No	Surface area	Mean thickness	Volume in M3	T.F Tonnage	Tonnage	Al2	R2o3	CaO	MgO	Al2 Tonnes	R2O3 Tonnes	CaO Tonnes	MgO Tonnes
1	20375	11.65	237448	2.7	582600	10.50	4.17	14.34	1.73	61230.1000	24753.6640	83558.2440	10082.6240
2	22481	12.60	283585		673800	12.20	0.71	43.07	1.43	85431.2580	25802.4180	290189.7060	11456.6340
3	20564	12.00	246768		675371	11.30	3.33	34.27	1.78	67200.9680	20410.7760	258346.3940	12015.7700
4	20000	12.00	240000		600000	10.00	2.10	44.12	1.73	62340.2600	15600.6000	232080.3600	10380.0000
5	45000	12.00	540000		2000000	8.50	2.85	47.05	2.78	226950.0000	31650.0000	1023450.0000	55620.0000
6	26178	12.00	313344		852000	10.53	2.60	41.60	1.35	63279.6200	19893.5760	175084.4360	11553.4800
7	25400	12.00	304800		792000	10.54	2.08	43.33	0.93	26745.6000	17699.2000	340019.6000	10865.4000
8	22000	12.00	264000		660000	12.67	2.46	45.39	1.73	84000.3600	14850.0000	299343.0000	16748.9600
9	42000	11.66	489720		1568000	12.73	2.02	48.33	1.78	101729.2360	27497.2000	571356.4000	20570.8000
10	17200	11.62	177331		484324	12.65	2.26	45.56	1.14	62400.0756	14302.3644	334117.3200	8154.1364
11	15200	11.43	173411		418628	13.35	3.03	44.98	2.73	85075.0484	19580.8512	197102.1988	7943.4510
12	40000	11.25	450400		1150000	10.61	2.42	47.10	1.83	104553.0000	27075.2000	1710480.0000	56000.4000
13	43000	11.56	482400		1166300	12.24	1.60	44.42	2.76	381274000	21504.3500	913483.4000	21085.0000
14	43562	11.60	483016		1209000	12.16	1.83	44.29	2.69	153420.0000	21960.0000	5914800.0000	34680.0000
15	20300	11.80	240000		600000	11.27	1.64	41.56	2.40	67620.0000	9840.0000	2831520.0000	2040.0000
16	23472	11.81	163968		884160	11.01	1.64	45.52	3.08	97245.0163	14504.2240	402569.6128	27232.1280
17	22704	12.00	272448		681120	13.52	2.09	42.68	5.38	95010.2400	14197.2800	2774247.2360	36623.2560
18	20000	12.00	240000		600000	10.91	2.04	40.08	5.67	63480.0000	24600.0000	2410800.0000	34020.0000
19	40000	12.00	480000		1500000	10.34	2.61	37.34	2.94	270000.0000	39000.0000	5490000.0000	44100.0000
20	20000	12.00	240000		600000	16.73	2.68	38.22	6.56	112000.0000	17000.0000	2178000.0000	39360.0000
21	16800	12.00	201600		504000	15.00	2.89	45.14	5.51	85680.0000	14868.0000	1811934.0000	33016.8000
22	13333	12.00	159996		399990	15.20	2.90	40.07	4.29	62998.8030	10197.3030	1618635.3000	16948.8000
23	12852	9.52	122376		294520	16.56	2.18	43.05	2.52	45360.4922	6863.3540	729510.2563	7488.1288
24	20214	8.40	204033		510084	14.78	2.14	44.06	2.64	70737.0520	10915.3340	2246011.1210	13479.0504
										2480781.9774	427230.0144	23167102.3230	534652.6640
		Reserves			17286744	Grade of the Bench					14.81	2.45	41.77	2.07

TABLE SHOWING THE CEMENT GRADE LIMESTONE RESERVES AND GRADE OF ORE IN DETAILED BLOCKS (3rd BENCH)

Block No	Surface area	Mean thickness	Volume in M3	T.P. Tonnage	Tonnage	Al2O3	Na2O	CaO	MgO	eq. Tonnes	R2O3 Tonnes	CaO Tonnes	MgO Tonnes
1	20676	2.00	42371		105947	10.32	0.95	45.07	2.67	10931.8604	1093.3106	4774.2998	2828.2246
2	52325	5.76	218248		545120	13.45	4.09	43.83	2.80	73301.9840	22418.1360	23895.7987	14941.1200
3	27464	1.38	38463		88588	5.30	2.72	49.2	2.03	10107.6650	1730.1660	20503.2301	12420.7968
4	20300	12.95	230060		647500	10.11	2.46	47.56	1.91	64636.5000	15932.5000	30796.0000	18497.2750
5	46016	15.40	670600		1145300	16.04	2.58	42.56	2.33	120819.6800	27008.4400	48734.5088	26914.7332
6	36113	14.34	388562		982250	15.29	2.37	43.79	1.28	145832.1680	22820.3840	42126.3040	18716.1600
7	26600	14.07	387261		906250	15.06	5.20	47.02	3.54	135399.3150	22177.2500	41455.3040	25687.6000
8	20000	15.00	300000		750000	16.67	2.34	41.89	2.01	149925.0000	13550.0000	31500.0000	21072.0000
9	40399	7.49	269480		706500	16.48	2.20	42.76	2.20	122943.8500	15098.2500	29211.4000	19412.7000
10	17200	2.73	46952		115500	14.08	2.19	44.79	1.91	16621.2050	2570.[illegible]	[illegible]	[illegible]
11	10350	2.19	22626		58845	10.00	2.50	44.13	2.23	10774.6050	2263.[illegible]	3903[illegible]	1739.[illegible]
12	4700	5.87	28603		257000	16.66	2.69	38.51	4.56	57877.[illegible]	12763.[illegible]	22[illegible]	3570.[illegible]
13	40000	6.75	270000		673000	7.55	1.69	43.62	4.02	[illegible]	[illegible]	[illegible]	[illegible]
14	40000	11.60	460000		1150000	12.75	1.75	43.42	3.62	[illegible]	[illegible]	[illegible]	[illegible]
15	20000	9.60	192000		480000	10.44	1.45	43.16	5.52	48096.0000	9881.7500	22767.2500	28579.5000
16	[illegible]	16.20	[illegible]		1052250	10.62	1.33	41.43	6.04	[illegible]	[illegible]	[illegible]	[illegible]
17	22704	12.25	278124		695310	9.45	1.62	41.24	7.87	66140.3430	10777.3940	28531.2645	54729.3870
18	20000	10.75	215000		537500	10.79	1.78	41.68	6.03	57999.2500	9625.2500	22404.5000	32403.2500
19	40000	11.37	454800		1137000	15.62	2.41	37.55	1.69	176873.4000	27626.1000	42703.5000	19212.3000
20	20000	10.55	211000		527500	14.80	2.22	37.19	7.69	77459.7500	11710.5000	19619.5000	40557.5000
21	16000	11.13	178080		445200	10.70	2.10	39.21	8.11	82552.6200	9976.5200	17446.4000	36111.0000
22	13200	12.63	166716		425340	14.32	2.36	39.69	9.25	65703.0036	10730.[illegible]	16[illegible]	39[illegible]
23	7200	3.00	36000		99000	13.80	2.56	40.64	8.59	15711.5639	2[illegible]	3[illegible]	[illegible]
24	28800	3.03	87264		176536	14.36	2.51	38.75	7.55	28760.7000	3967.[illegible]	6[illegible]	1[illegible]
										1141542.3243	339[illegible]	[illegible]	[illegible]
			Reserves		15[illegible]	Grade of II nd bench				14.26%	2.75%	41.72%	6.31%

Borehole Log

Nanoini Khunaini ML

Exploration 2011

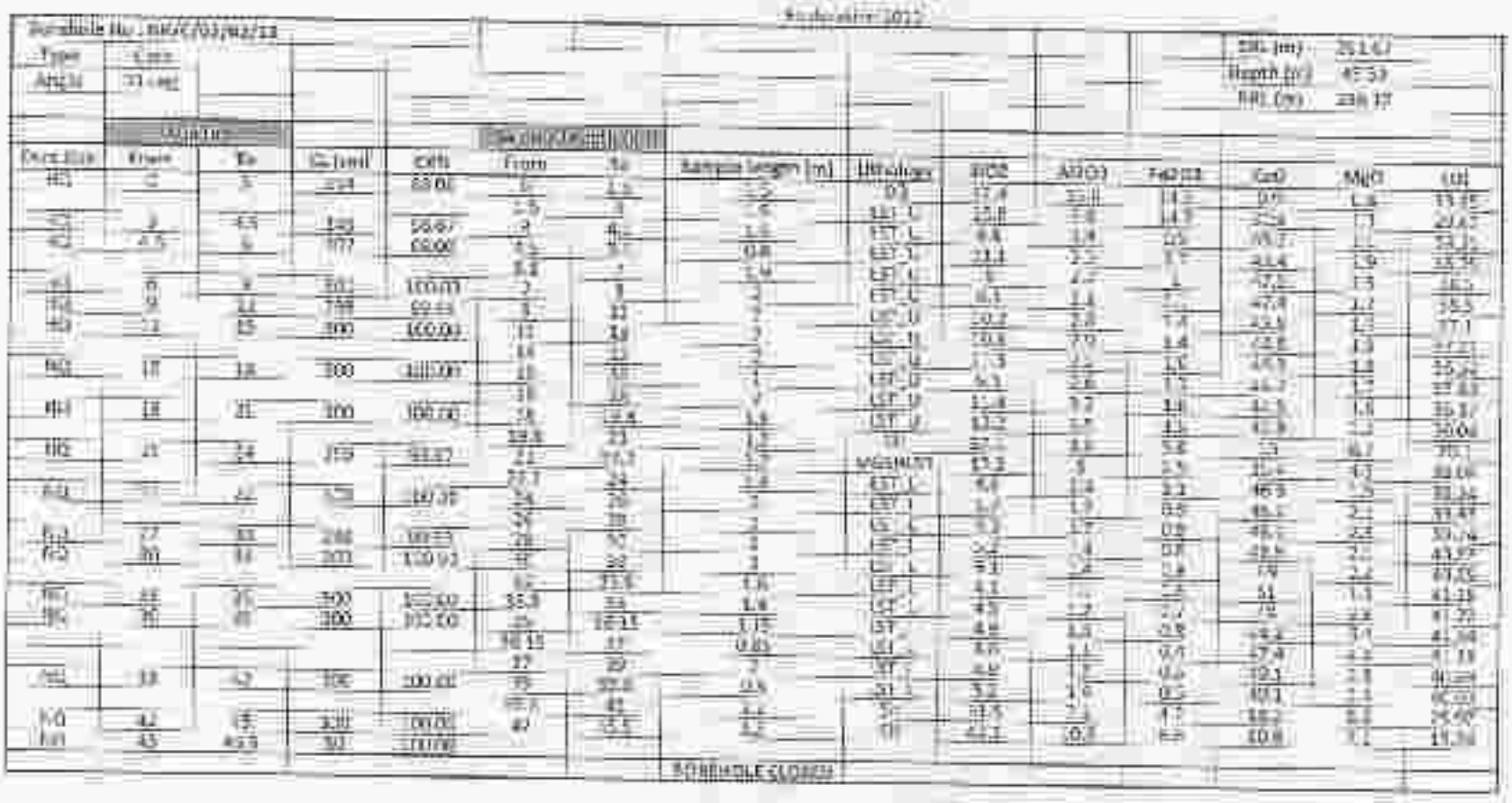
Borehole No : NR/E/01/08/11															
Type : Core														km (m)	350.05
Angle : 50 deg														Depth (m)	48.30
														Bill (m)	252.05
	Diameter				Sample Depth (m)										
Core Size	From	To	C (dm)	CML	From	To	Sample length (m)	Lithology	SiO2	Al2O3	Fe2O3	CaO	MgO	LOI
HQ	0	3.5	150	50.00	0.00	3.50	3.50	OB	29.7	12.9	40.8	0.0	0.0	17.05
HQ	3.5	34	70	35.00										
NQ	34	53	253	97.07	3.50	7.50	2.00	37.0	7.8	1.1	3.0	46.1	4.8	30.4
HQ	6.1	9.5	350	100.00	5.50	7.50	2.50	51.0	10.8	1.9	1.4	42.5	3.6	29.8
					7.50	9.50	2.00	45.6	9.3	1.2	1.6	43.6	3.4	37.8
NQ	9.5	12.5	350	100.00	9.50	11.50	2.00	[illegible]	11.1	2.8	1.5	39.9	6.2	32.7
HQ	12.5	15.5	350	100.00	11.50	13.50	2.00	54.2	10.2	1.9	2.4	42.5	3.7	32.9
HQ	15.5	18.5	350	100.00	13.50	15.50	2.00	45.2	9.3	1.6	1.5	45.2	3.8	33.3
					15.50	17.50	2.00	54.2	9.9	2.5	1.5	44.7	4.3	32.5
HQ	18.5	21.5	350	100.00	17.50	19.50	2.00	45.2	12.3	3.5	1.6	42.4	3.0	31.9
					19.50	21.50	2.00	54.2	13.0	4.3	1.3	37.8	3.4	32.9
HQ	21.5	24.5	350	100.00	21.50	23.50	2.00	45.2	17.0	5.9	0.4	35.7	4.1	33.2
HQ	24.5	27.5	350	100.00	23.50	25.50	2.00	54.2	16.2	2.1	2.6	32.5	7.5	35.0
					25.50	27.50	2.00	54.2	17.0	2.4	1.4	33.7	5.5	38.8
HQ	27.5	30.5	350	100.00	27.50	29.50	2.00	54.2	9.6	1.1	0.8	46.2	7.8	33.5
HQ	30.5	33.5	350	100.00	29.50	31.50	2.00	54.2	8.2	1.3	1.3	32.5	8.1	48.3
					31.50	33.50	2.00	54.2	8.8	1.7	1.2	38.2	16.2	43.1
HQ	33.5	36.5	350	100.00	33.50	35.50	2.00	54.2	5.5	0.9	0.7	38.5	19.0	47.0
HQ	36.5	39.5	350	100.00	35.50	37.50	2.00	54.2	6.0	1.3	0.8	37.3	12.9	41.5
					37.50	39.50	2.00	54.2	7.0	1.8	1.3	38.3	11.8	40.2
HQ	39.5	42.5	350	100.00	39.50	41.50	2.00	54.2	7.8	1.4	1.2	39.0	10.8	41.7
HQ	42.5	45.5	350	100.00	41.50	43.50	2.00	54.2	8.0	1.3	0.8	40.2	9.5	41.2
HQ	45.5	48	253	100.00	43.50	46.00	2.50	54.2	8.4	1.5	1.3	37.9	14.1	42.5
					46.00	48.30	2.30	54.2	7.8	1.4	0.9	38.4	15.1	43.1
BOREHOLE CLOSED															

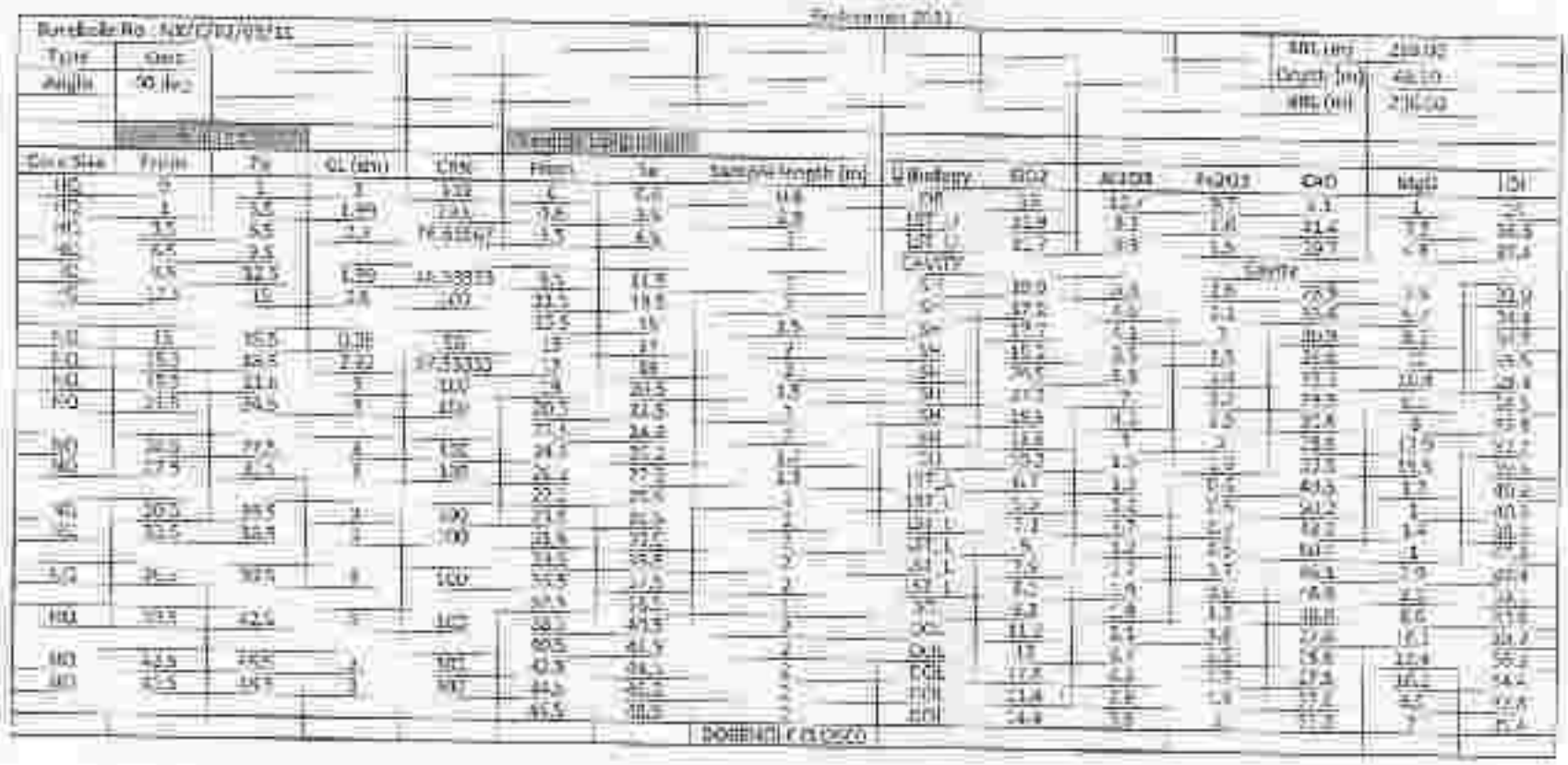
Borehole No : NG/E/81/01/13
Type: Core
Angle: 90 Deg.

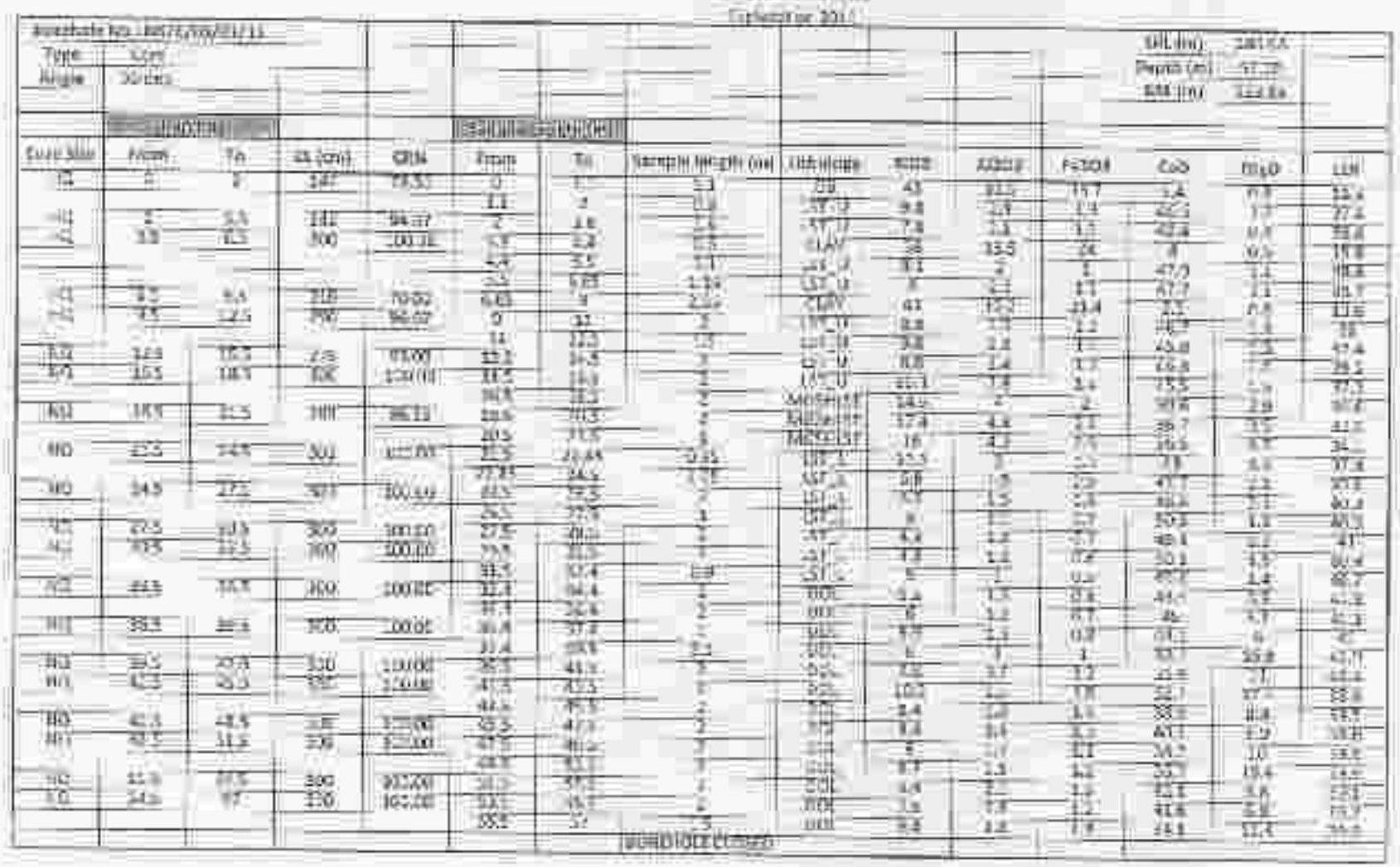
SRL (m) 269.03
Depth (m): 51
RSL (m) 218.03

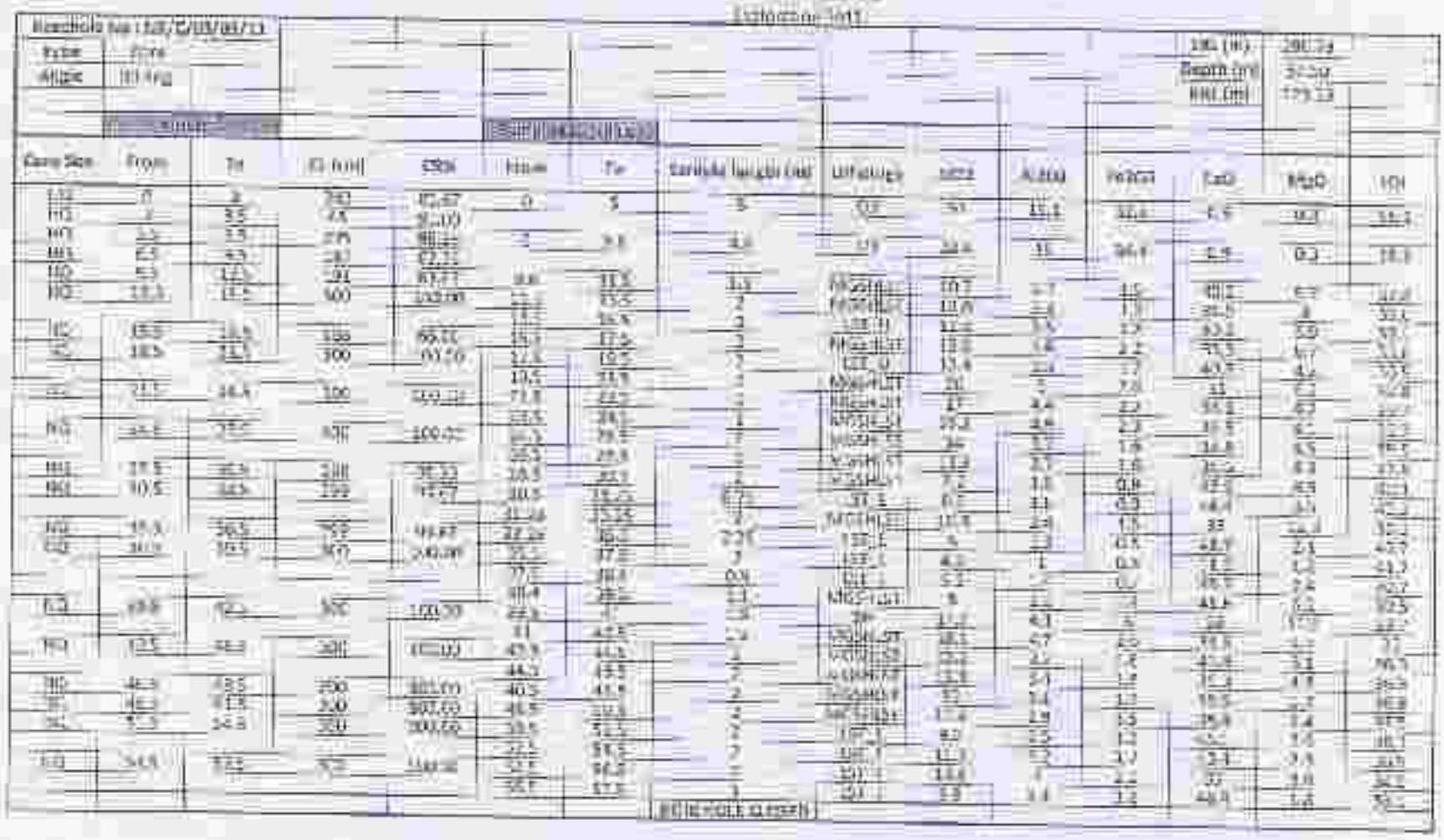
Core Sec.	From	To	CR (cm)	CR%	Depth	RQD	Sample length (m)	Lithology	SiO2	Al2O3	Fe2O3	CaO	MgO	LOI
NG	0	3	161	53.67	0	0	3	OB	39.9	13	10.8	7	5.3	14.8
NG	3	9	300	100.00	3	3	3	LST_1	9.2	2.1	13	49.7	3.1	35.4
					6	6	3	LST_1	10.1	2.7	13	44.4	2.8	32.5
NG	9	12	300	100.00	9	9	3	MDST	12.6	3.5	12	39.8	4.3	36.4
NG	12	15	300	100.00	12	10	3	MDST	13.2	3.5	12	38.5	5.2	34.1
					15	11.4	1.4	MDST	10.1	3.4	12	38.5	5	35.8
NG	15	18	300	100.00	18	15	3.0	DOL	11	2.8	17	33.5	10.0	38.4
					21	15	3	DOL	15.6	3.4	7	28.8	21.5	39.8
NG	18	19.5	28	93.00	24	17	3	DOL	10.3	3.2	1.8	30	20.1	38.3
NG	19.5	22.5	270	90.33	27	19	3	DOL	13.8	3.8	4	28.4	19.9	36.7
NG	22.5	25.5	267	89.67	30	24	3	DOL	22	5.8	3.2	24.1	8.6	32
NG	25.5	28.5	300	100.00	33	27	3	DOL	20.5	5.2	2.8	29	7.4	32.1
					36	33	3	DOL	17	4.1	2.3	33.5	6.3	34.3
NG	28.5	31.5	300	100.00	39	36	3	DOL	14.3	3.3	1.8	32.4	10.9	37.4
					42	27.5	1.5	DOL	8.2	1.9	1.6	28.7	18.3	41
NG	31.5	34.5	300	100.00	45	28.5	3	DOL	6.7	1.4	0.9	38.4	10.7	40.9
					48	30.5	3	LST_1	4.8	1	0.5	47.8	3.5	43.7
NG	34.5	37.5	300	100.00	51	32.9	3.4	LST_1	4.7	1.2	0.9	47.3	4.7	41.3
					54	32.8	0.3	DOL	6.8	1.8	0.9	46.7	3.8	40.9
					57	33.5	0.7	LST_1	4.9	1.3	0.6	48.4	2	41.8
NG	37.5	40.5	300	100.00	60	35.5	2	LST_1	5.8	1.6	0.8	48.1	2.2	40.5
NG	40.5	43.5	300	100.00	63	37.4	2	LST_1	5	1.2	0.6	50	1.7	40.7
					66	37.9	0.4	DOL	5.6	1.7	0.8	49.3	1.3	40.7
					69	39.5	1.6	DOL	9.8	2.5	1.2	37.7	4.9	33
NG	43.5	46.5	300	100.00	72	41.5	2	DOL	8.8	2	1.2	42	10	35.9
NG	46.5	49.5	300	100.00	75	43.5	2	DOL	5.5	1.3	1	39.5	9.8	43.5
					78	45.5	2	DOL	8.3	2.2	1.3	47.9	3.7	34.7
NG	49.5	52.5	300	100.00	81	47.5	2	DOL	7.2	1.8	1.1	48.7	3.2	35.5
NG	52.5	54	150	100.00	84	49.5	2	LST_1	6.3	2.2	1.2	47.7	3.7	34.5
					87	51	1.5	LST_1	13.5	7.8	1.3	41	2.3	31.3

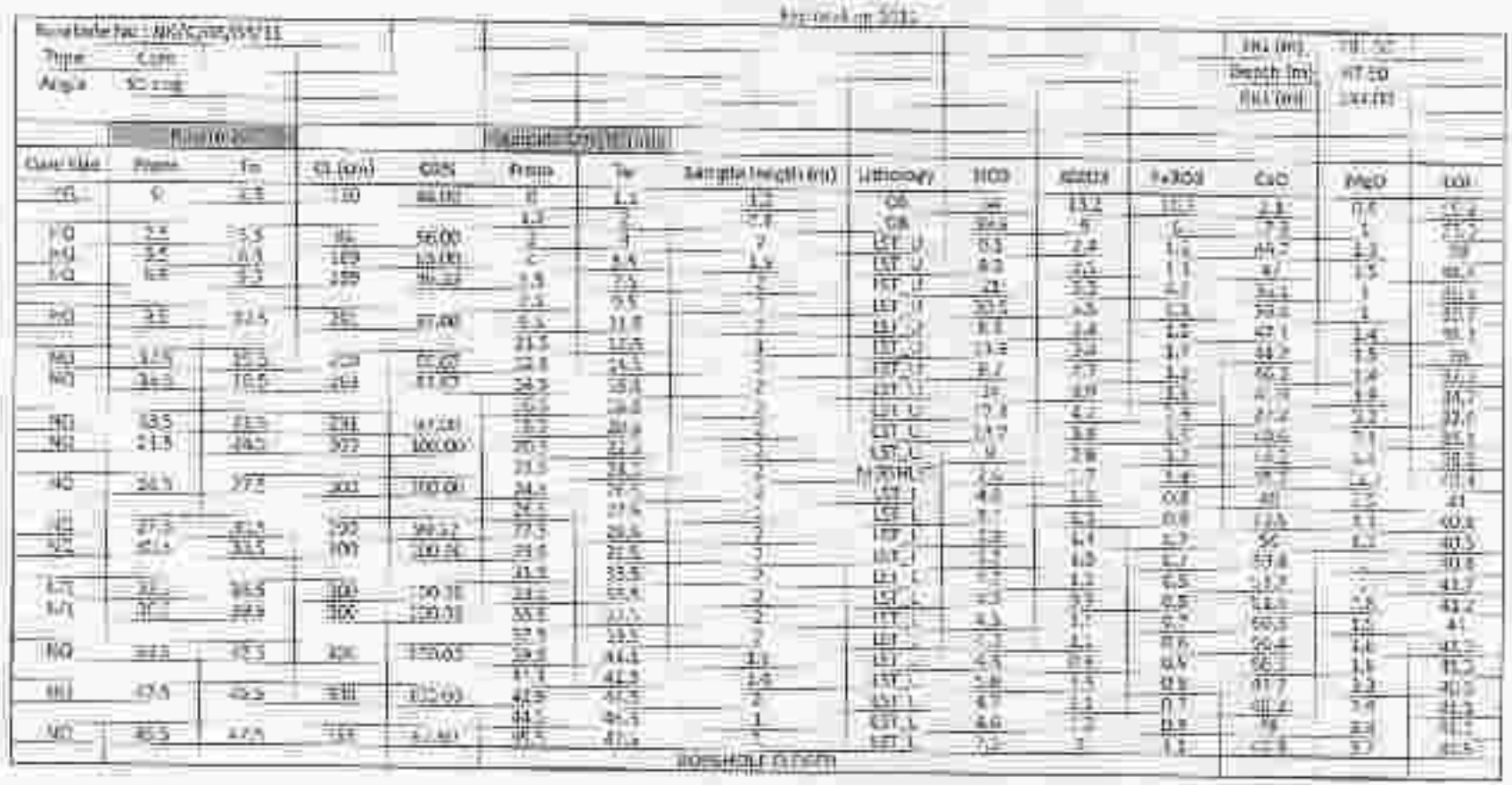
BOREHOLE CLOSED

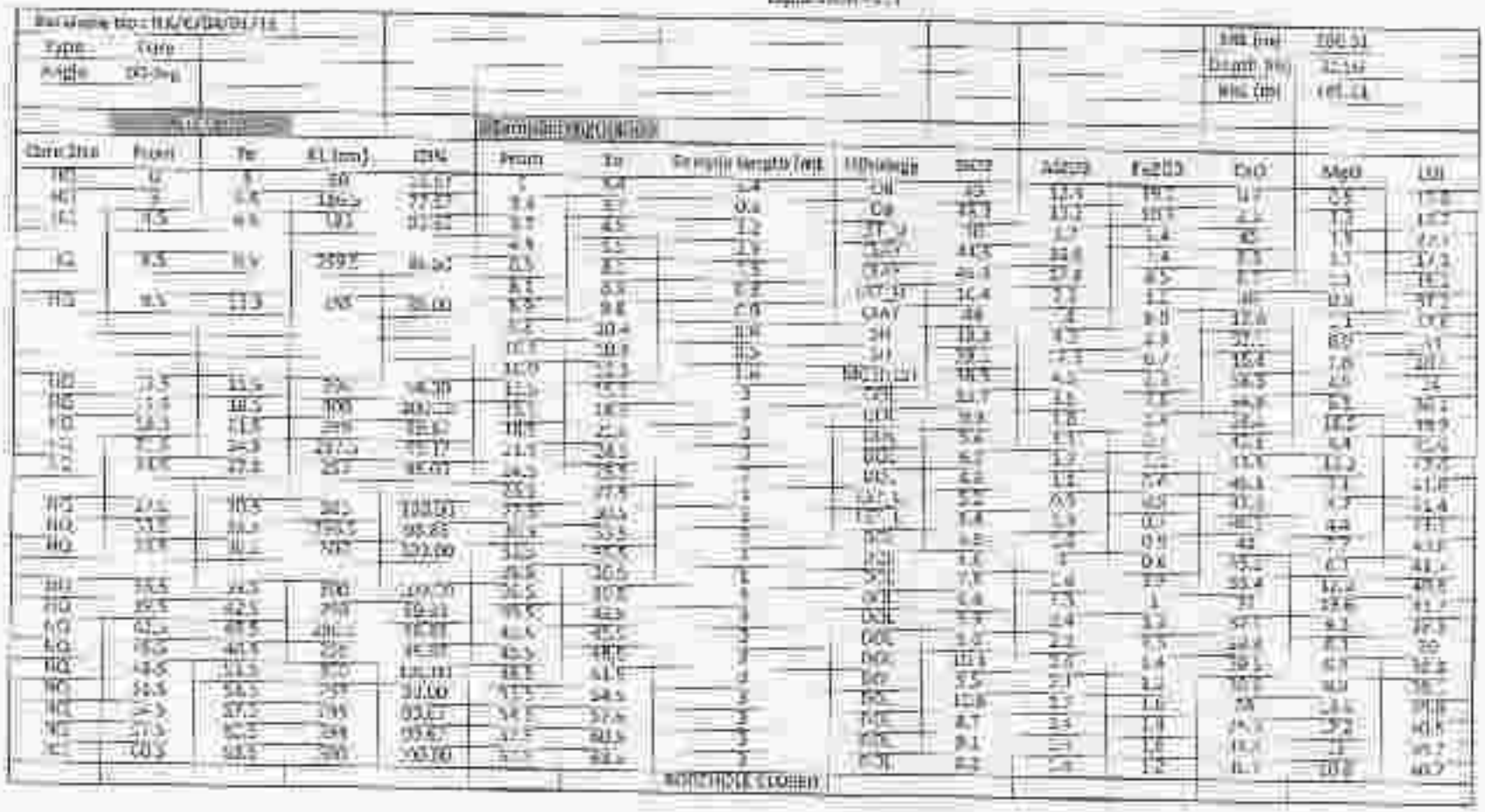


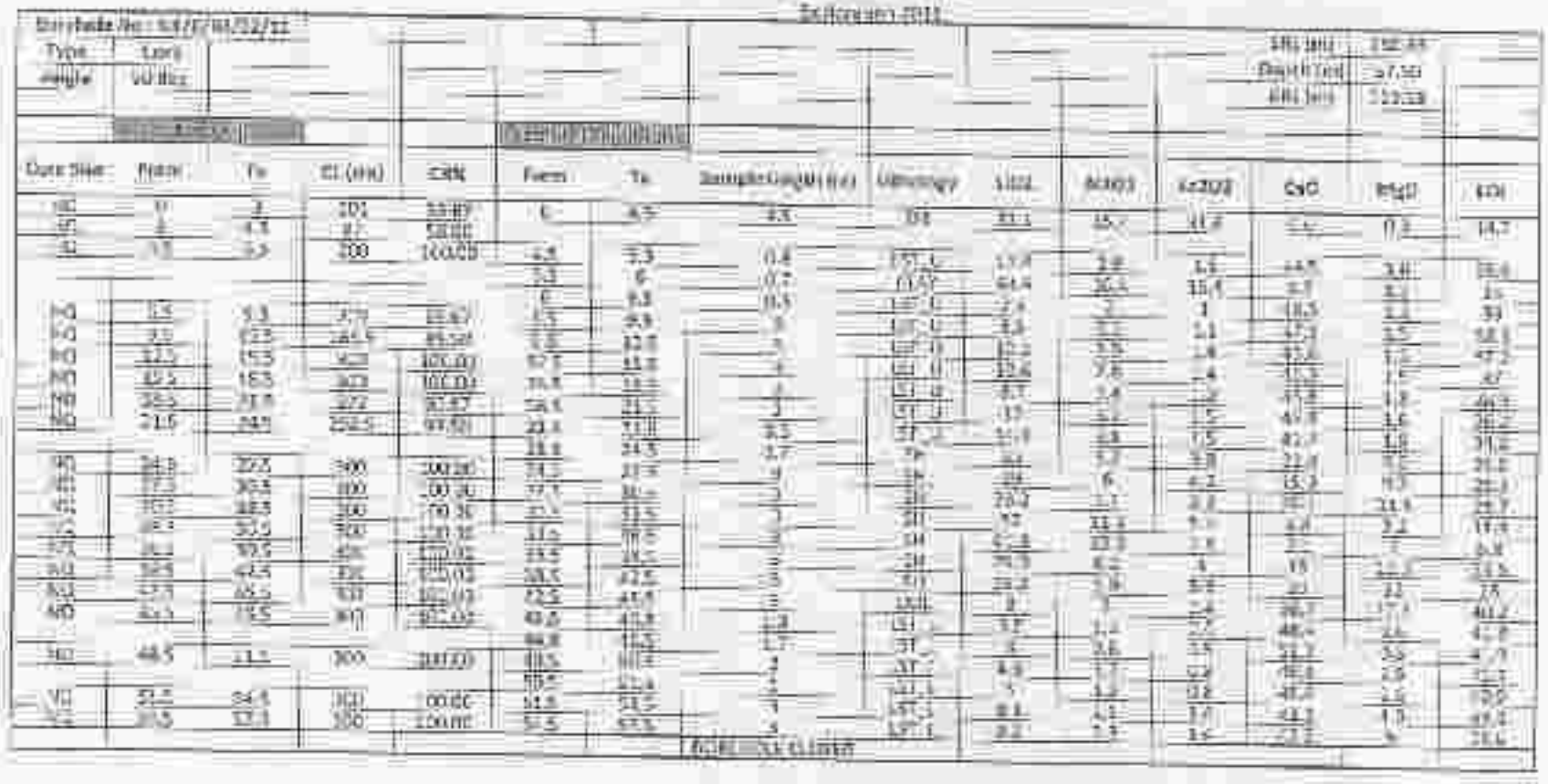


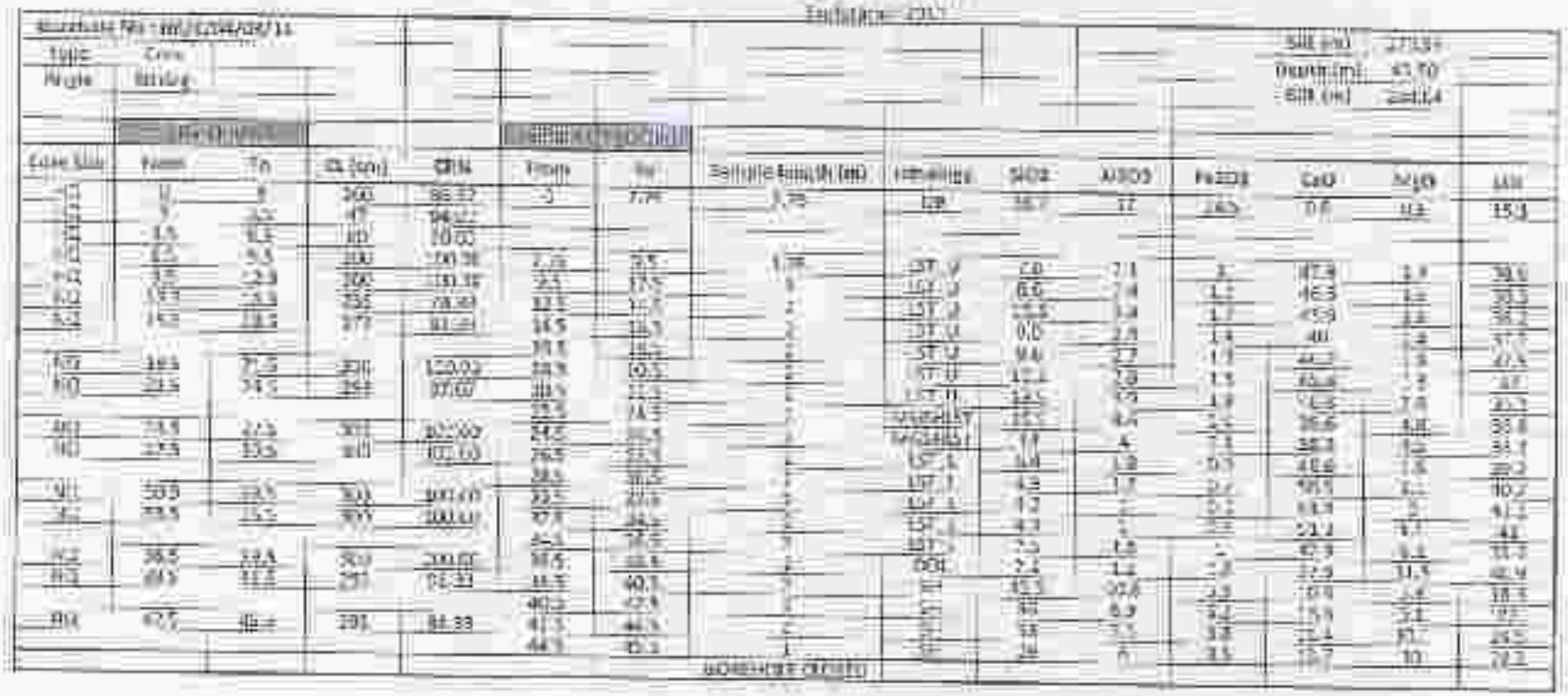


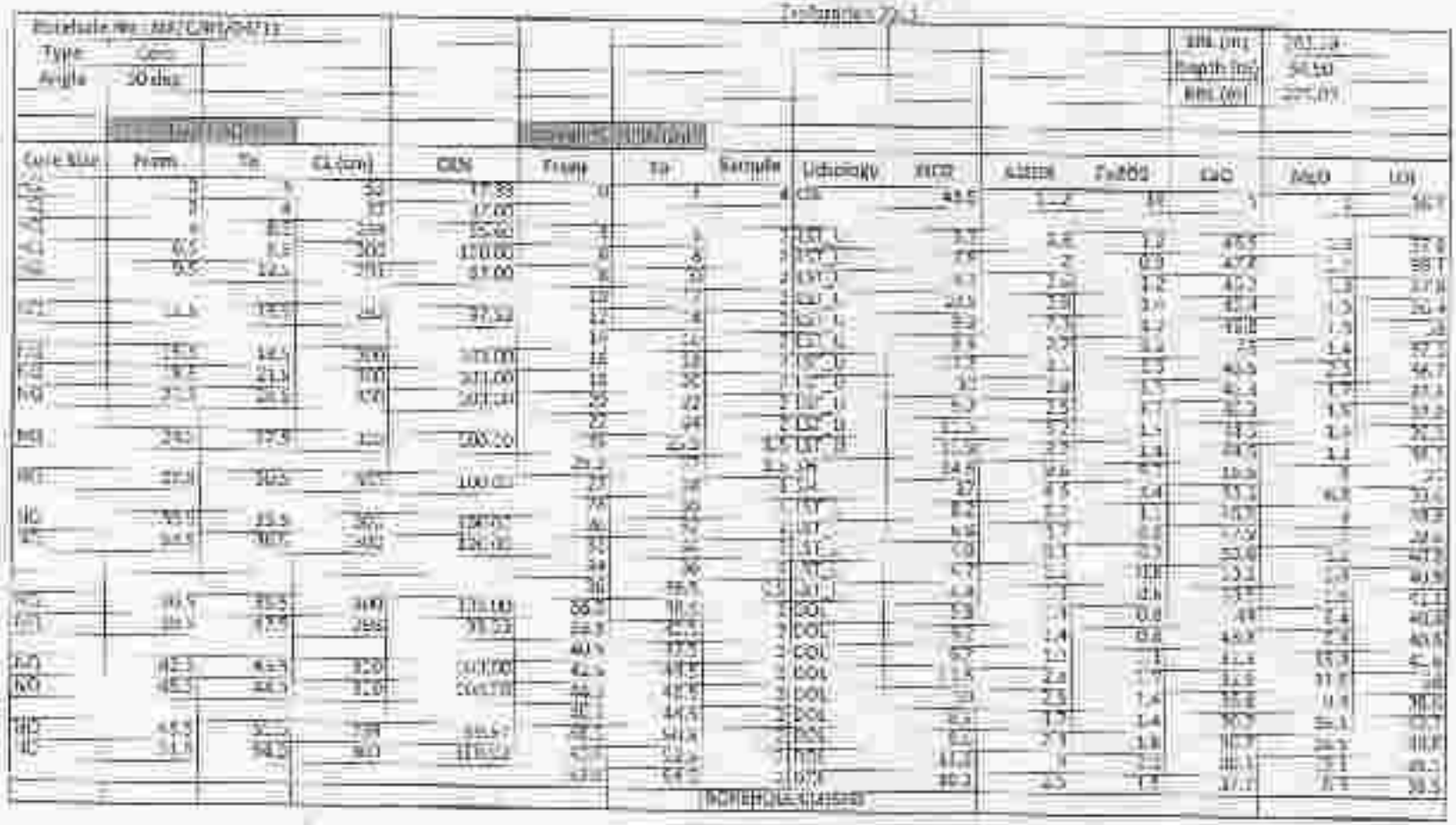


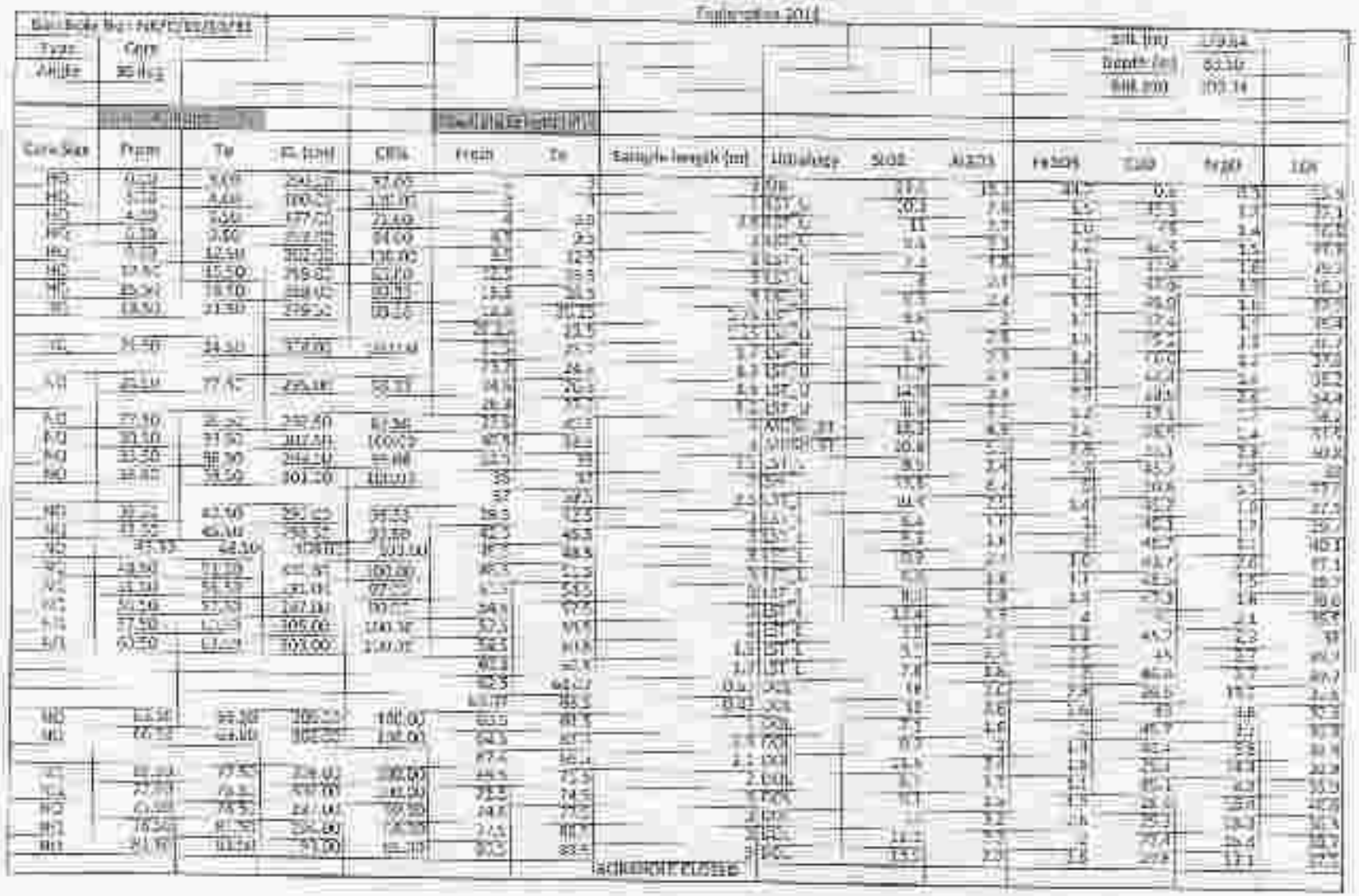


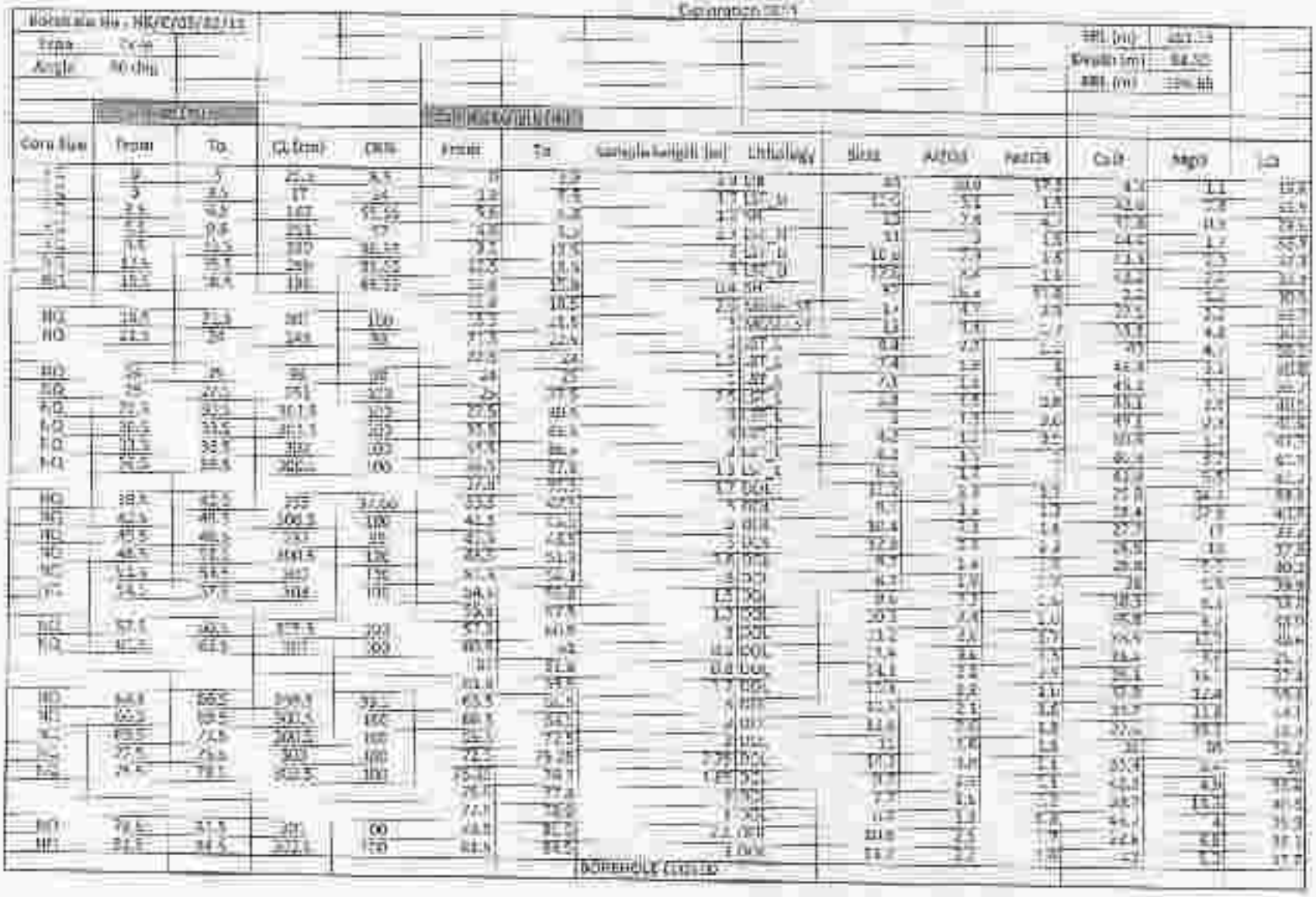


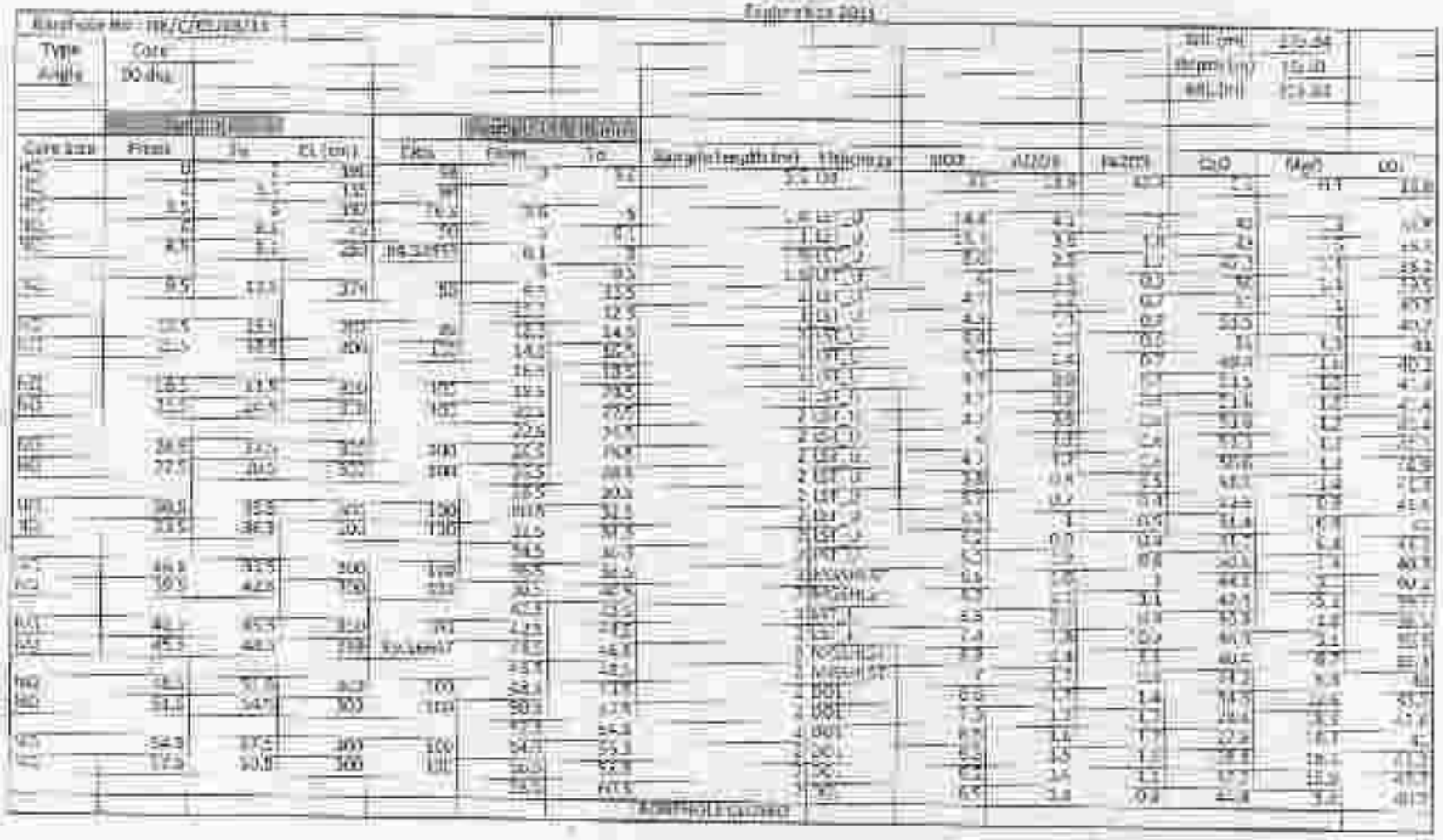


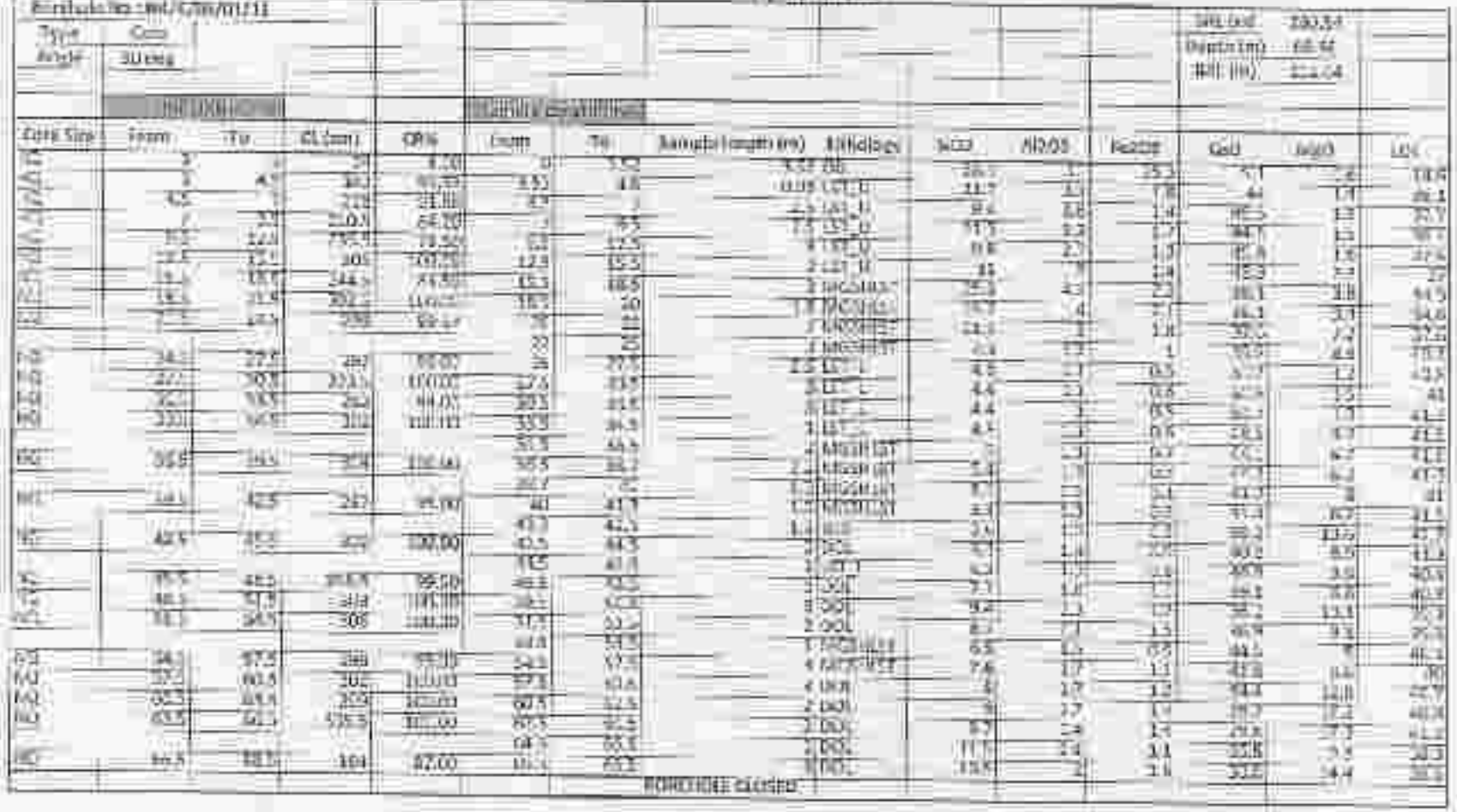


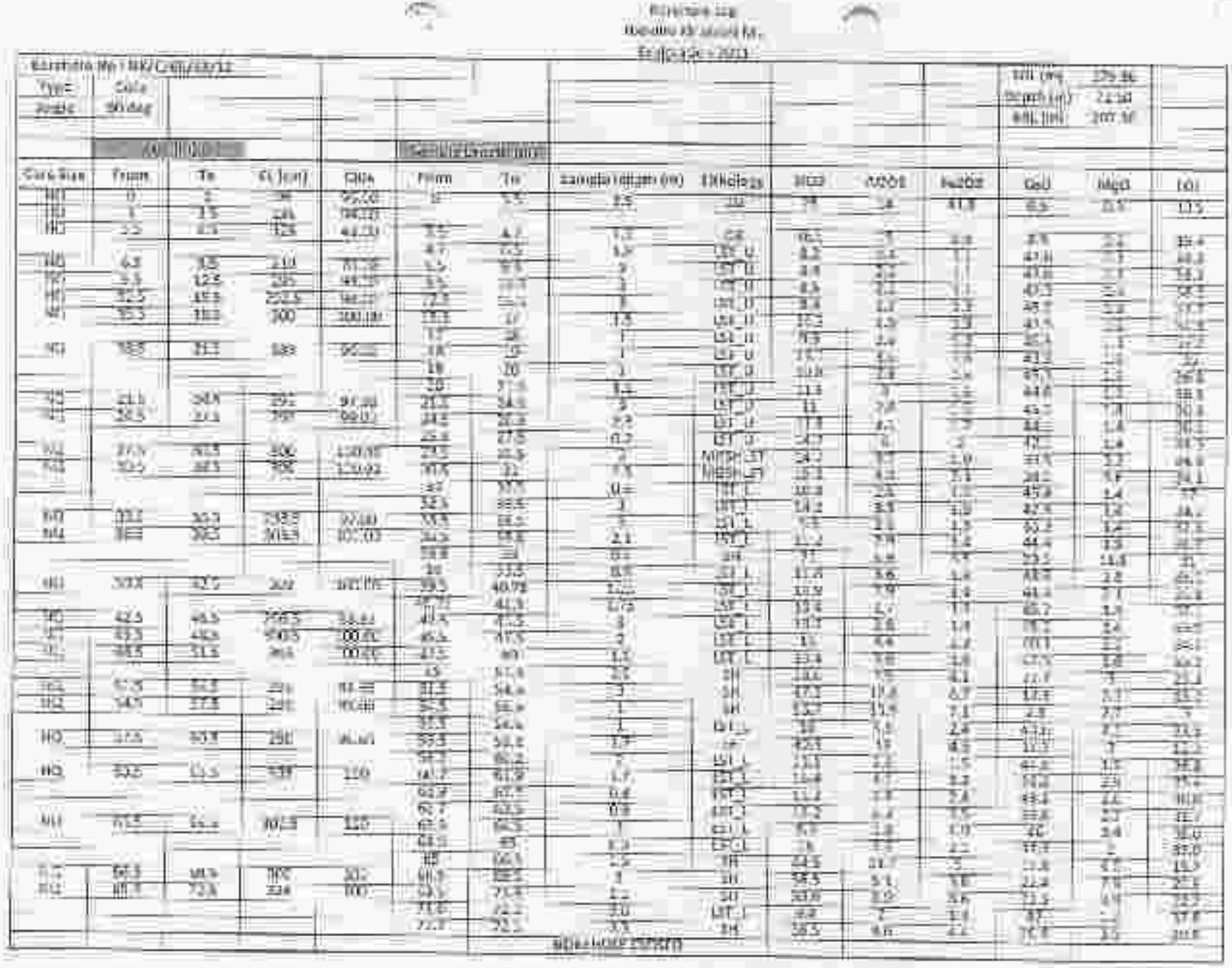


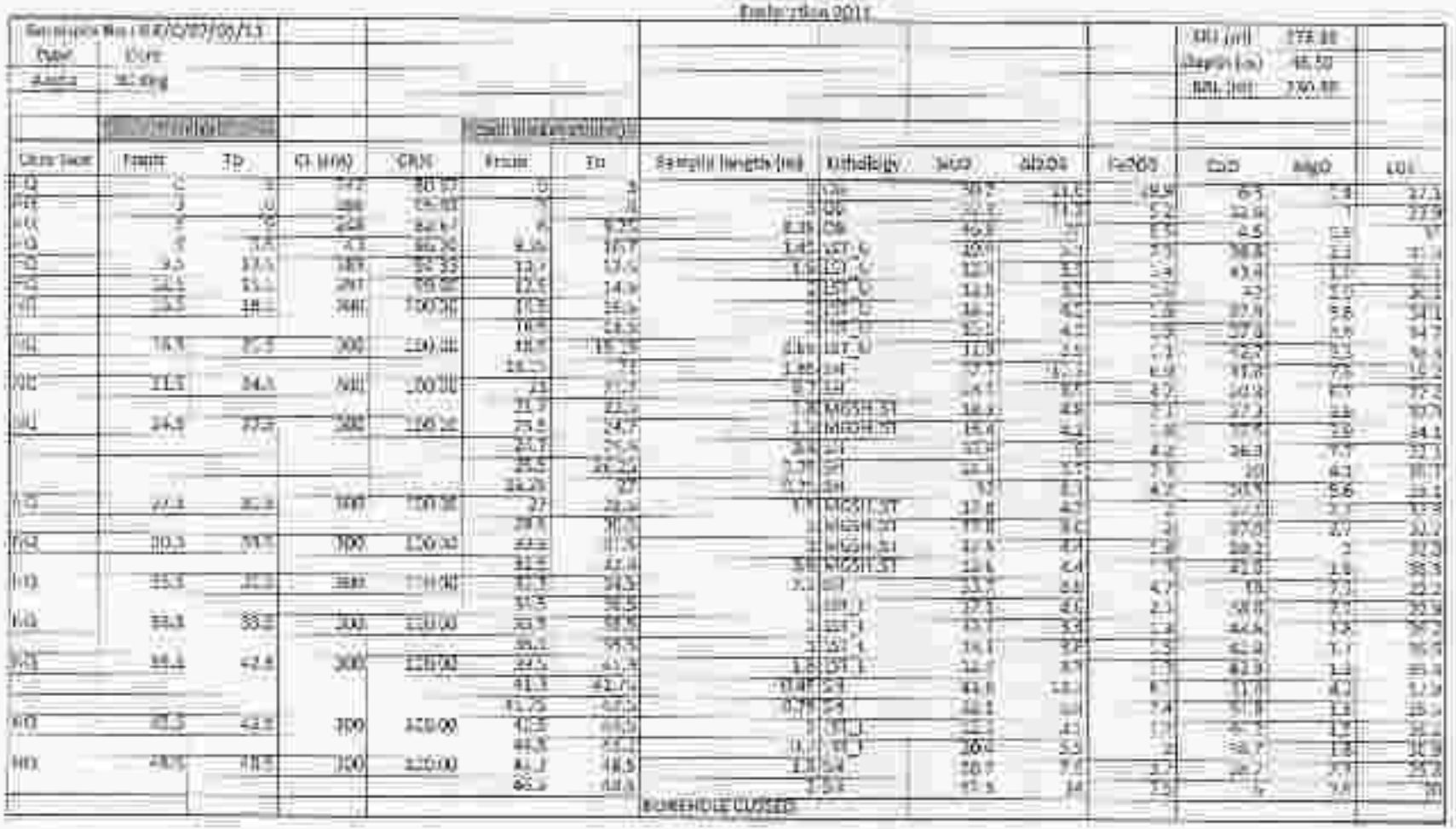












Core Size	From	To	Ω (cm)	GR	From	To	Sample length (m)	Lithology	SHS	Al2O3	Fe2O3	CaO	MgO	LOI
HQ	0	2	165	57.00	0	2	2	CLAY	0.5	14	10.5	0.5	0.5	13.5
HQ	2	4.5	93	38.67	2	3.8	1.8	CLAY	0.5	15.5	7.1	0.6	0.7	12.9
HQ	4.5	6.5	145	33.00	3.8	7.5	3.7	MUDSTONE	0.5	14.8	6.8	0.5	1.1	12.1
HQ	6.5	8.5	190	24.00	7.5	9.5	2	MUDSTONE	0.5	14.9	6.9	0.5	1.1	12.4
HQ	8.5	10.5	270	23.50	9.5	11.5	2	MUDSTONE	0.5	14.7	6.7	0.5	1.1	12.2
					11.5	12.5	1	MUDSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	10.5	15	214	33.00	12.5	14.5	2	MUDSTONE	0.5	14.6	6.6	0.5	1.1	12.1
HQ	15	15.5	70	100.00	14.5	15.5	1	SILTSTONE	0.5	14.9	6.9	0.5	1.1	12.4
					15.5	17.5	2	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	15.5	19.5	290	14.88	17.5	19.5	2	SILTSTONE	0.5	14.7	6.7	0.5	1.1	12.2
HQ	19.5	23.5	190	21.67	19.5	23.5	4	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	23.5	28.5	300	30.00	23.5	31.5	8	SILTSTONE	0.5	14.9	6.9	0.5	1.1	12.4
					31.5	33.5	2	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
					33.5	34.5	1	SILTSTONE	0.5	14.7	6.7	0.5	1.1	12.2
HQ	28.5	32.5	196	11.85	34.5	36.5	2	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	32.5	33.5	180	30.00	36.5	38.5	2	SILTSTONE	0.5	14.9	6.9	0.5	1.1	12.4
					38.5	40.5	2	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	33.5	35.5	180	30.00	40.5	42.5	2	SILTSTONE	0.5	14.7	6.7	0.5	1.1	12.2
					42.5	43.5	1	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	35.5	39.5	291	17.55	43.5	45.5	2	SILTSTONE	0.5	14.9	6.9	0.5	1.1	12.4
HQ	39.5	43.5	200	30.00	45.5	47.5	2	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
					47.5	49.5	2	SILTSTONE	0.5	14.7	6.7	0.5	1.1	12.2
HQ	43.5	47.5	290	21.67	49.5	51.5	2	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	47.5	48.5	190	100.00	51.5	52.5	1	SILTSTONE	0.5	14.9	6.9	0.5	1.1	12.4
					52.5	54.5	2	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	48.5	49.5	180	100.00	54.5	55.5	1	SILTSTONE	0.5	14.7	6.7	0.5	1.1	12.2
HQ	49.5	51.5	190	50.00	55.5	57.5	2	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
					57.5	58.5	1	SILTSTONE	0.5	14.9	6.9	0.5	1.1	12.4
HQ	51.5	53.5	188	100.00	58.5	59.5	1	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3
HQ	53.5	57.5	191	100.00	59.5	61.5	2	SILTSTONE	0.5	14.7	6.7	0.5	1.1	12.2
					61.5	62.5	1	SILTSTONE	0.5	14.8	6.8	0.5	1.1	12.3

ANNEXURE 4

Form J submitted for exploration done in Nandini Khundini Limestone Mines in 2011

Ref: JML/BM/Q - 444
Date: 23.01.2023

Regional Controller of Mines (NR)
Directorate of Mines
6th Floor, Block B & C, Indira Bhawan
Civil Lines, Nagpur – 440001

Kind Attn: Shri Abhay Agrawal, (M) [illegible]

Subject: Re-submission of Notice in Form – I in respect of Nandini Khandini Limestone Deposit over an area of 53.57 ha of ACC Limited, Jamul Cement Works.

Dear Sir

With reference to the subject matter, we want to inform you that Notice of sinking shafts and boreholes (Form – I) in respect of Nandini Khandini Limestone Deposit was submitted to your local office vide our letter no JML/BM/MP/Q/35, dated 1.03.2021.

We are once again enclosing herewith the copy of Notice of Sinking of shafts and boreholes (Form – I) in respect of Nandini Khandini Limestone Mine over an area of 53.57 ha of ACC Limited, Jamul Cement Works.

We request you for your kind consideration and necessary action please.

Thanking You

For ACC Limited

Satyam Tripathi
Manager - Mining and HOP
Jamul Cement Works

Encl: As above

→ Namdih Kandini Mine

Ref: JML/KMMP/0[illegible]
Dated: 04-May-2011

The Controller General
Indian Bureau of Mines,
Indira Bhawan, IBM complex,
Civil lines, Nagpur- 440001.

Sub: Notice of drilling of boreholes (Form J) in respect of Namdini Kandini Limestone Deposit over an area of 53.57ha of ACC Limited, Jamul Cement Works.

Dear Sir,

We are enclosing herewith duly filled in Form J along with drawing of proposed boreholes in Namdini Kandini deposit over an area of 53.57 ha of ACC Limited, Jamul Cement works.

Thanking you,

Yours faithfully,
For ACC Limited

Head Mining
Jamul Cement Works.

Encl: As above

Copy to:
1. The Controller of Mines(Central)
Indian Bureau of Mines,
Indira Bhawan, 6th floor, Block A&B,
Civil lines, Nagpur- 44000 1.
2. The Regional Controller of Mines,
Indian Bureau of Mines,
Indira Bhawan, 6th floor, Block B&C
Civil lines, Nagpur- 440001.
3. Director of Geology & Mining,
SONAKHAN, Ring Road no 1
Vill – Purena, P.O. – Raipur
Raipur – 492006

FORM-J
(Notice of sinking boreholes)

To

1. The Controller General,
Indian Bureau of Mines,
Indira Bhawan, DM complex,
Civil lines, Nagpur- 440001.

2. The Controller of Mines (Central),
Indian Bureau of Mines,
Indira Bhawan, 6th floor, Block A&D,
Civil lines, Nagpur- 440001.

3. The Regional Controller of Mines,
Indian Bureau of Mines,
Indira Bhawan, 6th floor, Block B&C,
Civil lines, Nagpur-440001.

4. Director of Geology & Mining,
Sonakhan, Ring road,
Raipur.

1. Name of prospecting and mineral worked/prospected
Nandini Kundini Limestone Deposit, Limestone.

2. Name and address of Licensee/Lessee
M/s ACC Limited., P.O. Jamul Cement Works, Dist. Durg 490 024, State – C.G.

3. Location
(i) Toposheet Number: 64 G/7
(ii) Village : Nawani Kundini
(iii) Taluka : Dhamda
(iv) District: Durg
(v) State: Chattisgarh

4. Number of shafts/boreholes intended to be sunk or extended
a) 27 No of boreholes to be drilled (Rot. drilling)

5. Purpose for which each of the shafts/boreholes is intended to be sunk or extended
1. To prove the contacts between the different lithologies present in the deposit, and to check quality variations.
2. To increase the reserves base for Jamul Cement works.

6. Type of shaft/underground workings proposed with dimensions.
-NA-

7. Type of drill used and size of core to be obtained.
1. Core drilling
2. Size of core obtained
a. HQ 3 63.1 mm
b. NQ 3 45.1 mm

8. Intended depth upto which shaft/borehole is to be sunk/bored.
Maximum 80mts from surface

9. If the shaft/borehole commences from underground the depth of the level at which the shaft/borehole is sunk.
None of the bore holes commenced from underground

10. Name and qualification of the geologist or mining engineer in charge of the operation.
1. Mr.J.Suxenthiran Head – Exploration.

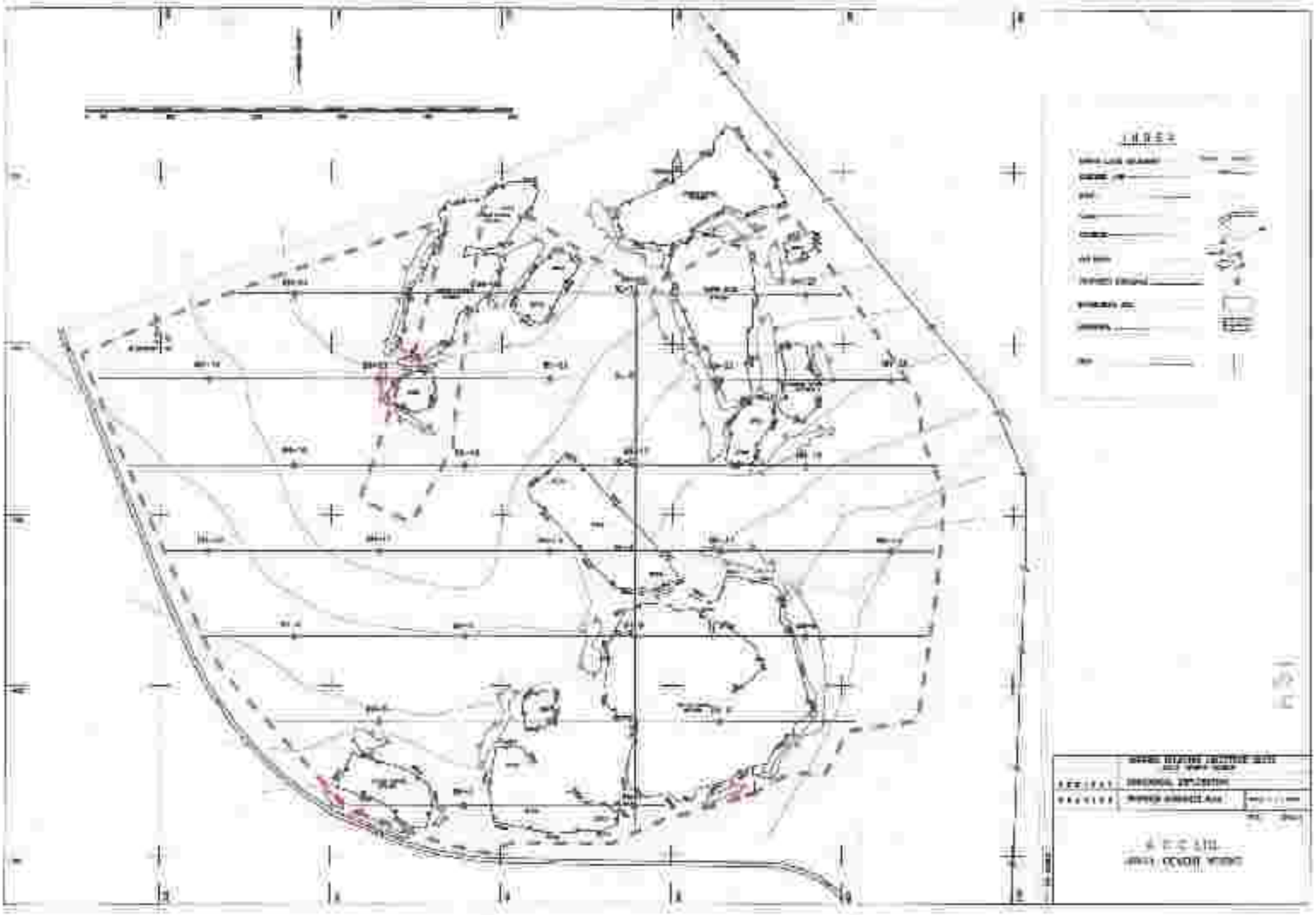
2. Mr.N.Pavan Kumar – Geologist,
M.Sc (Tech) Applied Geology.

3. Mr.R.Gopinath – Geologist,
M.Sc, Applied Geology

11. Date of commencement of proposed shaft sinking/drilling operation.
Drilling started on 4th May 2011

Place: Jamul Cement Works
Date: 04-May-11

Signature:
Name in (ul) RAMASHORE DAS
Designation: Head – Mining, ACC Limited,
Jamul Cement Works



ANNEXURE 5

NOC obtained from BSP in 1990 along with documents related to diversion of BSP land to ACC

To
M/s Associated Cement-
Companies Ltd.,
Jamul Cement Works,
Jamul-Distt.Durg(M.P.)

Sub:- No objection Certificate.

Ref:- Your No. MM/NOC/E-7/(6)64, dt. 3.11.1990.

Dear Sir,

[illegible] Steel Flexible [illegible] Industrial Area of 10A.1C acres(approx.) as per the enclosed list of village Mandal Chandni, Distt. Durg M.P. i.e. 2A.2B.1CD. We have NO OBJECTION for granting [illegible] lease on the area to M/s [illegible] Distt. Durg(M.P.).

[illegible]

LIST OF KHARIF (AUTUMN) HOLDINGS

S.No.	Kh. No.	Area in acres.
1.	916	0.10
2.	917	0.18
3.	918	0.41
4.	919	0.12
5.	920/1	1.25
6.	920/2	1.25
7.	921	0.12
8.	922	0.10
9.	923	0.35
10.	924	3.05
11.	925	1.00 (1.65)
12.	926	
13.	927	
14.	928	
15.	929	
16.	930	
17.	931/1	
18.	931/2	
19.	932	
20.	933/1	
21.	933/2	
22.	934	
23.	935	
24.	936/1	
25.	936/2	
26.	937	
27.	938	
28.	939/1	
29.	939/2	
30.	940	
31.	941	
32.	942	
33.	943	
34.	944	
35.	945	

JM:/SC/B-2/1409 Dt. 01.11.'9

To
Bhilai Steel Plant,
Bhilai (M.P.)

Kind Attn.:Sr.Manager, Mining

Dear Sir,

Sub: Mining lease

Kindly refer to the discussions we had on 31.1
when the undersigned called on yo. alongwith Sr.M.
Dy.G.M.of our Corporate Office and Sr.M.P.Pandey, Manag
Mining of our Works. As explained to you, we have al
mining lease at our Pathariya which is adjoining to you
Nandini Mines. We have proved 36 Million Tonnes of
limestone in this area. However, this quantity is not
sufficient for a full 1 Million Tonnes plant which we a
planning to put up. We understand that you have just
surrendered the leases of Tandini-Sonadih area which con
proved 25 Million Tonnes of limestone. We would like to
mention here that taking this 25 Million Tonnes limestone
together with our existing deposit of 36 Million Tonnes
Pathariya, it may be possible to furnish a new cement p
in this area.

In this context, I would request you to kindly
favour us with a No Objection Certificate please to enab
for filing application for the lease (Tandini-Sonadih ar
has been recently handed over by you to our Government).

Regarding the other issues discussed, we look
forward to hearing from you a convenient date for further
discussions at Nandini.

Thanking you,

Yours faithfully,
For The Associated Cement Companies Ltd.

(J.L.Kapoor)
Dy.General Manager (Opns.)
Jarul Cement Works.

VJa/mvr

cc. Dy.G.M. (O)/ Mr.Mishra.
cc. Supdg.Engr. Mines. (Pathariya)
cc. MKK

copy to Dy.G.M.(Opns.)-Kind Attn.:Mr.A.K.Sinha, Nandini.

मे/ श्री/श्रीमती/कुमारी .....
आवेदक

सहा. प्रबंधक (खान) .....अनावेदक
डिप्टी इण्डस्ट्री मैनेजर
बालाघाट

द्वितीय पुनरीक्षण क्रमांक
क्र.खनि/वि.प्र./2010-2011

आदेश

आवेदक की ओर से निम्न निवेदन प्रस्तुत किये हैं

1. यह कि मे. हिन्दुस्तान कॉपर लिमिटेड, खनिज साधन विभाग, बालाघाट के आवेदन पत्र क्र. एच.3-18/2004/12 दिनांक 12-3-2008 के अनुसार, आवेदक के पक्ष में, जिला बालाघाट के ग्राम नहदी-कुरैनी तह. परसवाड़ा के रकबा 53.57 हेक्टेयर क्षेत्र पर लौह खनिज पूर्वेक्षण एवं उत्खनित खनिज आवेदक के Captive Use के लिये 50 वर्षों के लिये दिनांक 02-12-2008 से 01-12-2058 तक के लिये स्वीकृत किया गया है। आवेदक ने उक्त क्षेत्र हेतु प्रस्तावित वित्तीय वर्ष में रुपये 80,15,25,250/- अनुमानित कीमत के खनिज की उत्खनन योजना प्रस्तुत की है। साथ के प्रस्तावित स्वीकृति आदेश को निर्धारित शर्तों पर सशर्त स्वीकृत देने में कोई आपत्ति नहीं होने की रिपोर्ट भेजी है, पर्यावरण एवं वन स्वीकृति, नई दिल्ली से प्राप्त होने की सूचना दिनांक 10-03-2011 के अनुसार विचाराधीन होना बताया है (प्रति संलग्न है)

2. यह कि स्वीकृत खनिज पट्टा क्षेत्र, कुल रकबा 53.57 हेक्टेयर क्षेत्र में से आवश्यकता अनुसार रकबा 10.85 हेक्टेयर क्षेत्र वन कटेकटर, कुरई के आदेश दिनांक 25-04-2011 के अनुसार कार्य करने प्रारम्भ करने की अनुमति प्राप्त हो चुकी है। आवेदक द्वारा रकबा 42.72 रकबा 18.92 हेक्टेयर वन खनि- 1964 रकबा 16.72 हेक्टेयर, पैदल रास्ता 3.08 हेक्टेयर तथा गिट्टी स्क्रीनिंग प्लांट की अवशेष-खनी रकबा की- सूचित किये हैं। उक्त अतिरिक्त आवश्यक पट्टे के संबंध में कलेक्टर, कुरई से अनुमति प्राप्त नहीं हुई है।

3. यह कि प्रत्यर्थी संख्या 3 को 53.37 हैक्टेयर भूमि दो भिन्न-भिन्न स्थानों की खतौनियों में दर्ज थी जो प्रत्यर्थी संख्या 3 के द्वारा दिनांक 08-02-1990 को न्यायालय श्री [illegible] उपजिलाधिकारी के समक्ष वाद संख्या 1/90 के पक्ष में समझौता करके एक खतौनी में दर्ज कराई गई जिसका नम्बर 1 है। उक्त समझौते के आधार पर आदेश के उपरान्त उपजिलाधिकारी के पक्ष में खतौनी संशोधित की गई।

4. यह कि खतौनी संशोधित होने उपरान्त, खतौनी निरस्त, संशोधित की गई अन्य सभी कार्यवाहियों की प्रति उपलब्ध कराये जाने हेतु श्री [illegible] को सूचना दी गई जिसके उपरान्त उन्होंने सूचना अधिकार अधिनियम 2005 की धारा 2(f) (i) (ii) के अन्तर्गत प्रार्थना पत्र दिनांक 14-01-2012 को प्रस्तुत किया जिसके अनुपालन में [illegible] को सूचना उपलब्ध कराई गई।

5. यह कि प्रकरण में कार्यालय उपजिलाधिकारी एवं सहायक कलेक्टर [illegible] द्वारा निर्णय पारित किया गया है। प्रत्यर्थी संख्या 3 ने भूमि को प्राप्त कर लिया तथा [illegible] को कब्जा दे दिया। [illegible] को [illegible] के कब्जा से बेदखल करने हेतु [illegible] के समक्ष वाद संख्या 1/90 दायर किया जिसके अनुसार [illegible] को [illegible] भूमि प्राप्त की थी।

6. यह कि वादकाल में [illegible] द्वारा [illegible] की गई भूमि के प्रतिफल की राशि के लिए [illegible] को 14,50,000/- के आधार पर गणना की गई है जो प्रावधानों के अनुरूप नहीं है, क्योंकि वाद भूमि का सर्किल रेट के आधार पर निर्धारित प्रतिफल, जिसके लिए [illegible] वर्ष 2010-2011 में रु० 6,50,000/- प्रति हेक्टेयर वर्ष 2011-2012 में रु० 13,00,000/- एवं वर्ष 2012-2013 में रु० 14,53,000/- के आधार पर लिए गये थे, वर्तमान में अधिकतम बाजार [illegible] रु० 11,00,000/- होना चाहिये।

7. यह कि वादी/प्रार्थी-कम्पनी को प्रतिवादी के निर्माण की लागत, वास्तविक मूल्यांकन तथा (Loss due to) के संबंध में सूचित किया गया था जिसके तहत 4,10,43,648/- रुपये का भुगतान किया जाना था जिसमें से 5,18,07320/- रुपये का भुगतान किया जा चुका है।

8. यह कि प्रतिवादी फोन पर ही बराबर व्यवधान डालते रहे। फोन में कुछ ही मिनटों में कॉल ड्रॉप हो जाती थी। बार-बार फोन पर ही बात करने पर व्यक्तिगत मुलाकात नहीं हुई। इसी पर वादी-कम्पनी द्वारा विभिन्न तारीखों में कई बैंक ड्राफ्ट (B/D) निर्गमित किये गये। परन्तु प्रतिवादी द्वारा उन्हें प्राप्त करने से मना कर दिया गया। अतः वादी-कम्पनी द्वारा 3,73,16,520/- रुपये का भुगतान किया जा चुका है।

अतः प्रार्थना है कि प्रतिवादी को निर्देश दिया जाये कि वह वादी कम्पनी को शेष राशि 1,44,90,800/- रुपये का भुगतान करे।

साथ ही प्रतिवादी को निर्देश दिया जाये कि वह वादी कम्पनी के निर्माण कार्य में व्यवधान न डाले।

प्रार्थी

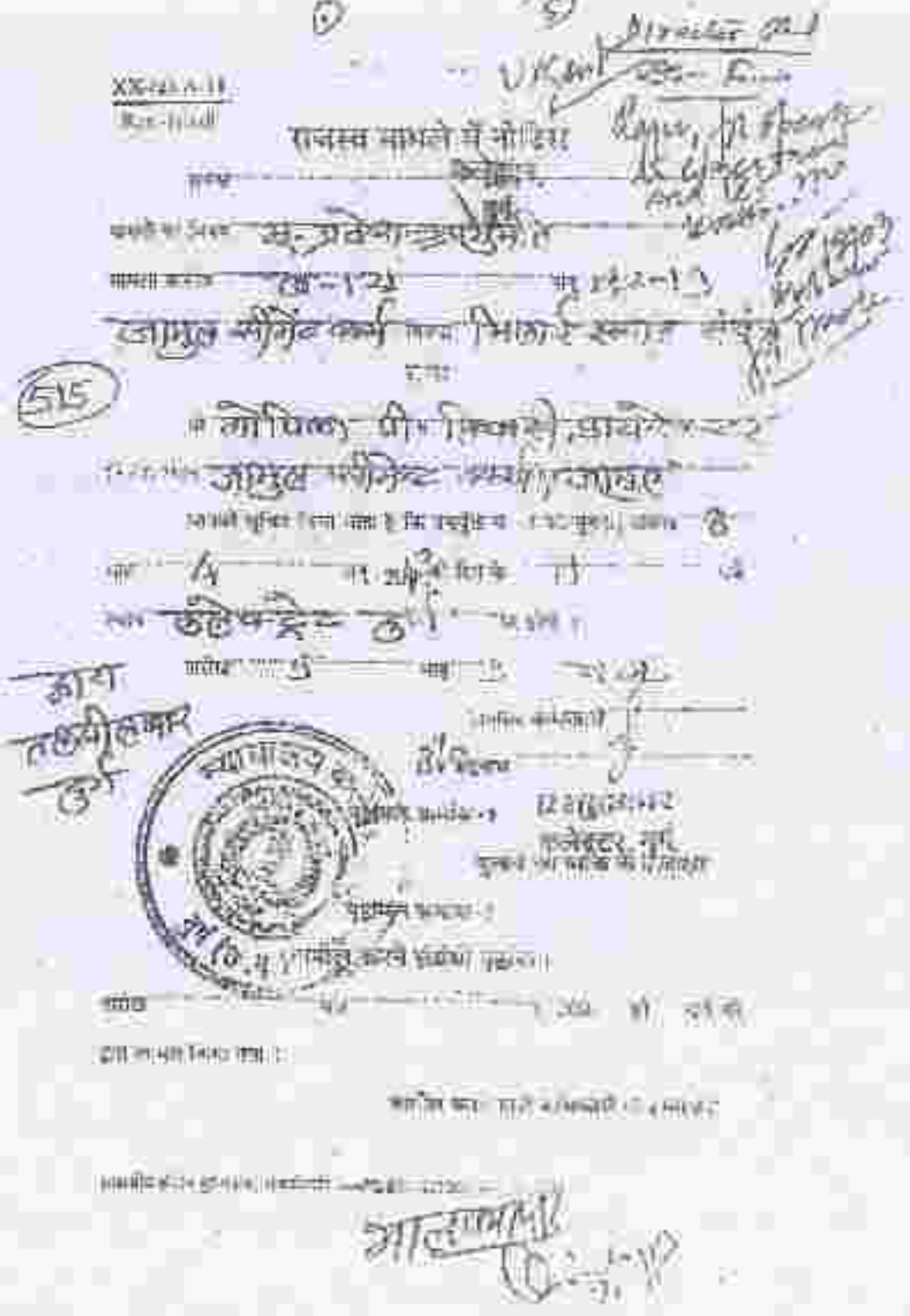
अधिकृत हस्ताक्षरी

[illegible]

[illegible]

[illegible]

XXVIII A-11



कार्यालय कलेक्टर (खनि शाखा), जिला दुर्ग 193
छत्तीसगढ़

क्रमांक 915 /खनि/अनाज/2012 दुर्ग, दिनांक 21/3/12

प्रति

सहरी निवासी
डायरा
जिला दुर्ग (छत्तीसगढ़)

विषय :— मु–प्रस्तर की अनुज्ञप्ति के संबंध में अधिरोपण आदेश।

संदर्भ :— आपका आवेदन क्रमांक 83/खनिज/2012 दिनांक 03.03.2012

—:0:—

नियमांतर्गत संदर्भित पत्र की कृपया अवलोकन करें। ग्राम सोनाखान तहसील सिमगा, जिला रायपुर के आवेदक श्री एस.के.–13/2004/12 साकुर दिनांक 13.03.2008 (संलग्नकानुसार) के अनुसार म0प्र0 एवं छ0ग0 गौण खनिज (क्रमांक 1–क्ष–4 जिला दुर्ग के ग्राम तेलीसुकली के खसरा 93/52 के क्षेत्र पर आवेदित चूनापत्थर का खनिपट्टा कार्यालय दिनांक 02.12.2008 से 01.12.2038 तक की अवधि के लिए स्वीकृत किया गया है।

खनिपट्टाधृत क्षेत्र कुल रकबा 33.52 हे0 में से आरक्षित वनभूमि खसरा नं0 1951/1 रकबा 7.00 हे0, 1941 रकबा 0.50 हे0, 1945 रकबा 3.22 हे0 कुल रकबा 10.72 हे0 घटाकर 17.68 हे0 क्षेत्र पर कलेक्टर महोदय के आदेश दि0 व0 28.04.2011 के अनुसार उपांत वनभूमि की अनुमति दी गई है। शेष भूमि खसरा नंबर 1942 रकबा 12.31 हे0, 1944 रकबा 1.46 हे0, 1946 रकबा 16.76 हे0 कुल रकबा 35.53 हे0 क्षेत्र खसरा नंबर(ो) के अनुसार निजी कब्जा वनेत्तर की भूमिस्वामी की भूमि होने के कारण खनन हेतु अनुमति प्रदान की जा सकती है।

छत्तीसगढ़ भू–राजस्व संहिता, 1959 की धारा 237(1) के प्रावधान के अनुसार खनिपट्टाधारी को खनिपट्टाधिकार, कलेक्टर की पूर्व स्वीकृति के बिना किसी व्यक्ति को हस्तांतरित नहीं कर सकेगा। खनिपट्टाधारी को पट्टा प्रदान किये जाने के पूर्व पट्टा क्षेत्र में स्थित समस्त भूमि का अधिकार उसे नहीं दिया गया है। किसी भूमि को खनन के लिए उपयोग करने के पूर्व संबंधित भूमिस्वामी से आवश्यक अनुज्ञप्ति/सहमति प्राप्त करना होगा। इसके अलावा खनिज संरक्षण एवं संवर्धन नियम 2010 के अंतर्गत कलेक्टर दुर्ग के आदेश क्रमांक एस.3–10/2009/12 साकुर दिनांक 18.09.2009 की शर्तों का भी पालन करना होगा। किसी भूमिस्वामी से आवश्यक अनुज्ञप्ति/सहमति प्राप्त करने के उपरांत ही उक्त खनिपट्टा क्षेत्र पर खनन की अनुमति प्रदान की जाए।

154

न्यायालय तहसीलदार [illegible] जिला दुर्ग

[illegible]

क्र0/ 85/ वाचक/2012 [illegible] दिनांक [illegible]/2012

प्रति,

खनि अधिकारी
खनिज शाखा
दुर्ग (छ0ग0)

विषय:- भू-प्रवेश की अनुमति के संबंध में प्रतिवेदन बाबत।

-::प्रतिवेदन::-

इस न्यायालय के रा0प्र0क्र0 28/अ-19/वर्ष 2011-12 [illegible] आवेदक [illegible] जामुल [illegible], [illegible] दुर्ग [illegible] जामुल दुर्ग के नाम [illegible] प0ह0नं0 28/31 तहसील [illegible] जिला [illegible] में सी.एस.पी. को स्वीकृत खनिज पट्टा [illegible] 1965 [illegible] कुल रकबा 38.65 है0 [illegible] संहिता 1959 की धारा 247 (3) व (4) की कार्यवाही [illegible] प्रतिवेदन हेतु प्राप्त हुआ था, [illegible] दिनांक 27.08.2012 को [illegible] खनिज अधिकारी को प्रतिवेदन किया जावे।

अतः इस संबंध में आपका [illegible] अग्रिम कार्यवाही हेतु अनुविभागीय अधिकारी दुर्ग को [illegible]

संलग्न- प्रकरण क्र0 28/अ-19/वर्ष 2011-12

तहसीलदार
[illegible] जि.-दुर्ग

11

[illegible]

75

कार्यालय तहसीलदार, धमधा जिला दुर्ग

क्र./ /वाचक/2019 धमधा, दिनांक [illegible]

प्रति

कलेक्टर दुर्ग
(छ०ग०) [illegible]

द्वारा- अनुविभागीय अधिकारी दुर्ग।

विषय- जिला दुर्ग तहसील धमधा के [illegible] ग्राम [illegible] में [illegible] की भूमि [illegible] छ०ग० भू-राजस्व संहिता 1959 की धारा 237(3) एवं (4) की कार्यवाही [illegible] करने बाबत।

संदर्भ- कार्यालय कलेक्टर जिला दुर्ग के [illegible] क्रमांक [illegible] दुर्ग दिनांक [illegible] 2019 / अनुविभागीय अधिकारी दुर्ग के [illegible] क्रमांक 115/[illegible]

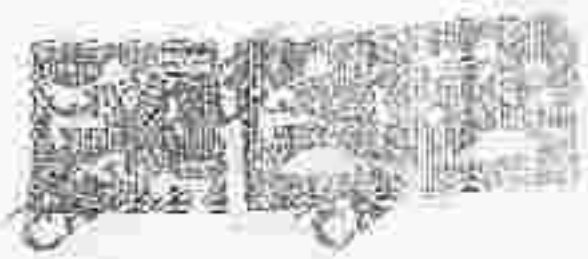
::::::00::::::

[illegible] 20/अ-121/2011-12 [illegible]

1\. [illegible]

2\. [illegible]

[illegible]



3. निरीक्षक [illegible] स्थलों का निरीक्षण किया। [illegible] हुए न स्वामित्व की है और केन्द्र सरकार के समक्ष [illegible] कोई भी अनापत्ति [illegible] कर दिया गया हो तथा [illegible] दिया गया हो, किसी भूमि की [illegible]।

भूमि सरकारी विभाग [illegible] अधिकार का भुगतान नहीं हुआ और न ही [illegible] हुआ है। [illegible] का [illegible] नहीं [illegible] की जा सकती। [illegible]

4. जनपद के [illegible] 1946 रकबा 36.63 [illegible] भूमिधारी [illegible] अभिलेख को [illegible] की अनुमति [illegible]।

5. [illegible] 11,50,000/- [illegible]

[illegible]

[illegible] भूमि को [illegible]

TRUE COPY

रखते हुये श्री अपना आदेश पा [illegible] में [illegible] को, आवासीय व्यावसायिक [illegible] [illegible] के [illegible] [illegible] निर्गत किया है, कि [illegible] [illegible] [illegible] [illegible] स्वीकृत स्वामित्व के स्वीकृत [illegible] 1542 [illegible] [illegible] की कुल रकबा 85.68 हैक्टेयर [illegible] [illegible] की [illegible] [illegible] [illegible] [illegible] पी॰ है, [illegible] [illegible] [illegible] [illegible] कर आदेश की अवहेलना करते और [illegible] [illegible] के अतिक्रमण हेतु [illegible] [illegible] [illegible] [illegible] की [illegible] धारा 143(5) के अन्तर्गत [illegible], [illegible] [illegible] आरम्भ कर देगा।

दिनांक 11/12/2013

(अरुण कु॰ [illegible])
नायब तहसीलदार (न्यायिक)
[illegible]
[illegible]

Ref No:- DMO/256/12-NK-250
Dated 9th May 2012

199

ACC

Accuracy
[illegible]
[illegible]
[illegible]

Phone [illegible]
FAX [illegible]
[illegible]

प्रति

सचिव
छत्तीसगढ़ सरकार
वाणिज्य एवं उद्योग विभाग
मंत्रालय
रायपुर (छ.ग.)

विषय :- [illegible] के संबंध में।

संदर्भ :- वाणिज्य एवं उद्योग विभाग का पत्र क्रमांक एफ 2-[illegible]/12-वाणिज्य दिनांक [illegible] एवं इस कार्यालय का पत्र क्रमांक DMO/256/12-NK-[illegible] दिनांक [illegible] 2012 तथा शासन के मौखिक [illegible] -964 दिनांक 30 July 2012

महोदय,

[illegible] के संबंध में [illegible] 2064/12 दिनांक 11 मई 2012 के [illegible] 28 फरवरी 2012 को [illegible] वाणिज्य विभाग के संयुक्त [illegible] अधिकारी [illegible] के [illegible] पत्र क्रमांक DMO-256/12 NK [illegible] 9 May के द्वारा [illegible] के संबंध में [illegible] किया गया था, जिसमें [illegible] एवं [illegible] एकांत कार्य [illegible] किया गया था। [illegible] 25 मई 2012 को [illegible]

[illegible] के संबंध में [illegible] 25/264 [illegible]

1981 की धारा 21 के अन्तर्गत [illegible]
होने से रजिस्ट्रेशन से किसी प्रकार का [illegible]
लाभ प्राप्त करने से अनिवार्य [illegible]
प्राप्त करने हेतु अनिवार्य [illegible]

अतीक्षण [illegible]
17.89 ई० तक [illegible]
द्वारा प्रदान की गयी [illegible]
तथा निरस्त Mr. Bharti [illegible]
अनुसार, मुक्ति स्वामी [illegible]
की धारा 247(3) [illegible]
मुक्ति स्वामी की [illegible]
से प्रेषण की अनुमति [illegible]
समस्त अभिलेख [illegible]
[illegible]
प्रकरण [illegible]
[illegible]
अवमान अभिलेख [illegible]
[illegible]
28-7-2012 [illegible]
न्यायालय का प्रकरण [illegible]
समाप्त हो।

आज अभिलेख [illegible]
रखते हुये [illegible]
[illegible]
नियमावली 1960 [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Skillful एवं Workman like manner में कार्य
आरम्भ कर देगा। 20/

संलग्नक,

हस्ताक्षर

आवेदक - महेन्द्र कुमार

( )

प्रतिलिपि,

लाईसेन्सर (अधिशासी) को उक्त
आवेदक कार्यवाही हेतु अग्रेषित।

न्यायालय श्रीमान [illegible] जिला [illegible]

[illegible] आमुल सोनिट ...अभियुक्त

विरुद्ध

[illegible] कुमार बेस मल्ल एडवोकेट
की.एस.पी. ...अभियोजक

[illegible]

आदेश

अभियोजक की ओर से निम्नलिखित आवेदन प्रस्तुत है :-

1. कि आवेदक द्वारा प्रस्तुत आवेदन संक्षिप्त नहीं है जिस कारण उसे पढ़ा जाना संभव है। कि दस्तावेज अभिलेख के अनुसार ग्राम [illegible] स्थित भूमि खसरा नं. [illegible] रकबा 1.852 हेक्टेयर जोत रकबा 1.946 रकबा 1.676 हेक्टेयर भूमि बिक्री द्वारा सरकार के हक व स्वामित्व की है जो केन्द्र सरकार का उपक्रम है। कि आवेदक ने अपनिक भूमि खसरा नंबरों पर खनिज चूना पत्थर आदि के खनन के लिए जमीन अनुमति चाहा है कि इस संबंध में न्यायालय का ध्यान [illegible] के पत्र [illegible] (5) की ओर आकर्षित किया जाता है जो निम्नानुसार :-

217(5) :- सरकार या कोई भी सार्वजनिक संस्थान की पूर्व सहमति के बिना और तब तक और तक कि प्रतिस्थ प्राधिकारी ने यह लिख नहीं दिया हो उन व्यक्तियों के जिनके कि अधिकारों पर प्रतिकूल प्रभाव [illegible] कर दिया गया हो, किसी भूमि की खान [illegible] हो उसे खनन में लेगा।

2. कि उपरोक्त प्रावधानों को पढ़ने से स्पष्ट है कि [illegible] भूमिधारी की उसकी भूमि का वास्तविक बाजार मूल्य को [illegible] नहीं हो जाता तब तक कोई कार्यवाही नहीं [illegible] कोई कार्यवाही मूलतया या जानबूझकर करता है तो विधि अनुसार ऐसी कार्यवाही प्रारंभ से शून्य है। कि मुख्यमंत्री सिंगाई हरित प्लाट [illegible] कोई परिवर्तन का भुगतान नहीं हुआ और न ही आवंटित हुआ है। कि प्रकरण में आवेदक [illegible] की ओर से ऐसा कोई प्रमाणित [illegible] है कि केन्द्र शासन या राज्य शासन का कब्जा [illegible] भूमि खसरा नं. को प्रतिकर निर्धारित के [illegible] है इसलिए प्रकरण में आगे कोई कार्यवाही नहीं की [illegible] स्वामित्व की जमीन पर खनिज [illegible] नहीं देगा।

अतः प्रस्तुत आवेदन [illegible] निरस्त किए जाने [illegible] आदेश पारित किया जाकर प्रकरण [illegible]

[illegible] नोटिस

समक्ष न्यायालय तहसीलदार [illegible] जिला दुर्ग (छ.ग.)

मामले का विषय :- [illegible]

मामला क्रमांक :- बी/अ-121 वर्ष 2011-2012

[illegible]

बनाम

श्री [illegible] कुमार मीणा उपमहाप्रबंधक [illegible] ऑफ इंडिया [illegible] भिलाई (छ.ग.)

आपको सूचित किया जाता है कि [illegible] 2012 को दिन के 11.00 बजे स्थान [illegible] उपस्थित होवें।

तारीख 30 माह 03 सन् 2012

संलग्न :- [illegible] का आवेदन [illegible] 14/03/2012 [illegible]

तहसीलदार
धमधा जिला-दुर्ग

[illegible]

तारीख ——— माह ——— सन् ——— [illegible]

[illegible]

2/4/12

29/5/2012

S.K.N. R. Alwani
9406209787

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कार्यालय कलेक्टर, दिल्ली-दुर्ग (छ.ग.)

ज्ञाप।

क्रमांक/ /अ.कले./2012 दुर्ग दिनांक फरवरी 2012

अनुविभागीय अधिकारी (ए)
दुर्ग।

विषय- जिला दुर्ग पंचायत क्षेत्र के अंतर्गत ग्राम खपरी खुर्द में खसरा नंबर 57 का रकबा 0.810 हे. का स्वीकृत आबंटन पत्र में दीर्घसूत्री की गयी कार्यवाही, जो अंतरण के फलस्वरूप भारित 1969 की धारा 34(1)(ए) (ए) की कार्यवाही उपधारा धारा 247(3) के अंतर्गत नु-प्रवेश की अनुमति प्रदान करने बाबत।

संदर्भ- आवेदक श्री गोविंदा श्री तिवारी डायरेक्टर (निधन) ग्राम खपरी खुर्द तहसील दुर्ग का आवेदन पत्र दिनांक 14.01.201

-00-

विषयांकित संदर्भित पत्र कृपया देखने की कोशिश में पाया है कि आवेदक श्रीमति गोविंदा तिवारी डायरेक्टर (निधन) ग्राम खपरी खुर्द तहसील दुर्ग के नाम से खसरा नंबर 57 का रकबा 0.810 हे. भूमि कृषि भूमि है। आवेदक द्वारा उक्त भूमि पर आवासीय कॉलोनी विकसित करने हेतु आवेदन किया है। आवेदक द्वारा उक्त भूमि पर आवासीय कॉलोनी विकसित करने हेतु आवेदन किया है।

संलग्न : उपरोक्तानुसार।

ह. अपठनीय
अनु. अधिकारी, दुर्ग

क्रमांक/1178/अ.कले./2012 दुर्ग दिनांक 1 फरवरी 2012

प्रतिलिपि-
श्री गोविंदा श्री तिवारी डायरेक्टर (निधन) ग्राम खपरी खुर्द तहसील दुर्ग को उनके संदर्भित पत्र के तारतम्य में सूचनार्थ प्रेषित।

ह. अपठनीय
अनु. अधिकारी, दुर्ग

Case Registered in the Court of Tahsildar - Dhamdha as Revenue Case - 23-क/121-2011-2012
Case fixed for 5/3/2012

ACC Limited
PVG Jamul Cement Works
Post Office - 490 024
Chhattisgarh, India

Phone +91 788 2246461 to 66
Fax +91 788 2382340
www.acclimited.com

प्रति,

कलेक्टर

(दुर्ग छत्तीसगढ़)

विषय :- जिला दुर्ग तह. धमधा अन्तर्गत ग्राम नन्दनी, कुल्दनी के रकबा 53.57 हे. क्षेत्र पर स्थापित चालू खदान में मैं. ए.सी.सी. की भूमिस्वामित्व रकबा 35.68 हे. क्षेत्र में छ. ग. भू. राजस्व संहिता 1959 की धारा 247 (3), (4) की कार्यवाही उपरान्त धारा 247 (5) के अन्तर्गत भू-प्रवेश की अनुमति प्रदान करने बाबत्।

संदर्भ :- कलेक्ट्रेट धमतरी जिला दुर्ग का भू-प्रवेश अनुमति आदेश क्र. 239 भा. वि. / खनिज / 2011 दिनांक 29.04.2011 एवं मिलाई स्थित संयंत्र को लिखे गये पत्र की पावती क्र.क्र. 2016 / सी.सी. / खनिज / 2011 दिनांक 26.03.2011।

महोदय,

उपरोक्त विषयांतर्गत संदर्भित पत्रों का अवलोकन करने का कष्ट करें। जैसा कि ज्ञात है कि मै. ए.सी.सी. लिमि. जामुल सिमेंट वर्क्स को छ. ग. शासन खनिज साधन विभाग के आदेश क्र. एफ. 3-19 / 2004 / 12 रायपुर दिनांक 18.09.2008 द्वारा तह. धमधा अन्तर्गत ग्राम नन्दनी कुल्दनी के रकबा 53.57 हे. क्षेत्र पर खनिज उत्खनन पट्टा स्वीकृत किया गया है, जिसका अनुबंध निष्पादन दिनांक 02.12.2008 से 01.12.2020 तक के लिये किया गया है।

उपरोक्त परिपेक्ष्य में जिला दुर्ग द्वारा आवेदक कम्पनी को संदर्भित आदेश क्रमांक 239 / भा. वि. / खनिज / 2011 दिनांक 29.04.2011 अनुसार खनिज्ञा में स्वीकृत

क्रमशः 2...

[illegible] के अंतर्गत [illegible] में उल्लेख किया गया है, जिसका विवरण निम्न है :-

क्र.	ख. नं.	अधिसूचित रकबा (हे. में)
1.	[illegible]	7.03
2.	[illegible]	0.50
3.	[illegible]	2.26
4.	[illegible]	8.10
	कुल	17.89

[illegible] में कुल रकबा 53.57 है. में से शासकीय भूमि 17.89 है. में भू– प्रवेश की अनुमति हेतु जारी [illegible] 35.68 [illegible] है, जो क्रमशः ख. नं. 1942 रकबा 18.92 है. तथा ख. नं. 1946 रकबा 16.76 है. का सम्मिलित क्षेत्र है तथा जो अभिलेख अनुसार खसरा पंचशाला में भिलाई स्थित संयंत्र की भूमि स्वामी दर्ज है। अतः संयंत्र में आवेदक कम्पनी को शासकीय कुल रकबा 17.89 है. में से [illegible] द्वारा प्रदत्त भू – प्रवेश अनुमति दिनांक 29.04.2011 तथा खनिपट्टा में स्वीकृत मान चित्र की प्रति एवं खसरा पंचशाला की प्रति सुलभ संदर्भ हेतु संलग्न है।

अतः अनुरोध है कि आवेदक कम्पनी को खनिपट्टा में स्वीकृत ख. नं. 1942, रकबा 18.92 है तथा ख. नं. 1946 रकबा 16.76 है. अर्थात् कुल रकबा 35.68 है. क्षेत्र पर जिसका भूमि स्वामी हक भिलाई स्थित संयंत्र के नाम दर्ज है, में छ. ने. भू राजस्व संहिता 1959 की धारा 247 (3) एवं (4) के अंतर्गत स्वामीवाही उपबंध धारा 247 (5) के अंतर्गत भू – प्रवेश की अनुमति प्रदान करने का कष्ट करें।

धन्यवाद

संलग्न जानकारानुसार

भवदीय

गोपिका पी. तिवारी
डायरेक्टर (प्लांट)
जामुल सिमेंट वर्क्स
जामुल, दुर्ग

14-11-2012

2.00

Ref: ANL/SG/NK-245
Date: 10th February, 2012

The Secretary
Government of Chhattisgarh
Mineral Resources Department
Dau Kalyan Singh Bhawan
Secretariat, Raipur (C.G)

Sub: Relaxation under Rule 38(2)(a) of Mineral Concession Rule 1960 for non-commencement of Mining operation in stipulated time limit.
Ref:- Order no. F-2-18/2008/12 dated 16.9.2008 issued by Director of CG M.R Deptt.

Dear Sir,

With reference to the subject mentioned above, an area of 53.57 Ha in Village – Nandini Khurdeni has been granted to us by the State Govt. vide order no F-2/18/2008/12 Raipur dated 16.09.2008. The lease deed has been executed on 02.12.2010 and the same executed lease deed has also got registered on 02.12.2010 in the O/o Registrar Office, Tehsil – Dhamda, Dist – Durg. The Environment Clearance has been obtained vide letter No.J-11015/237/2009-IA.II(M) Dated 20.03.2011. The Collector (Mining Section), Durg has also permitted us vide their order no. Nistar/Khanij/2011 Dated 29.01.2011 to enter upon the 17.69 ha of land out of total lease area of 53.57 Ha to excavate the limestone.

We have also applied for the consent to establish under Air (prevention & Control of Pollution) Act 1981, Water (prevention & Control of Pollution) Act 1974 to Chhattisgarh Environmental Conservation Board on 30/7/2011 but Meeting for the consent to establish, however after installing the weighing scale we shall apply for the consent to operate and commence mining operation. In the meanwhile we have also submitted an application on 14.1.2012 to decide the land compensation for the land belongs to Bhilai Steel Plant Under section 247(3) & (4) of CG land Revenue code 1959.

Looking to the reasons stated above, we receive the commencement of the mining Operation may be delayed further i.e. beyond the stipulated period under Rule 38(2)(a) of Mineral Concession Rule 1960. We are enclosing herewith a bank draft for Rs. 500/- deposited vide treasury challan No.290 Dated 10.02.12 in favour of the Applied for of Rs. 500/- therefore, we request your good self to kindly accord necessary approval and permission to commence production and despatch of limestone from Nandini Khurdini Mining Lease after completion of all formalities which may take approximately another 2 months.

Thanking you,
For ACC Limited

Sd/-
Gopika P Tiwari
Director Plant
Encl: As above in original

Copy to : The Collector (Mining Section), Durg (C.G) for information and necessary action.

1/

स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड
STEEL AUTHORITY OF INDIA LIMITED
भिलाई इस्पात संयंत्र
BHILAI STEEL PLANT

क्रमांकः [illegible]/खनिज/2/

दिनांक - 17.01.2012

प्रति,

अपर कलेक्टर, दुर्ग
कार्यालय कलेक्टर (खनिज शाखा)
जिला - दुर्ग (छ.ग.)

विषयः तहसील पाटन अन्तर्गत ग्राम नंदनी खुदली के रकबा 53.57 हेक्टर क्षेत्र पर मे0 स.प्रा.सा.स्टील लिमि. के पक्ष में स्वीकृत खनिपट्टा पर खनन हेतु सहमति बाबत।

संदर्भः आपका पत्र क्रमांक- 2917 दिनांक - 26.03.2011 एवं 302 दिनांक - 05.05.2011।

महोदय,

विषयान्तर्गत संदर्भित पत्र के संबंध में लेख है कि भारत सरकार, इस्पात मंत्रालय से उनके पत्र दिनांक- 29.04.2011 द्वारा सूचित किया है कि सरकार ने सार्वजनिक प्रयोजनों के अधिकार वाले भूमि के हस्तांतरण या आवंटन की [illegible] निति तैयार की जा रही है जिसका स्वीकृति माननीय मंत्री द्वारा की गई है जब तक सरकार ने सार्वजनिक प्रयोजनों के अधिकार वाले भूमि को बेचने या लीज पर देने के लिये समय के लिए रोक हेतु केबिनेट की विशेष अनुमोदन लेनी होगी। (छत्तीसगढ़ संलग्न)

अतः उपरोक्त परिप्रेक्ष्य परिलक्षित में मिलई इस्पात संयंत्र तहसील पाटन अन्तर्गत ग्राम नंदनी खुदली के रकबा 53.57 हेक्टर क्षेत्र पर मे0 स.प्रा.सा.स्टील लिमि. के पक्ष में स्वीकृत खनिपट्टा में से भिलाई इस्पात संयंत्र के अधिकार [illegible] 35.66 हेक्टर भूमि पर खनन हेतु सहमति पत्र देने में असमर्थ है।

धन्यवाद सहित।

Discussed with Director (prod.) &
we have to apply to collector for
Re-consideration (Govt. has right to withdraw)
Compensation
प्रतिलिपिः

(प्रदीप कुमार सेन)
उपमहाप्रबंधक (खनिज अनुभाग-रावघाट)

श्री आर.के.राय, इंजी.मैनेजर, ए.सी.सी. जामुल सिमेंट वर्क्स जामुल सिमेंट दुर्ग (छ.ग.) - कृपया [illegible]

No. 17(5)/2011- Coord.
Government of India
Ministry of Steel

Udyog Bhawan, New De
29th April, 2

To

The Chief Executive of All the PSU's
(Under administrative control of the Ministry of Steel)

Sub: Transfer or alienation of land held by the Government or public authorities- Decision of Hon'ble Prime Minister

Sir,

I am directed to forward herewith a copy of letter No. 93/2011-[illegible] dt 6th April, 2011 received from Ministry of Urban Development, Land Development Office on the subject mentioned above for information.

Yours faithfu

Encl: As above

(K.R.
Under Secretary to the Govt. of I
Tel: 2306

Copy to:

All Project Sections/Cells concerned in the Ministry.

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14/c-1

F-20011/9/11-UDD
Government of India
Ministry of Urban Development
Land & Development Office

Dispatch No. 91/2011-UDD

Nirman Bhawan, New Delhi
Dated the 6th April, 2011

To,

1. All the Ministries through Director, Coordination
2. All PSUs under the Ministries
3. Vice Chairman, DDA
4. Principal Secretary (UD), GNCTD
5. Commissioner, MCD
6. Chairman, NDMC
7. Chairman, DMRC
8. Chairman-cum-Managing Director, HUDCO
9. Chairman-cum-Managing Director, NBCC
10. Dy. Director (Policy), Dte. Of Estates, Nirman Bhawan
11. DG, CPWD, Nirman Bhawan.

Sub:-Transfer or alienation of land held by the Government or its various authorities- Decision of Hon'ble Prime Minister

Sir/Madam,

I am directed to state that vide D.O. No. 513/2/1/2010-Cab.(i) dated 21 July, the Secretary (Coord. & PG), Cabinet Secretariat has intimated that instances have come to the notice of the Government where land in possession with various Government / Government controlled entities is sought to be alienated through sale or lease and / or licence. It has been observed that the value of land has increased tremendously, especially during last one or two decades.

2. A policy also called to transfer or alienation of land held by the Government or its various authorities etc. is being framed. The Government, which also has approved that in / Departments which are / are not dealing in the matter / Cabinet in such case it will be duly for the heads of

(Seal)

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Ref No. JMC/SGCNK/2011/784
Jamul, Dated: 7-04-2011

ACC Limited
Jamul Cement Works
Dist. Durg - 491 441
Chhattisgarh, India

Phone +91 788 2388511 to 15
Fax +91 788 2381480
www.acclimited.com

The Deputy General Manager (Technical),
Mines Department,
Steel Authority of India Ltd.,
Bhilai Steel Plant,
BHILAI

Kind Attn: Shri Ab ura Mukherjee

Sub: Regarding acceptance of consent to obtain working permission in Kundan Khurd Limestone Mining Lease area of 53.57 Ha.

Ref: Yours letter no. HQ/Mining II/by GM (Tech) Nandini/1623 Dated, 16/3/2011

Dear Sir,

With reference to subject above we wish to inform you, we had requested vide our letter No: JMC/MRC/1409 Dated, 7/11/1990 (copy attached) to Bhilai Steel Plant to issue us NOC over the area of 134.40 acres i.e. 54.40 Ha. Then the Bhilai Steel Plant issued the unconditional NOC vide their letter No.GM:EOM:LP: 1/90/727, dated, 21st Nov 1990. Out of the said area 53.57 Ha has been sanctioned min... lease to ACC Ltd. ... have requested for your consent to enter up to 35.68 Ha L.... which belongs to SAIL

Regarding payment of any compensation to SAIL ... obtaining the above NOC ... not arise since you had surrendered the said mining lease ... we have proposed on Lat basis only. Hence we would once again like to request you for your kind consent to mine upon the said land as desired by the District Mining Officer vide their letter No. 2111 dated 26/3/2011.

We look forward for your Kind cooperation and early action.

Thanking you,

Yours Faithfully,
For ACC Limited,

R.K. Dash
Head Mining
Jamul Cement Works

Encl: As above

Received by me on 7.4.11
Copy Received
Copy to Shri [illegible] ji

स्टील अथॉरिटी आफ इण्डिया लिमिटेड
STEEL AUTHORITY OF INDIA LIMITED
भिलाई इस्पात संयंत्र
BHILAI STEEL PLANT

क्रमांक-सं.इ./इस्पात/भ.इ.(खान)/मंत्रणा/11-2017
दिनांक - 16.09.2011

प्रति,

श्री आर.के.दास,
हेड माइनिंग, ए.सी.सी
आमुल सिमेंट वर्क्स, जामुल
जिला - दुर्ग (छ.ग)

विषय: तहसील धमधा अन्तर्गत ग्राम नंदली खुर्द की रकबा 63.57 हेक्टर क्षेत्र पर मे0 ए.सी.सी सीमेंट लि0 के पक्ष में स्वीकृत खनिपट्टा एवं संबंध में।

संदर्भ: 1. खनि अधिकारी, दुर्ग का पत्र क्रमांक- 2917 दिनांक - 26.03.2011 ।
2. ए.सी.सी सीमेंट लि0 का पत्र दिनांक- 05.11.2011 एवं 21.05.2011 ।

महोदय,

Mining Officer, Durg vide above referred letter (Ref.1) has intimated that Mining Lease over an area 63.57 Ha in village Nandali Khurd has been granted to M/s ACC for a period of 20 years w.e.f. 02.12.2008. It is intimated that Khasra No.942 area is 18.92 and Khasra No.1946 area 16.76 totaling 35.68 Ha as per Khasra Patchsala is in the name of Bhilai Steel Plant.

M/s ACC vide letter at Ref.2 has requested Bhilai Steel Plant to provide No-Objection Certificate for the 35.68 Ha area in SAIL's Name, if Bhilai Steel Plant agrees for the same.

In view of the above, it is requested to kindly intimate whether any compensation had been paid by M/s ACC Ltd. to Bhilai Steel Plant while obtaining the NOC from BSP in the year 1990.

धन्यवाद सहित ।

Encls

Ref No - [illegible]

(आर्य कुलश्री)

टेलिफोन #09,001, पी.बी.नं.9, भिलाई, छत्तीसगढ़ (भारत) 490001, ई-मेल - sailbsp@sailbhilai.com, वेबसाइट - www.sailbsp.co
Phone 490 001 Chhattisgarh, Fax : 91-788-2220000 (STD) 222340, E-mail : [illegible]

215 → M.K. Sir Sir

कार्यालय कलेक्टर (खनि शाखा) जिला दुर्ग
छत्तीसगढ़

क्रमांक :- 35 / मान.वि. / खनिज / 2011 दुर्ग, दिनांक- 5/1/11

प्रति,

श्री ए.के.सेन,
निदेशक एवंप्रायजर,
ए.सी.सी. सीमेंट लि0,
जामुल भिलाई जिला दुर्ग।

विषय :- सूचना के अधिकार के अन्तर्गत प्रतिलिपि प्रदाय करने बाबत्।
संदर्भ :- आपका पत्र दिनांक 28.11.2011।

-:0:-

विषयान्तर्गत संदर्भित पत्र में चाही गई जानकारी 03 पृष्ठों में संलग्न कर प्रेषित है।

खनि एवं जन सूचना अधिकारी
जिला दुर्ग (छ.ग.)

[illegible]

दि. 18-04-2004

प्रति,

मुख्य निदेशक
भिलाई इस्पात संयंत्र भिलाई
तहसील व जिला दुर्ग (छ.ग.)

विषय — ग्राम नंदनी [illegible] जिला दुर्ग में ए.सी.सी. [illegible] सीमेंट कंपनी को स्वीकृत [illegible] 93.57 हेक्टेयर भूमि में से भिलाई इस्पात संयंत्र की निजी भूमि (37.30 हे.) को बिना [illegible] प्रदान किये [illegible] को वापस करने के संबंध में।

महोदय,

छत्तीसगढ़ राज्य शासन, खनिज साधन विभाग रायपुर के आदेश क्र. एफ-3-18/2004/12 दिनांक 16.3.2004 के अनुसार ग्राम नंदनी [illegible] जिला दुर्ग में 53.57 हे. भूमि पर चूना पत्थर [illegible] के लिए [illegible] निजी कंपनी ए.सी.सी. [illegible] को स्वीकृत किया गया है। उक्त स्वीकृत भूमि में से खसरा नम्बर 1942 एवं [illegible] 16.76 हेक्टेयर भिलाई इस्पात संयंत्र भिलाई की निजी भूमि है। [illegible] बिना [illegible] प्रदान किये [illegible] की गई है, यह [illegible] है। [illegible] भूमि (37.38 हेक्टेयर अर्थात 93.45 एकड़) की [illegible] 15 करोड़ रुपये से अधिक है।

यह कि, भिलाई इस्पात संयंत्र [illegible] [illegible]

- 2

समर्थनीय को प्रतिलाभ उपलब्ध कर के प्रस्ताव निस्तार कराये । जैसी की विधि भूमि की अधि गृहण कर लिये जाने पर अधि विधा :: नियम 1960 के नियम ... 72 के नियमानुसार मुआवजा प्रधान करने के पश्चात ही मुकदमों की अनुमति दिया जाना चाहिए क्या कि राज्य सरकार द्वारा जिला विधिक सलाहकार के अपने आदेश दिनांक 16.8.2008 के कंडिका 4 में लिखी भूमि सम्बन्धी की स्थिति स्पष्ट की गई प्रतिवेदन दिये जाने के पश्चात ही मुकदमों की अनुमति किये जाने का निर्देश दिया ।

अतः आपसे अनुरोध है कि पंजाब राज्य बनाम जैल सिंह एवं अन्य आदेश दिनांक के परिप्रेक्ष्य में भूमि का आधुनिक प्रतिलाभ प्राप्त किये जाने संबंधी मुकदमों की अनुमति न दिये जाने हेतु निर्देशानुसार कार्यवाही करने का कष्ट करें ।

(हरिवंश सहाय)

प्रतिलिपि -

1. श्रीमान् जिलाधिकारी, [illegible]
2. समस्त उपजिलाधीश, नगर दण्डाधिकारी एवं [illegible] को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित ।

(हरिवंश सहाय)

ACC

ACC Limited
[illegible]
[illegible]
[illegible]

[illegible]
Fax [illegible]
[illegible]

JJ/ENV/11/37
July 10, 2011

Member Secretary
C.G.Environment Conservation Board
1-Tilak Nagar, Shiv Mandir Chowk,
Main Road, Raipur (C.G.)

Sub: Application for Consent for Establish for new [illegible]mt Khandlai Limestone mine (53.57 ha), production 0.15 MTPA

Dear Sir,

This has reference to the above subject please find enclosed an application form in triplicate for Consent for establish of new Nandini Khandlai limestone mine (lease 53.57 ha), production 0.15 MTPA under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 & if under section 25/26 Water (Prevention and Control of Pollution) Act, 1974.

Kindly also find enclosed a Multicity Cheque no. [illegible]7238 [illegible] of Rs. 1,79,000.00 (One lakh Seventy thousand only) as application fee.

Kindly grant us consent for establish.

Thanking you,

Yours truly,
For ACC Limited

Gopika P Tiwari
Director Plant
Jamul Cement Works

Encl: Application Forms with Annexure

D/C

Dated- 21st June 2011, [illegible]

220 ACC

ACC Limited
P.O. Jamul Cement Works
Distt. Durg - 490 024
Chhattisgarh, India

Phone +91 788 [illegible]
Fax +91 788 [illegible]
www.[illegible]

प्रति,

उप. महाप्रबंधक
(भवन)
भिलाई स्पात संयंत्र, इस्पात भवन
भिलाई : दुर्ग

विषय :- नगर पालिका [illegible] अंतर्गत ग्राम [illegible] के खसरा नं. 57/1 [illegible] होने पर एसीसी लिमि. के पक्ष में [illegible] (संबंधित)

संदर्भ :- आपके कार्यालय का पत्र दि. 3rd May 2011

आदरणीय महोदय,

उपरोक्त विषय में [illegible] का अवलोकन करने का कष्ट करें, जिसके द्वारा उपरोक्त [illegible] को स्वीकृत [illegible] खसरा नं. 57/1 [illegible] पर बी.एस.पी. की [illegible] खसरा 35/1 [illegible] पर आपसे [illegible] हेतु सहमति चाही गई थी। इसी परिप्रेक्ष्य में दिनांक 21.6.2011 को [illegible] कार्यालय के [illegible] द्वारा स्थल के [illegible] नक्शा एवं [illegible] 4-6/7 पर [illegible] करते हुए [illegible] की जा रही है।

अतः निवेदन है कि उपरोक्त विषय पर आपकी सहमति प्रदान करते हुए कलेक्टर दुर्ग के पत्र दिनांक 16/3/2011 के संबंध में उसे प्रेषित करें, [illegible] करने का कष्ट करें।

सधन्यवाद

संलग्न उपरोक्तानुसार

(पी. के. [illegible])
[illegible]

Received
21/6/11

कार्यालय कलेक्टर (खनिज साखा) जिला दुर्ग 221
छत्तीसगढ़

क्रमांक 239 /गा.खनि./खनिज/2011 दुर्ग, दिनांक- 29/4/11

प्रति,

मे0 ए.सी.सी. सीमेंट लि0
जामुल सीमेंट वर्क्स, पैलाई,
जिला दुर्ग (छ0ग0)

विषय :- जिला दुर्ग के ग्राम नंदीखुर्द की खसरा 53/2 क्षेत्र 0.80 हे0 पर खनिज चूनापत्थर के स्वीकृत खनिपट्टा।

मे0 ए.सी.सी. सीमेंट लि0 के पक्ष में ग्राम नंदीखुर्द की कुल रकबा 53/2 हे0 क्षेत्र खनिज चूनापत्थर का खनि.पट्टा दिनांक 02.12.2008 से 01.12.2038 तक की अवधि के लिए स्वीकृत है। स्वीकृत खनि.पट्टा क्षेत्र के नीचे दर्शायी गई राजस्व भूमि पर उपलब्ध चूनापत्थर के खनन संचालन हेतु भू-धारक से अनुमति कलेक्टर महोदय के आदेश दिनांक 25.04.2011 द्वारा प्रदान की जाती है।

खसरा नंबर	रकबा	भूमि का प्रकार
1824/1	7.03 हे0	शासकीय भूमि (मार)
1941	5.50 हे0	शासकीय भूमि (डोल)
1945	2.26 हे0	शासकीय भूमि (मार)
1953	2.10 हे0	शासकीय भूमि (मार)
योग :-	04	17.29 हे0

पर्यावरण की दृष्टि से स्वीकृत क्षेत्र के चारों ओर पेड़पौधों का रोपण वांछनीय समुचित ढंग से रख रखाव किया जावे।

सहायक कलेक्टर।
(श्री [illegible])
जिला खनिअधिकारी दुर्ग (छत्तीसगढ़)
दुर्ग, दिनांक-

क्रमांक /गा.खनि./खनिज/2011

प्रतिलिपि :-
1. तहसीलदार धमधा जिला दुर्ग।
2. श्री जी.हेमन्त भारद्वाज, सहा.खनि अधिकारी जिला दुर्ग।
3. श्री एस.एल.लाजरे, प्रभारी अधि निरीक्षक जिला दुर्ग।
4. सम्बन्ध निरीक्षक धमधा जिला दुर्ग।

की ओर सूचनार्थ।

जिला खनिअधिकारी
जिला कलेक्टर दुर्ग (छत्तीसगढ़)

222

ACC

ACC Limited
[illegible]
Chhattisgarh, India

Phone +91 [illegible]
Fax +91 [illegible]
www.acclimited.com

Letter No.:MI/Cor/Q-MI/354
Date:30th July, 2010

The Secretary
Govt. Of Chhattisgarh
KANTRALAYA
Mineral Resource Department
Dau Kalyan Singh Bhawan
RAIPUR (C.G.)

Sub: Relaxation under rule 28(4) of Mineral Concession Rule, 1960 for [illegible] commencement of Mining Operation in stipulated time period.

Ref.: State Government of Chhattisgarh, M.P.'s order no.F-2-18/2004/12, dated16/09/2008.

Dear Sir,

With reference to subject above [illegible] ha of 52.57 ha. in village Nandini-Khurdini has been granted to us by the State Government ,vide order no. F-2-18/2004-12, Raipur, dated16/09/2008.The lease deed have been executed in form 'K' on 02/12/2008 and the executed lease deed as also got registered on 04/12/2008.

While sanctioning the Mining Lease for the above area of 52.57 ha. in village Nandini Khurdini in favour of the company vide said order as referred above, the State Government has imposed a condition as stated in clause 4.2 of the said order, that the working permission to start mining activities will be permitted after obtaining the clearance from MoEF, Government of India under the provision of Environment Impact Assessment Notification dated 14th September 2006.

In respect to that the process of obtaining Environment Clearance from MoEF, Government of India is in progress and public hearing has been performed on dated 29/04/2010 in the presence of Additional Collector, Durg , representative of Chhattisgarh Environment Conservation Board ,Raipur and the local villagers of the near by areas of Nandini Khurdini etc. The minutes of said hearing has already been forwarded to MoEF, Government of India for further action & recommendation. The Environmental Clearance is still awaited from Government of India and it will take some more time.

Considering the above fact, we have submitted an application dated 05/07/2010 & 20/07/2010 to Collector, Durg for grant of permission to enter upon the demised land, so that the activities like making of Approach road, construction of site office and other preliminary job except excavation (Mining) may be taken up by us. Hearing this the Collector, Durg refused to give permission & ordered us on the directed to obtain EIA Clearance from MoEF. Both [illegible] of the said letters are enclosed herewith for your kind perusal.

[illegible]

looking to this, for want of EIA clearance f... Government of India, the commencement of Mining operation shall be delayed... beyond stipulated period under rule 28(4) of MCR1960. Therefore, it is requested... kindly accord us necessary permission to keep the mine idle till we receive E... A clearance from Government of India and necessary consent to operate from t... State Environment Board which may take another 2 years.

Regarding this we are herewith enclosing the pr...scribed fee of Rupees 200.00/- (Rupees Two hundred only) deposited vide transac... Challan No.15132668236 dated 29/07/2010 and other supporting documents and ...correspondence in reference to company's efforts to obtain the MoEF clearance.

Thanking you

Your's faithfully
For ACC Limited

GOPIKA PATIVARI
Director Plant

Encl: As above

अनुसूची – राजस्व लेखा
FORM GST PCT-7
(See Subsidiary Rule)

चालान प्रपत्र

खजाना/उप – खजाना/ट्रेजरी चैलान ऑफिसर/सिटीजन बैंक ऑफ़ ... जिला ... में जमा करने का चालान

कोड नम्बर	जमा करने वाले द्वारा लिखवाया जाए		राशि	सरकारी अधिकारी द्वारा लिखवाया जाए		
	जमा करने वाले (या भरने वाले) और पक्ष जिसकी ओर से पैसा जमा किया जा रहा है।	जिस खाते पैसा जमा किया जा रहा है, उसका पूरा विवरण		जिस तीर्थ	जिस अधिकारी/खाते पर जमा किया	बैंक को आदेश
1	2	3	4	5	6	7
नाम						
हस्ताक्षर						
(शब्दों में) रुपये						

बैंक को विभाग के अधिकारी द्वारा जोड़ा जाएगा ...

रुपये ...

जमा करने वाले का पूरा नाम व पता ...

हस्ताक्षर ...

मुहर ...

225

ACC

ACC Limited
Regional Commercial Division
Unit Delhi-400064
Office Address

Phone No. 26778554
Fax No. 26778554
email id

Our letter No. JMU/Sty/Q-594
Date : 05/02/2009

To: Collector
(Mining section)
Collectorate
Bijapur

Sub: Grant of working permission in mining lease over an area of 53.57 Ha. in Village Nandur Khurdum (Nirl) Dist. Bijapur in favour of ACC Ltd. Jamul Cement Works.

Ref: State Govt. of Chhattisgarh, Mineral Resources dept. Order No. F-3-18/2004/12, Raipur dated 16/09/2008.

Dear Sir,

With reference to subject above an area of 53.57 Ha. in village Nandur Khurdum has been granted by State Govt. vide order no. F-3-18/2004/12,Raipur, dated 16/09/2008.The said Lease Deed have been executed on Form "K" at 02/12/2008 The executed lease deed is also got registered on 04/12/2008 at Sub Registrar (Stamp) Dhamtari Office.

As per your demarcation order dated 22/01/09 the said undelineated area of 53.57 Ha in village Nandur Khurdum has been demarcated by your Mines Surveyor, Sihawa Office, Durg on 24/01/2009 in presence of Revenue Inspector Nawada and concerning Halka Patwari and representative of ACC Ltd. Jamul.

Therefore it is requested that, as the area has been demarcated and demarcation pillars erected around the boundary of the granted area, kindly accord the permission to enter upon the land so that activities like making of approach roads, construction of site office and other required preliminary jobs for mining and Dilla Collection etc. can be taken up by us. We shall be undertaking the Mining operations after obtaining the FC/EF clearance.

Thanking you

Yours faithfully
For ACC Limited

(J.L. TIWARI)
Director Plant

कार्यालय कलेक्टर (खनि शाखा) जिला–दुर्ग 226
छत्तीसगढ़

क्रमांक ए/III/खनि वि3/खनिज/2009 दिनांक : - 2 APR 2009

प्रति,

अधिकृत (खनन)
एसीसी लिमिटेड
पो0 जामुल सीमेन्ट वर्क्स, जि दुर्ग
जिला दुर्ग (छ0ग0)

विषय :– ग्राम नंदनीचुरदनी के खनि पट्टा क्षेत्रफल 53.57 हे0 पर मु–प्रलेख कार्य की अनुमति बाबत्।

संदर्भ :– आपका पत्र क्रमांक सी.एम.एल./डी.ओ./1584 दिनांक 05.02.2009।

–:0:–

उपरोक्त विषयांतर्गत में आपसे प्राप्त हार्ड आपने ग्राम नंदनीचुरदनी स्थित खनिज पट्टा क्षेत्र 53.57 हे0 क्षेत्र पर मु. प्रलेख कार्य करने हेतु निवेदन किया है, जिसके अवलोकन से खनि पट्टा क्षेत्र में खनन कार्य को छोड़कर अन्य स्थानों से पहुँच मार्ग, आफिस, भवन निर्माण, जल तथा अन्य आवश्यक कार्य संपादित करना पाया है।

इस संबंध में शासन द्वारा कलेक्टर परिपत्र क्रमांक एफ–3–18/2004/12 दिनांक 16.09.2005 की कंडिका 10 में यह स्पष्ट आदेश दिया गया है कि खनि पट्टा क्षेत्र में कार्य प्रारंभ करने की अनुमति के पश्चात् डायरेक्टर कलेक्टर परिपत्रांक दिनांक 16.09.2005 के लिये संबंधित प्राधिकारी से निम्नानुसार अनुमति प्राप्त करने के उपरान्त ही संपादन की जावे।

अतः कृपया संलग्नित उक्त अभिन्यास को पर्यावरण प्रभाव आकलन अधिसूचना दिनांक निबन्धानुसार खनिज पट्टा क्षेत्र में कार्य प्रारंभ कर अनुमति प्रदान करने हेतु आवश्यक कार्यवाही की जा सके।

RECEIVED
09 APR 2009
Mineral Concession Works

खनि अधिकारी
कृते कलेक्टर दुर्ग (छ0ग0)

ACC

Ref : IML/SG/Q-Eas
Date : 20.03.2008

The Collector
Mining Section
Collectorate
Cuddalore

Sir,

Sub: Grant of working permission over M.L. area of [illegible] village [illegible]

Ref: Lr.No.IML/SG/Q-234 and 5/2039/A/Vol.I/Dated:10.10.2007/Dated:20.03.2008/Our letter dated 2nd April 2008

Dear Sir,

With reference to the above we would like to clarify that the MoEF clearance for the said Mining Lease in under process and we have already submitted all desired documents to DEIAA on 3/2/2010 for public hearing. photocopy of the same is attached for ready reference. We shall submit the MoEF clearance as soon as we receive it. We hope to enable us to commence Incidental Mining Operations.

Thanking you

Yours Faithfully
For ACC Limited

(R. [illegible])
Head Mining
Jamul Cement Works

Encl: As above

CC: The Secretary, Mineral Resources Dept. [illegible] Secretariat, Chennai-9

ANNEXURE 6

Reserves calculation as per UNFC guidelines along with Feasibility Report of Nandini Khundini Limestone Mines

"Feasibility Study of Nandini Khurdini Limestone Deposit"

Geographical Conditions:

The area falls within latitude 21°22'40" N & longitude of 81°23'00" E and is covered by Survey of India Toposheet number 64I/7 on 1: 50,000 scale. The same is enclosed as Key plan (**Plate – I**) in volume II in this scheme. The site is flat and general ground level is 282 m above Mean Sea Level (MSL). The cement plant site is about 23 km in south direction of the mine site and well connected with all electronic communication facilities.

Location and approach details are as follows:

Topo Sheet No	Part of Toposheet No. 64 I/7
Latitude	21°23'40" N
Longitude	81°23'00" E
Village Covered	Nandini Khurdini
Taluka (Tehsil)	Dhamda
District	Durg
State	Chhattisgarh
Nearest Railway Station	Bhilai Pitt House which is 25 km towards south
Nearest Highway	N.H no.06 which is 28 Km towards south
Nearest Airport	Mana Airport, Raipur which is 60 Km from site

Infrastructure:

Public utilities:

Jamul is well located near to Bhilai and Durg city. All public utilities such as hospitals, market areas, banks, post office, weekly markets, religious places, schools and colleges are located within the radius of 10 KM. Management has provided a school bus for students attending schools and colleges in durg and Bhilai. Local transport is easily available to the colony residents.

Road, Railway and other:

Village Nandini Khurdini is at about 25 km NE of Durg Railway station (situated on Nagpur-Howrah Broad Gauge of South Eastern railway). Nandini Khurdini is well connected to important cities & towns by a network of National & State Highways. The National Highway No. 6, Mumbai to Calcutta, passes through Bhilai and is only 28 km away from Mines. The mine site is at a distance of approximately 30 km from Bhilai, the nearest town. The nearest airport is at Raipur about 60 km from the mine site.

Manpower:

The mine is not yet operated since last 05 years, but management had plans for recruiting skilled workforce in managerial as well as non management cadre.

Geology:

Nandini Khurdini area is located within Chattisgarh basin. Chhattisgarh basin present at the central part of the Indian peninsula over the Bhandara craton. Rocks present here are of Middle to Upper Proterozoic age. Lithounits present here comprises metasedimentary, metamorphic rocks. North and west of the basin are faulted contact with older

(Mesoproterozoic) metamorphic of Sausar belt and Kotri Dongargarh volcanics respectively. Granitoids of Bastar craton and Eastern ghat mobile belt present at the eastern side of the basin and Sausarbar Greenstone belt present at the south of the basin. Granitic terrain surrounds this basin known for their several kimberlite pipes.

This Basin holds 2500mts thick sediments of orthoquartzite- carbonate-pelite suite, deposited in multiple sedimentary cycles, intercalates with minor felsic volcanic and pyroclastics and punctuated by unconformities (Ramakrishnan & Vaidyanadhan, 2010). The entire basin is divided into two sub basins: Hirri sub-basin in the west and Baradwar sub-basin in the east. The western part of the Chattisgarh basin (Hirri sub-basin) is dominated by stromatolitic limestones, mature sandstones and shales, and the succession is comparable with that of a stable shelf (Patranabis Deb & Chaudhuri, 2007). The eastern Chattisgarh succession, by contrast, is characterized by a thick sequence of immature to submature sandstones, conglomerates, shales, pyroclastics and limestones. The succession exhibits rapid lithofacies variations, and bears signatures of unstable basin conditions, and deposition in diverse paleo-environments (Patranabis Deb & Chaudhuri, 2002).

Chhattisgarh Supergroup is subdivided into 3 sub-groups- Raipur group, Chandrapur group and Singhora group.

Structure size and shape:
The ore body is bedded and dipping around 2 deg towards north. It pinches towards south of deposit. Topography of the area is more or less flat. Minimum and maximum RL of the area was 279mts & 285mts.

Legal Matters:
Rights and Ownership:
Nandini Khundini Limestone Mines having lease area of 53.57 ha is located at Village Nandini Khundini, Tehsil –Dharoda in the district of Durg of Chhattisgarh State. Mining lease area over this area was first granted to Bhilai Steel Plant of SAIL. But it was later surrendered to the State Government. ACC Limited applied for the mining lease in this area and lease was granted to ACC Limited in 2008. Land of Mining Lease is partly Govt Land and part of it belongs to BSP. BSP has issued a **NO OBJECTION CERTIFICATE** to ACC Limited in 1990 for granting mining lease on this surrendered lease. State Government by their order no F3-19/2004/12 dated 05.02.2008 has granted mining lease for a period of 30 years to ACC Limited, Jamul Cement Works. Execution of Mining lease was done on 02.12.2008. Mining lease partly comprises of Govt Land of 17.89 ha and rest belongs to BSP. State Government by their order no 239/MAN.CHI/KHAND/2011 dated 29.04.2011 has also granted permission to start mining in government land of mining lease. The copy of all interim orders and Form K is attached as **annexure -1.** Certified copies of Revenue Plan are attached as **Plate – IIA.**

Explanation: Exploration done in mining lease area (BSP as well as Govt. land)

21 nos of boreholes were drilled in mining lease area considering the following:

(i) **"NO OBJECTION CERTIFICATE"** issued by Bhilai Steel Plant in favor of ACC Limited for grant of mining lease in the area surrendered by BSP.
(ii) Exploration proposal as approved by IBM during approval of Mining Plan in the year 2008 which has to be executed before submission of next scheme.
(iii) Timely submission of Notice of Sinking of Boreholes (Form – I) vide our letter no. IML/RMMP/Q/95 dated 04.05.2011 and resubmitting the same on 23.01.2015 to IBM regarding exploration to be done in Nandini Khundini lease area.
(iv) For scientific development of minerals and declaration of reserves and resources as per UNFC guidelines within five years from the approval of last mining plan / scheme of mining.

Operating:

Mining Method:
The Nandini Khundini Limestone Mine will be worked by mechanised system of opencast mining method. Initially overburden will be removed and stacked along lease boundary by shovel – dumper combination. This material will be utilized for developing green belt along lease boundary. After removal of OB, limestone benches will then be ready for drilling and blasting operation. Blast holes of 115mm Dia will be drilled up to 7-8 meters with the help of drilling machines with 5% sub grade drilling. The complete drilling operation will be carried out by wet drilling method and no dust is allowed to be air borne while drilling. The blast holes so drilled will have burden of 2.5 to 3.5 m and spacing 3 to 5.5 m. These blast holes will be charged with explosive (mixture of ANFO and water). Around 70 % of hole depth will be charged with explosives and balance 30% will be stemmed with loose soil to have effective blast. These blast holes after charging with explosives will be normally blasted by using non-electric shock tube detonator/delay system. This reduces the ground vibration and throw. For breaking the oversized boulders, Rock breaker will be used.The blasted stone will then be loaded by Hydraulic excavators and transported by tippers to crusher at Jamul Mines for further processing. The distance from the mines to the plant is approx 23 Kms. The mode of transportation chosen is by 16 tonne capacity tippers. Loading of limestone is done by shovels having a bucket capacity 4.0 cubic meter. To arrest the dust pollution while hauling the limestone by tippers, water will be sprinkled on the haul road with help of water tanker. The width of the working benches will be maintained at 15 to 20 meters, bench height will be maintained 7-8 mts and the ultimate slope will be 60° from the horizontal.

Mining Equipment:
As the mining is yet to start at Nandini Khundini Mining Lease area, Mining equipments are not deployed. The type of HEMM proposed for various mining operations is listed below.

List of Mining Machinery proposed to be used

S. No.	Type	Make	Model	Capacity	Nos
1	Hyd. Excavator	Komatsu	PC 400	1.9 cu. Mts	2
2	Tippers	16/18 / Leyland		35 tonnes	As per requirement
3	Track Mounted Drill	Atlas Copco	ROC L6	115mm dia hole	1
4	Dozer	BDP_D	D 155 A-1	340 H.P.	1
5	Hyd Rock Breaker	Komatsu on PC-220	PC-220		1
6	Jeep	Tata	Sumo Victa		1
7	Water Tanker	TDL		8000 ltrs	1
8	Water Pump	Kirloskar & Pumi		71 kw engine	1

Construction plan and schedule:
Construction of buildings, workshops, substation will be done in due course of time as the mine starts operation.

Mill and Processing Plant:
The ROM mineral of Nandini Khundini mine is used for captive use for production of cement. All facilities for crushing and subsequent processing is installed in cement plant. Uncrushed limestone is delivered to cement plant for further processing.

Tailing disposal:
There is no beneficiation plant within the mine premises so there is no generation of tailings.

Water Management:
Industrial water is required for mining operations/establishment mainly for sprinkling on haulage roads and at faces for suppression of dust. Water is also required for washing and servicing utilities for equipment. Water requirement after start of operations will be approx 5 m^3/day which will be met from rain water harvesting in old pits within the lease area. Groundwater is not utilized for the mine operations.

Transportation:
Transportation of ROM limestone is done through tippers from Mine pit to crusher in plant. This activity is done in one shift.

Power:
The power is required mainly at the mine office premises, workshop, lighting and dewatering purpose. Power will be drawn from Rural grid for CSEB.

Manpower:
All mining operations except transportation proposed in Nandini Khundini mine will be done by departmental. Transportation of ROM stone will be done by engaging contractor tippers. Total workforce will be divided in two groups i.e management cadre and non management cadre.

Closure Design:

Nandini Khundani mine is not yet started for mining. After commencement of operations, it will be operated for more than 30 years. A tentative closure plan i.e Progressive mine closure plan is prepared and attached in this scheme. All activities to be done during the time of closure are tentatively planned and details are provided in Progressive mine closure plan.

Environment:
This chapter is separately discussed in chapter no 09 of this Scheme of Mining.

Market Analysis:
The limestone mined from Nandini Khundani Limestone mine will be supplied to cement plant for manufacturing of cement. The cement produced in plant has huge demand in eastern region. There is always a continuous demand of Jamul cement in eastern market.

Capital Cost:
As the mine is not yet started till date, major investment is not yet done. Approx Rs 50.0 lakhs only has been invested till date and there are proposals to invest approx Rs 10.0 crores for HEMM, infrastructure and other ancillary facilities. In the current state a feasibility check is carried out to assess cash flow i.e cash out flow with respect to investment proposed and cash inflows with respect to sale price and market demand of cement.

Cash flow Forecast:
The receipt from sales per tonne of Cement is taken as Rs 2000 and proportionate receipt of Limestone is taken as Rs 300 per tonne hence return of Rs 44 per tonne is given for limestone as mines level. This sum is discussed in PMO and the calculations are mentioned in **annexure - 16.** Yearly cash flow and returns for next 5 yrs given below:

CASH FLOW STATEMENT FOR THE YEARS :

Year	Cement Sales (Qty. in tonnes)	Receipts from sales at works level	Quantity of LS consumed in tonnes	Proportionate receipt at mines level	Cost of LS	Return at mines level
2013-2014	161454	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2014-2015	164100	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2015-2016	167109	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2016-2017	765479	1142875712	1530960	334192560	781450000	72072560
2017-2018	765479	1174833153	1530960	374992400	799750000	74809560

INVESTMENT CRITERIA

Value of investment as on 31.03.2012 is taken as Rs.5000000. (cross check

Additional investment for next 5 year period Rs 100000000 Total = 105000000

1.Calculation of NPV :-

Year	Cash Inflows	Cash Outflows	Difference	Discounting factor @ 15%	NPV
2013-2014	474606000	378823236	94600000	0.909	86018925
2014-2015	526600000	422400000	104200000	0.826	86069200
2015-2016	615000000	413850000	201150000	0.751	151104203
2016-2017	864087500	591450000	272637500	0.683	186222863
2017-2018	971662500	888000000	248662500	0.621	154397187
					1213950180
Less:- Capital investment at the beginning of the year					105000000
				NPV	1,82,89,138

2. Calculation of Pay back period :-

		Rs		
	Capital Invested :-	105000000		
Less :-	Net Discounted Cash flow at the end of 1 yr.	86018925		
		94391031		10609068.00
Then :-	Net Discounted Cash flow	86018925		86018925.74
	Time required in 2 yr.	8		8 hr.

378823236	0.909	344277081.92
422400000	0.826	348902400.00
413850000	0.751	310803735.00
591450000	0.683	403960350.00
888000000	0.621	551448000.00

0.00

Pay Back period for the above will be 1 year and 10 months.

3. Calculation of IRR :-

NPV	182891380.89
Present value of outflows	858908542.74

= 3.38

The Internal rate of return calculated as per Net Present Value is 3.38 % which is low during initial stages of proposed new investment.

Operation cost:

The operation cost of Nandini Khundini mine for delivering stone to crusher is divided in two basic areas i.e fixed cost cost and variable cost cost. The cost of operations includes manpower cost, fuel cost, explosives cost, machine spares cost, O/S repair cost, electricity cost, depreciation

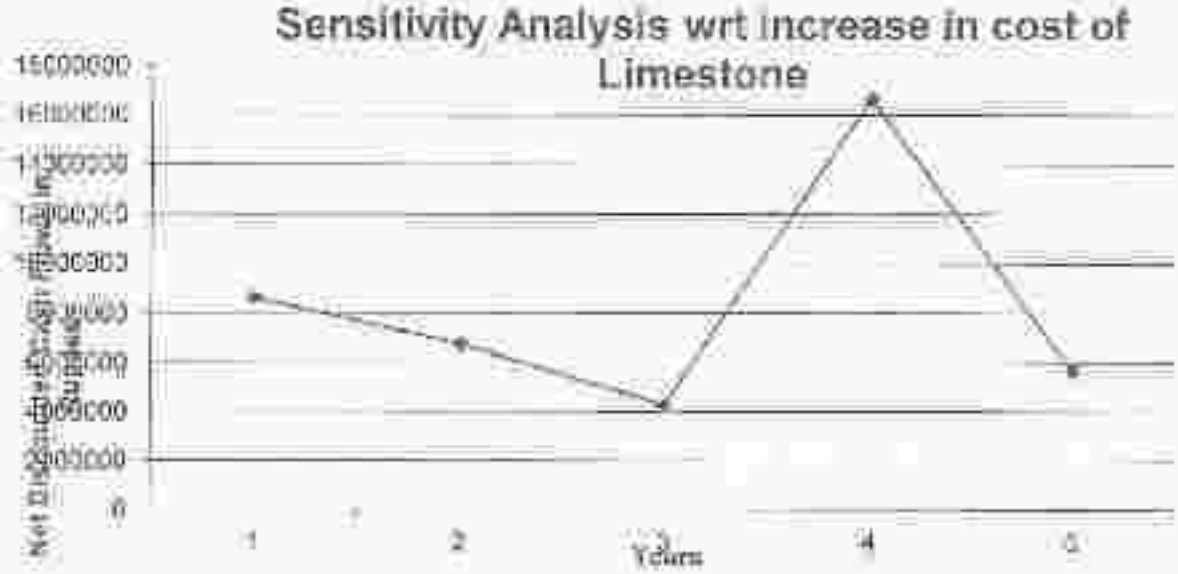
cost, establishment cost and royalty and cess. Presently it is assumed that it will vary from 250 to 269. per tonne

Sensitivity Studies

The sensitivity studies are done based on two criteria

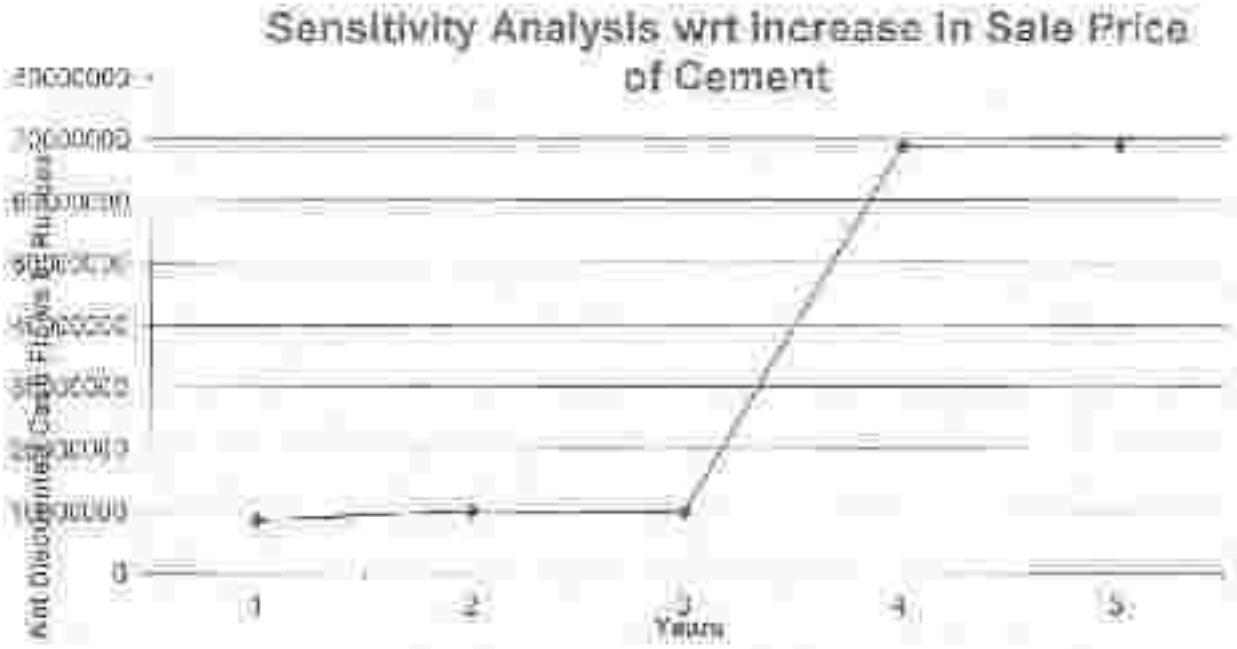
a) With respect of increase in cost of limestone:

Year	Sales (Tonnes)	Sales (Rs.)	5 % increase in cost of Lime stone	Diff.	Disc factor @ 10%	Net Disc. Cash Flows
2013-2014	148137.5	474840000	379223000	95616997	0.909	86916093
2014-2015	150426	510106500	408109400	101997100	0.826	84258217
2015-2016	150535	481714200	424658858	57055342	0.751	42870625
2016-2017	1500000	3295800000	3032512000	263288000	0.683	179859490
2017-2018	1500000	3298800000	3205844000	92956000	0.621	57717473
						473103864
			LESS :- Capital investment at the beginning of the year			100000000
					NPV	373,103,864



b) With respect to increase in sale price:

Year	Sales (Tonnes)	5 % increase in Sale Price	Limestone Cost (Rs.)	Diff.	Disc factor @ 10%	Net Disc. Cash Flows
2013-2014	148137.5	474840000	379223000	95616997	0.909	86916093
2014-2015	150426	528888831	408813800	119926731	0.826	99048654
2015-2016	150535	515556238	385586803	129811278	0.751	97496778
2016-2017	1500000	3943695500	3679809000	263886500	0.683	180277582
2017-2018	1500000	3748601500	3513880000	234721500	0.621	145811431
						609550538
		LESS :- Capital investment at the beginning of the year				100000000
					NPV	509,550,538



Closure cost and rehabilitation cost: A sinking fund has been created to make available these costs during running of mines. However progressive mines closure is done along with mine operation to reduce the burden at the end. The same is discussed in **annexure – 13** and **annexure – 14.**

Specific statutory conditions applicable to operations of mine:

- Land Rights of Govt land is already obtained and transfer of ASP Lease to ACC is under progress.
- EIA and EMP studies have been done and MOEF clearance for Mines for 0.15 MTPA and Plant has been obtained by the company.
- Company is in process of obtaining required permissions under mines act, environment act etc. for running the Mines. Later on appointment of sufficient no of officers and competent persons of all cadres will be done as required by all statutory laws to run the Mines.
- The Company has been actively engaged in CSR activities like construction of Schools Building, hand pump Installation, Roads making, seats providing, providing knowledge modern techniques of farming, etc. Company has good reputation and acceptability in the eyes of Local Public.
- Consent to establish has already been obtained.
- Environmental point of view, the area is feasible for mining. EC has already been granted for the mining lease.
- On quality point of view, Proved reserves (111) are adequate suitable for cement manufacturing process.
- No marketing is needed for limestone as it is required for captive usage for manufacturing of cement.
- Lower sensitivity of limestone cost with respect to cement cost.
- No villages will be displaced due to mining activity.

- No Water courses will be diverted.

Application of Feasibility study and categorization of reserves and resources as per UNFC Guidelines:

Measured (331) mineral resources categories have been considered for feasibility assessment. Above resources will be reducing by non-mineable parts due to statutory obligation and tonnage having grade below cut off grade. Statutorily, some part of area cannot be mined as NE part of lease has to be diverted for plantation purpose. 50 Mtr safety barriers from public road, 7.5 mtr safety barriers from boundary of lease area, 7.5 m left over for development of green belt and Ultimate pit slope at 45° for slope stability of pits etc.

In Mand V Khurpani Deposit, some quantity of Limestone reserves will be blocked due to 7.5 m safety barrier and green belt along mining lease boundary, 30 m left out for creation of green belt in NE part of Lease area and some material will be blocked due to maintenance of Ultimate pit slope of 45 to 60 deg all along the mineral blocks.

Conversion of Measured mineral resources (331) to Proved mineral reserves (111) demonstrated through feasibility study:

Category	Lithology	Reserves (Mt.t)
Measured Mineral Resources (UNFC Code: 331)	Overburden	3.27
	Limestone Upper	40.42
	Mg Shaly Limestone	11.04
	Limestone lower	22.73
	Total	95.26

Non mineable part of Measured Mineral Resources (Blocked due to statutory obligation): These are approx losses are estimated due to 7.5 m safety barrier and green belt along lease boundary, 30 m width green belt for development of green belt in NE along lease boundary and limestone blocked due to ultimate pit Limit at 45 - 60 deg.

Category	Lithology	Reserves(Mt.t)
Feasibility Mineral Resources (UNFC Code: 211)	Limestone Upper	2.06
	Mg Shaly Limestone	1.70
	Limestone lower	5.19
	TOTAL	8.95

The detailed breakup of the reserves spread sheet for various lithologies is given in annexure – 4.

Proved Mineral Reserves (111): Proved mineral reserves are obtained after subtracting feasibility mineral resource from measured mineral resource. Mg Shaly Limestone is also considered under proved category due to presence of an average CaO % of 38.64%. Break up as per different lithological units is tabulated below:

Category	Lithology	Reserves(Mt.t)
Proved Mineral Reserves (UNFC Code: 111)	Limestone Upper	38.36
	Mg Shaly Limestone	9.34

	Limestone (Mt)	37.31
	TOTAL	45.74

Method of Estimation of Reserves (*Geological Cross-Sectional Area Method*)

Reserve estimation is done by geological cross sectional area method.

For estimation of resources using cross-sectional area method cross-sections were drawn first using borehole logs. Topography of the sections was updated as per detailed topographical survey. Cross sectional areas of different lithounits are calculated from all the sections. Between two consecutive sections, average cross sectional area is calculated for different lithounits. The average intersectional area was then multiplied by the distance between two sections to arrive at the volume between the two sections. The volume so determined then converted into weight (in tons) by applying 'volume to weight' ratio commonly referred to as 'tonnage conversion factor' (TCF).

TCF for different litho-units were determined from the borehole core by weighing samples and the total volume of NX core was computed using the core length and radius of core samples. TCF thus calculated for different lithologies are tabulated below:

Overburden	1.9
(SL)U	2.6
(SL)L	2.5

Mining Benches

Following mining benches are proposed are being maintained.

Bench	Level (in metres) Above 200	Remarks (All in SL)
I	280 - 277	OB Bench
II	277 - 270	Benches developed in limestone horizon which includes limestone Upper Part is of Massive Limestone and Limestone Lower
III	270 - 263	
IV	263 - 255	

ESTIMATED RESERVES AND RESOURCES

Classification	Code	Quantity (Mio T)	Grade
(1)	(2)	(3)	(4)
Total Mineral Resources(A+B)			
A) Mineral Reserve			Grade of Mineral is good & it is entirely blendable with Mineral of our other captive Mine (Jamul & Pathariya L/s Mine) and suitable for cement manufacturing
(1) Proved Mineral Reserve	121	43.74	
B) Remaining Resources			
(1) Feasibility Mineral Resource	211	8.05*	
(2) Measured Mineral Resource	331	NIL	
(3) Indicated Mineral Resource	332	NIL	
(4) Inferred Mineral Resource	333	NIL	
(5) Reconnaissance Mineral Resource	334	NIL	

* *365 Allocable due to Statutory obligations. Not economical and feasible due to current cement market scenario & mining technology presently followed*

Enhancement of Reserves after Exploration done in 2011: Summary

Reserves Declared in Mining Plan (2008)		Approx Exploration Expenditure during Exploration done in 2011		Reserves / Resources as per UNFC system (in 2012)	
Category	Reserves (in million tonnes)	Activity	Amount in Rs. Lakhs	Category	Reserves (in million tonnes)
Proved Reserve (UNFC 111)	4.01	Staff Wages	9.0	Proved Reserves (UNFC 111)	43.74
		Spare parts & plant machinery	1.0 1.0		
		Analysis	2.2		
		Temple Prep exp	1.2k	Feasibility (Limited Reserve (UNFC 211))	0.95
		Electricity	1.5		
Indicated Reserves (UNFC 333)	16.94	Consumables	2.0		
		Site Preparation & Scholarship on cap	0.8		
		Labour charges	0.5	Measured Mineral Reserve (UNFC 331)	0.000
		Camp Vehicle	1.2		
		Land bonus	3.10		
		Other Expenses	2.8		
		Total	19.2		

3.4 Category wise updated Proved Reserves (111) with weighted average Grade of each radical (as on 31.03.2012)

Litho Unit	UNFC – 111 in Mill Tonnes	Mean Quality SiO_2 %	Al_2O_3 %	Fe_2O_3 %	CaO %	MgO %	LOI %
Limestone Upper	17.36	2.35-14.91	1.37-2.93	0.73-3.39	48.63-50.34	1.16-4.69	34.77-41.21
Ply Shale Limestone	9.34	7.4-20.37	1.24-5.56	0.78-3.10	31.50-43.75	2.1-2.7	31.35-41.27
Limestone Lower	17.04	4.43-15.74	1.07-4.28	0.53-2.37	45.17-50.44	1.56-4.73	32.67-41.38
Total	**43.74**	**9.00**	**2.62**	**1.40**	**43.99**	**2.93**	**38.89**

Year wise exploration proposed in the next five years:

During next five Years of Scheme period, exploration program is not proposed as lease area is fully explored as per conditions to fulfil G1 norms of UNFC guidelines.

Suitable Justification for steep hike in Mineral Reserves:

In the earlier Approved Mining Plan, Mineable reserves in UNFC 111 was 4.01 million tonnes. This data was based on Geological Report of BSR. In the current document mineable reserves are enhanced to 43.74 million tonnes, following specific reasons justifying the steep hike in mineral reserves is mentioned below:

1. **Increase in mineralized area:** In the earlier Approved Mining Plan, mineralized area in mining lease was considered limiting in to account of 06 boreholes done by BSR in Mining Lease area. Also the spacing of boreholes was on a bigger grid and dept of

boreholes was approx 35 meters. Only one third area of mining lease was counted for calculating reserves. After last approval, 21 boreholes were drilled in the year 2011 and reserves were re estimated in the total mining lease area. Depth considered for assessment of reserves is 52 meters. Total lease area is now considered in mineralized category. As an outcome of this study, mineralized area has increased three times.

2. **Re-assessment of old boreholes and assessment of exploration:** During study, data of all previously drilled boreholes (88 nos) done by GSP was reassessed in terms of depth. In the current scenario reserves are considered upto an average depth of 52 meters. In addition to old boreholes data by GSP, 21 boreholes were drilled and assessment as per results of all boreholes was done. Due to this, reserves under UNFC – 111 have increased from 4.01 million tonnes to 43.74 million tonnes. Detailed breakup of exploratory boreholes drilled during different exploration camps from 1956 till 2011 is mentioned below.

3. **Assessment of reserves with respect of new Threshold limit fixed for limestone (CaO > 34%):** During all previous investigations done, limestone reserves were considered based on its quality for producing clinker. Limestone of Approx + 42% CaO was only considered for computation of reserves. In the current scenario, Threshold limit of limestone i.e. +34% CaO is taken in to account which has increased mineable reserves in UNFC – 111 to 43.74 million tonnes.

NANDINI KHUNDNI MINING LEASE- RESOURCE SUMMARY				
	DB	LSTU	MSSHLST	LSTL
TOTAL Resource (331) IN MT	2.57	19.42	11.04	12.72
Total in Million Tonnes	55.25			

SECTIONAL AREA STRIKE LINE SECTIONS (IN SQ.M)					
SL	UNFC	DB	LSTU	MSSHLST	LSTL
1	331	910.59	1183.77	4919.33	7778.12
2	331	757.35	11215.52	6776.64	10022.35
3	331	3339.92	12812.7	8413.65	20388.91
4	331	4076.34	13373.57	10091.19	8325.65
5	331	2643.38	18014.77	4516.52	16417.92
6	331	3507.29	18445.12	9428.51	16247.86
7	331	2628.11	4109.81	5020.65	8214.89
	TOTAL VALUES	18063.98	79155.26	49165.49	89514.9

RESOURCES : QUANTITIES

Unit C Code	Section Line No:	Sectional Area (Sq.m)	Mean sectional area (Sq.m)	Distance between sections (mts)	Volume	Tonnage (Tonnes)	Resources (MT)
[illegible]	[illegible] boundary	910.99					
			710.99	30.00	21320.70	0.0213.20	0.04
	2	510.99					
			554.47	100.00	55447.00	0.0554.47	0.11
	3	597.95					
			648.43	100.00	64843.00	0.0648.43	0.13
	4	698.91					
			748.13	100.00	74813.00	0.0748.13	0.16
	5	797.35					
			845.93	100.00	84593.00	0.0845.93	0.17
	6	894.51					
			942.33	100.00	94233.00	0.0942.33	0.19
	7	990.15					
			1037.7	100.00	103770.00	0.1037.7	0.21
	8	1085.25					
			1128.33	30.00	33850.20	0.0338.5	0.07
	[illegible] boundary	1171.41					
						[illegible]	[illegible]

RESOURCES : LIMESTONE UPPER

Drill C Code	Section Line No.	Sectional Area (Sq.m)	Mean sectional area (Sq.m)	Distance between sections(mts)	Volume	Resources(Tonnes)	Resources (MT)
381	NE boundary	1180.77					
			1180.77	30	35423.10	88057.71	0.09
	1	1180.77					
			5109.65	100	510964.50	1549681.26	1.55
	2	11216.52					
			12014.61	100	1201461.50	3030692.80	3.03
	3	12812.70					
			13093.14	100	1309313.50	3279283.70	3.28
	4	13373.57					
			15534.17	100	1553417.00	3923542.50	3.92
	5	18014.77					
			18228.35	100	1822864.00	4557466.35	4.56
	6	18445.92					
			11277.47	100	1127746.50	2819366.35	2.82
	7	4109.01					
			4109.01	20	82180.20	206400.00	0.21
	NE boundary	4109.01					
						TOTAL	25.02

RESOURCES : MS SHALY LIMESTONE :

JNTC Code	Section Line No.	Sectional Area (Sq.m)	Mean sectional area (Sq.m)	Distance between sections(m's)	Volume	Resources(Tonnes)	Resources (MT)
331	ML boundary	4919.33					
			4919.33	30	147579.90	368549.75	0.37
	1	5919.33					
			5597.95	100	559795.50	1398490.15	1.40
	2	6276.64					
			6340.15	100	634014.50	1585036.25	1.59
	3	6403.65					
			8247.42	100	824742.00	2061855.00	2.06
	4	10091.19					
			7303.86	100	730385.50	1825963.75	1.83
	5	4516.52					
			6972.52	100	697251.50	1743128.75	1.74
	6	9428.51					
			7224.29	100	722428.50	1806071.25	1.81
	7	5020.06					
			5020.06	20	100401.20	251003.00	0.25
	ML boundary	5020.06					
						TOTAL	14.04

RESOURCES | LIMESTONE LOWER

UNFC Code	Section Line No	Sectional Area (Sq.m)	Mean sectional area (Sq m)	Distance between sections(mts)	Volume	Resources(Tonnes)	Resources (MT)
331	NIL boundary	2778.12					
			7778.12	34	253763.60	583359.08	0.58
	1	7778.12					
			11600.69	100	1150068.50	2645157.55	2.65
	2	15423.25					
			18113.58	100	1811358.00	4165393.00	4.17
	3	20803.91					
			14164.78	100	1416478.00	3257499.40	3.26
	4	7525.65					
			12271.70	100	1227178.50	2821510.55	2.82
	5	17017.75					
			15782.69	100	1578269.00	3630018.70	3.63
	6	14547.63					
			12181.17	100	1218117.00	2801169.10	2.80
	7	9814.72					
			8934.89	30	268047.00	616508.10	0.62
	NIL boundary	8055.06					
						TOTAL	27.22

NANDINI MINING LEASE- RESOURCE SUMMARY

RESOURCE CLASSIFICATION	OB	LSTU	MGSHLST	LSTL
PROVED RESOURCE (UP TO 30 M)	2.42	17.36	9.34	17.04
PROBABLE RESOURCE (30-60 M)	0.15	2.06	1.70	5.19
	2.57	19.42	11.04	22.23

SECTIONAL AREAS FROM THE BOUNDARY (0-30 M)						
SL	MINE	OB	LSTU	MGSHLST	LSTL	
1	111	284.52	1026.73	4059.1	5524.42	
1	211	136.47	151.04	860.23	1823.7	
2	111	754.02	10330.41	5080.23	13331.78	
2	211	43.53	880.11	287.41	2651.67	
3	111	3178.65	13160.95	5708.59	17317.72	
3	211	101.47	671.75	655.65	2886.19	
4	111	4218.06	19526.04	8990.85	0325.61	
4	211	62.46	607.68	1100.34	1799.04	
5	111	2703.08	15582.52	3727.35	11622.57	
5	211	240.29	2402.25	788.17	4585.35	
6	111	3296.06	15857.60	7414.75	11476.47	
6	211	211.23	2577.52	2013.75	4670.99	
7	111	2186.63	9036.31	3275.44	4460.53	
7	211	441.48	1014.20	1744.62	3822.95	
	TOTAL AREA	18113.01	129113.26	46629.9	93193.70	

RESERVE / OVERBURDEN

UNFC Code	Section Line No.	Section Area (Sq.m)	Mean sectional area (Sq.m)	Distance between section lines	Volume	Resources (tonnes)	Resources (MT)
111	N. boundary	784.52					
			784.52	30.00	23535.60	35303.4	0.04
	1	784.52					
			769.27	100.00	76927.00	115390.5	0.12
	2	754.02					
			1966.235	100.00	196623.50	294935.25	0.29
	3	3178.45					
			2096.155	100.00	209615.50	314423.25	0.31
	4	1013.86					
			1354.475	100.00	135447.50	203171.25	0.20
	5	1695.09					
			1953.575	100.00	195357.50	293036.25	0.29
	6	2212.06					
			2741.345	100.00	274134.50	411201.75	0.41
	7	3156.25					
			1324.65	33.00	43712.60	65568.9	0.07
	SE boundary	2186.63					
						TOTAL	1.74
211	SE boundary	126.47					
			126.47	30.00	3794.10	5691.15	0.01
	1	126.47					
			85.2	100.00	8520.00	12780	0.01
	2	43.93					
			112.7	100.00	11270.00	16905	0.02
	3	181.47					
			111.975	100.00	11197.50	16796.25	0.02
	4	42.48					
			111.385	100.00	11138.50	16707.75	0.02
	5	180.29					
			195.76	100.00	19576.00	29364	0.03
	6	211.23					
			326.355	100.00	32635.50	48953.25	0.05
	7	441.48					
			441.48	20.00	8829.60	13244.4	0.01
	NE boundary	441.48					
						TOTAL	0.15

RESOURCE (in MT)

111	2.42
211	0.15
TOTAL Resource	2.57

RESERVES INVESTMENT (PTE)

LNFC Code	Shelter Line No.	Sectional Area (Sq m)	Mean sectional area (Sq m)	Distance Between Shelters (m)	Volume	Resources(Tonnes)	Reserves (MT)
111	Mr. Ikenna V.	1028.79					
			1034.21	91	94091.11	82229.76	0.08
	1	1039.63					
			1040.04	100	104004.00	90963.50	0.09
	2	1040.45					
			1230.03	100	123003.00	107577.62	0.11
	3	1419.61					
			1283.72	100	128372.00	112265.50	0.11
	4	1147.83					
			1168.03	100	116803.00	102152.63	0.10
	5	1188.23					
			1200.09	100	120009.00	104957.88	0.10
	6	1211.95					
			1191.09	100	119109.00	104170.88	0.10
	7	1170.23					
			1095.11	22	24092.42	21070.87	0.02
	Mr. Ikechukwu	1020.00					
						TOTAL	0.57
211	Mr. Emmanuel	1112.34					
			1151.04	33	37984.32	33223.78	0.03
	1	1189.74					
			1225.98	100	122598.00	107223.75	0.10
	2	1262.22					
			1200.83	100	120083.00	105022.63	0.10
	3	1139.43					
			1109.03	100	110903.00	97014.13	0.09
	4	1078.63					
			1034.97	100	103497.00	90522.38	0.09
	5	991.31					
			1049.87	100	104987.00	91814.13	0.09
	6	1108.43					
			1106.51	100	110651.00	96756.88	0.09
	7	1104.59					
	Mr. Ikechukwu	1023.70					
						TOTAL	0.60

RESERVAGE (IN MT)

111	57.00
211	2.04
TOTAL Reserve	59.04

RESERVE ESTIMATION

UNFC Code	Section Line No	Sectional Area (sq.m)	Mean sectional area (sq.m)	Thickness between sections(m)	Volume	Reserves(Tonnes)	Reserves (MT)
111	Boundary	9865.39					
	1	9886.30	9875.85	50	1237729.00	3344169.30	3.34
	2	9989.22	9937.76	100	993776.57	2683796.23	2.68
	3	9206.39	9597.81	100	959781.48	2591708.50	2.59
	4	8860.86	9033.62	100	903362.00	2439174.00	2.44
	5	8727.31	8794.09	100	879409.00	2374524.30	2.37
	6	7410.75	8069.03	100	806903.00	2178638.10	2.18
	7	3375.44	5393.10	100	539310.00	1456437.00	1.46
	M1 boundary	3375.44	3375.44	20	67508.80	182273.76	0.18
211	M1 boundary	860.23					
	2	860.23	860.23	20	17204.60	46452.42	0.05
	3	380.83	620.53	100	62053.00	167543.10	0.17
	4	69.00	224.92	100	22492.00	60728.40	0.06
	5	102.17	85.59	100	8559.00	23109.30	0.02
	6	2103.94	1103.06	100	110306.00	297826.20	0.30
	7	962.17	1533.06	100	153306.00	413926.20	0.41
	M2 boundary	2744.03	1853.10	20	37062.00	100067.40	0.10
						3828	3.83

RESOURCE (IN MT)

111	3.39
211	1.70
TOTAL Resource	11.04

UNIT CODE	Particulars	Sectional Area (Sq.m)	Inter sectional area (Sq.m)	Distance between sections (in Kms)	Volume	(Weight of Timber)	Remarks (MT)
1	RF boundary	5765.43					
			5654.81	20	113096.20	141370.25	141.37
		5544.19					
			5408.43	120	648941.16	811176.45	811.18
	2	5272.67					
			5144.75	120	617370.00	771712.50	771.71
	3	5016.82					
			4892.17	120	586940.40	733675.50	733.68
	4	4767.52					
			4674.58	120	560949.60	701187.00	701.19
	5	4581.63					
			4505.53	120	540663.60	675829.50	675.83
	6	4429.43					
			4357.70	120	522924.00	653655.00	653.66
	7	4286.00					
			4196.38	20	83927.60	104909.50	104.91
	SE boundary	4106.77					
						TOTAL	5194.10
	FLI SE boundary	4873.70					
			4823.70	80	385896.00	482370.00	482.37
	1	4773.70					
			4737.58	100	473758.00	592197.50	592.20
	2	4701.47					
			4668.64	120	560236.80	700296.00	700.30
	3	4635.81					
			4602.52	120	552302.40	690378.00	690.38
	4	4569.24					
			4537.28	120	544473.60	680592.00	680.59
	5	4505.33					
			4473.38	120	536805.60	671007.00	671.01
	6	4441.43					
			4409.47	120	529136.40	661420.50	661.42
	7	4377.51					
			4345.56	20	86911.20	108639.00	108.64
	NE boundary	4313.60					
						TOTAL	5194.10

ANNEXURE 7

Letter of Environment Clearance from MOEF and other related documents

BY SPEED POST

No. J-11015/ 257/2006-IA II (M)
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110 003

Dated the 10th May, 2011

To

M/s ACC Ltd
Kachchidih Limestone Mines
ACC Ltd, Durg – 490 024
Chhattisgarh

Subject: Limestone Mine of M/s ACC Ltd. at Village Kandori Kurella, Tehsil Dhamda, District Durg, Chhattisgarh – Environmental clearance regarding.

Sir,

This has reference to your letter no. Kachh/MoEF/10/66 dated 31.08.2010 on the subject mentioned above.

2. The proposal is for opening of a new mine for production of 0.15 million TPA of limestone at Village Kandori Kurella, Tehsil Dhamda, District Durg, Chhattisgarh to be used in the Cement plant at Bamnidih. Mine lease area is 53.57 ha. The coordinates of the mine lease are - Latitude 21° 23' 11.0" N, 21° 23' 07.5" N, 21° 22' 48.7" N, 21° 23' 06.9" N and Longitude are 81° 31' 19" E, 81° 31' 29" E, 81° 23' 39.6" E, 81° 22' 52.3" E. No forestland is involved. No National Park / Sanctuary is reported within 10 km of the mine lease. Mine working will be opencast mechanized by drilling, blasting. Ultimate working depth will be 60 m (+) 250 m AMSL). The groundwater table is reported to be at 268.2 m AMSL. Mine will be working above groundwater table. Based on the hydrogeological study it has been reported that the area falls in safe zone from the groundwater potential point of view. It is estimated that 6, 00,000 tonnes of OB will be generated during the mine life. Backfilling will start from 6th year onwards. The mined out area will be converted into a lake. The mine life is estimated as 17 years. Mining plan approved by IBM vide 328/2009. Water requirement is estimated as 5 kl/d which will be met from borewells/nallah. It was reported that there is no court case pending against the project. There will be no displacement of population and hence there will be no rehabilitation involved due to the project. It was also noted that there are certain common facilities of other mine of the proponent in the area to be

used for this area. Public hearing has been held on 29.4.2010. Budget allocation under CSR activities will be Rs.0.25 Crores (Rupees). EMP cost will be Rs. 0.10 Crores (Capital & Rs. 0.05 Crores/Recurring). Project cost will be Rs.4.00 Crores.

3. The terms of reference for the project was issued on 26.10.2009 for preparation of EIA and EMP. The Public hearing was held on 29.4.2010 at village Jharkarra, Tehsil Dharamjaigarh, Distt. Raigarh by the Chhattisgarh Environment Conservation Board.

4 The proposal has been considered by the Expert Appraisal Committee for Mining projects in the Project Sanctioned and has recommended for the grant of environmental clearance for the said mine. Directions during project. Accordingly, the Ministry of Environment and Forests hereby accords environmental clearance to the said project under the provisions of Environment Impact Assessment Notification, 2006 subject to strict compliance of the terms and conditions as follows:

A. Specific conditions:

(i) The project proponent shall obtain Consent to Establish and Consent to Operate from the Chhattisgarh Environment Conservation Board and strictly implement the conditions stipulated therein.

(ii) Sensitive habitats / fauna found in the study area shall be monitored closely and A plan shall be prepared and implemented for their conservation.

(iii) Groundwater shall not be extracted at any point of time during the project life.

(iv) The top soil shall temporary be stored at earmarked site(s) only and it should not be kept unutilized for long. The top soil shall be used for land reclamation and plantation.

(v) Garland drain, Catch drain, check dams and siltation ponds at appropriate site shall be constructed around the mine working, soil and mineral dumps to prevent run off of water and flow of sediments. The water so collected shall be utilized for sprinkling in the mine area, roads, green belt development etc. The drains shall be regularly desilted, particularly after the monsoon, and maintained properly.

(vi) Dimension of the working pit as the toe of the OB benches within the mine to check soil and slope stability should be based on the overall data.

(vii) A greenbelt shall be developed consisting a 7.5m wide stabilizing buffer all around the mining lease, safety zone, reclaimed area, mineral waste body, waste etc. by planting adequate species in consultation with the local DFO/Agriculture Scientists, however, a 30m wide greenbelt shall be developed all along from toe of the ML boundary. The ultimate area to be planted /afforested shall not be less than 13.44 ha. The density of the

trees should be around 2000 plants per ha. Greenbelt shall be developed all along the mine lease area in a phased manner and shall be completed within next five years.

(xxiii) The project authority shall implement suitable conservation measures including suitable rain water harvesting measures to augment ground water resources in the area in consultation with the Regional Director, Central Ground Water Board.

(xx) Regular monitoring of ground water level and quality shall be carried out in and around the mine lease by establishing a network of existing wells and constructing new piezometers during the mining operation. The ground water monitoring shall be carried out four times in a year pre-monsoon (April-May), monsoon (August), post monsoon (November) and winter (January) once in each season. The data so collected may be sent regularly to the Ministry of Environment and Forests and its Regional Office, Central Ground Water Authority and the Regional Director, Central Ground Water Board. If at any stage, it is observed that the groundwater table is getting depleted due to the mining activity, necessary corrective measures shall be carried out.

(xxi) Vehicular emissions shall be kept under control and regularly monitored. Pollution shall be kept under control by controlling of vehicular traffic in mine operations and by transportation of minerals. Water shall be sprayed on haul roads and transportation of minerals. Within the lease up to the destination.

(xxii) The minerals transportation within the mine lease shall be carried out through the existing haul roads only and the vehicles carrying the mineral shall not be overloaded. The mineral transportation outside the mine lease shall be carried out through the tarpaulin covered trucks only and the vehicles carrying the mineral shall not be overloaded. There shall be no spillage of mineral enroute up to the delivery points.

(xxiii) The optimum charge for blasting shall be determined based on vibration study. Blasting operation shall be carried out only during the daytime. Controlled blasting shall be carried out. The mitigative measures for control of ground vibrations and to arrest fly rocks and pollutants should be implemented.

(xxiv) Drills shall either be operated with dust extractors or equipped with water injection system.

(xxv) Mineral handling areas shall be provided with adequate number of high efficiency dust suppression system, loading and unloading areas including all dust prone points in the site. Fugitive dust control measures like water sprinkling shall be properly maintained and operated.

(xxvi) PPE shall also be provided for the workers and vibration monitors during the mining operation.

(xvi) The company shall carry out the preventive aspects of occupational health.

(xvii) Pre-placement medical examination and periodical medical examinations of the workers engaged in the project shall be carried out and records maintained for the purpose. Schedule of health examination of the workers should be drawn and followed accordingly.

(xviii) Provision shall be made for the housing of construction labour within the site with adequate infrastructure and facilities such as fuel for cooking, water, sanitation etc. Safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

(xviii) The critical pollutants such as RSPM (Particulate matter with size less than 10 micron i.e. PM_{10}) and NO_x in the ambient air within the impact zone, core zone (within 5 km radius) i.e. within 10 km distance or within the nearest habitation, whichever is closer shall be monitored periodically. Further, quality of effluent water shall also be monitored for pH, DO, and Total Suspended Solids (TSS). The monitored data shall be uploaded on the website of the company as well as displayed on a display board at the project site in a suitable location near the main gate of the Company in public domain. The email ID [illegible] dated 27.05.2008 regarding display of Environment Clearance and Forest (FC) is available on the website of the Company. Environmental clearance shall also be uploaded by the project proponent.

(xix) A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.

B. **General conditions:**

(i) No change in mining technology and scope of working should be made without prior approval of the Ministry of Environment & Forests.

(ii) No change in the calendar plan including excavation, quantum of mineral, limestone and waste should be made.

(iii) At least four ambient air quality monitoring stations should be established in the core zone as well as in the buffer zone for RSPM (Particulate matter with size less than 10 micron i.e. PM_{10}) and NO_x monitoring. Location of the stations should be decided [illegible] based on the meteorological data, topography, [illegible] and [illegible] and [illegible] and [illegible] with the State Pollution Control Board.

(iv) Data on ambient air quality (PM10 (respirable particulate matter with size less than 10micron (i.e., PM_{10}) and NO_2) should be regularly submitted to the Ministry including its Regional office located at Bhopal and the State Pollution Control Board /Central Pollution Control Board once in six months.

(v) Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading and unloading and at transfer points should be provided and properly maintained.

(vi) Measures should be taken for control of noise levels below 85 dB(A) in the work environment. Workers engaged in operation of HEMM, etc. should be provided with ear plugs / muffs.

(vii) Mine drainage water (workings and waste water from the mine) should be properly collected, treated so as to confirm to the standards prescribed under EPA, 1986 vide GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. Oil and grease trap should be installed before discharge of wastewater effluents.

(viii) Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and to take remedial measures, if needed.

(ix) A separate environmental management cell with suitable qualified personnel should be set-up under the control of a Senior Executive who will report directly to the Head of the Organization.

(x) The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purposes.
Year wise expenditure should be reported to the Ministry and its Regional Office located at Bhopal.

(xi) The project authorities should inform to the Regional Office located at Bhopal regarding date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work.

(xii) The Regional Office of the Ministry located at Bhopal shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer(s) of the Regional Office by furnishing the requisite data / information / monitoring reports.

(xiii) The project proponent should submit six monthly reports on the status of compliance of the stipulated environmental safeguards including results of monitored data (both in hard copies as well as in e-mail) to the Ministry of Environment and Forests, Regional Office at Bhopal, the respective zonal office of Central Pollution Control Board and the State

Pollution Control Board. The proponent shall upload the status of compliance of the environmental clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the Ministry of Environment and Forests, Bhopal, the respective Zonal Office of Central Pollution Control Board and the State Pollution Control Board.

(xviii) A copy of the clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad, Municipal Corporation, Urban Local Body and the Local NGO, if any, from whom suggestions/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the Company by the proponent.

(xix) The State Pollution Control Board should display a copy of the clearance letter at the Regional office, District Industry Centre and the Collector's office/Tehsildar's office for 30 days.

(xx) The project authorities shall advertise at least in two local newspapers of the district or state wherein the project is located and widely circulated, one of which shall be in the vernacular language of the locality concerned, within 7 days of the issue of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution Control Board and also at web site of the Ministry of Environment and Forests at http://envfor.nic.in and a copy of the same should be forwarded to the Regional Office of the Ministry located at Bhopal.

7. The Ministry or any other competent authority may alter/modify the above conditions or stipulate any further condition in the interest of environment protection.

8. Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract action under the provisions of the Environment (Protection) Act, 1986.

9. The above conditions will be enforced inter alia, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and rules made there under and also any other orders passed by the Hon'ble Supreme Court of India/ High Court of Chhattisgarh including the Court of Law relating to the subject matter.

10. [illegible] as is mandated by the Environment Protection Act, 1986, as amended subsequently, shall be put on the website of the company along with

the status of compliance of environmental clearance conditions and shall also be kept on the respective regional office of the Ministry of Environment and Forests. Project by e-mail.

(Ajit Kumar)
Deputy Director

Copy to:-

1. Secretary, Ministry of Mines, Government of India, Shastri Bhawan, New Delhi.
2. Secretary, Department of Environment, Government of Chhattisgarh, Raipur.
3. Secretary, Department of Mines and Geology, Government of Chhattisgarh, Raipur.
4. Secretary, Department of Forests, Government of Chhattisgarh, Raipur.
5. Chief Conservator of Forests, Ministry of Environment & Forests, Regional Office,Kendriya Paryavaran Bhawan E-5, Arera Colony, Link Road-3 ,Ravishankar Nagar, Bhopal- 462 016.
6. Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-Cum-Office Complex, East Arjun Nagar, New Delhi-110 032.
7. Chairman, Chhattisgarh Environment Conservation Board, Nehru Nagar, Civil Lines, Raipur – 492 001, Chhattisgarh.
8. Member Secretary, Central Ground Water Authority, A2, W-3 Curzon Road Barracks, K.G. Marg, New Delhi-110 001.
9. Controller General, Indian Bureau of Mines, Indira Bhavan, Civil Lines, Nagpur-440 001.
10. District Collector, Dhamtari, Chhattisgarh.
11. EI Division, Ministry of Environment & Forests, Paryavaran Bhawan, New Delhi.
12. Monitoring File/Guard File/Record File.

(DEEPAK PRAKASH)
DEPUTY DIRECTOR

Minutes of the 37th Meeting of the Expert Appraisal Committee (Industry-1) held during 14th & 15th June, 2012 at IOCL Conference Room, 6th Floor, Core 5, Scope Complex, Lodhi Road, New Delhi - 110003.

37.0 Opening Remarks of the Chairman

At the outset, Chairman welcomed the members of the Expert Appraisal Committee (Industry-1). Thereafter, agenda items were taken up for discussion.

37.1 Confirmation of the Minutes of the 36th Meeting of the Expert Appraisal Committee (Industry-1) held on 24th & 25th May, 2012.

The Minutes of the 36th Meeting of the Expert Appraisal Committee (Industry-1) held on 24th & 25th May, 2012 were confirmed.

37.2.0 Consideration of the Projects

14th June, 2012

Proposals for Environmental Clearance

37.2.1 Proposed Ferro Alloy Plant of 21,650 TPA by installing 6 MVA (Phase-I) and 9 MVA (Phase-II) submerged arc furnace at Village Ghutgoria, P.S. Bankura, District Bankura in West Bengal by M/s Samarpan Steel Pvt. Limited - regarding Environmental Clearance

The project authorities and their consultant, M/s CTRAN Consulting Private Limited, Bhubaneswar gave a detailed presentation on the salient features of the project and proposed environmental protection measures to be undertaken as per Terms of Reference (TOR's) awarded during the 15th Meeting of the Expert Appraisal Committee (Industry-1) held during 25th - 27th October, 2010 for preparation of EIA/EMP. All the Ferro Alloy Plants are listed at S. No. 3(a) under Primary Metallurgy Industries under Category A of the Schedule of EIA Notification 2006 and appraised by the Expert Appraisal Committee (Industry-1) of MoEF.

M/s Samarpan Steel Pvt. Ltd. have proposed for a Ferro Alloy Manufacturing Unit of 21,650 TPA by installing 3 MVA (Phase-I) and 9 MVA (Phase-II) submerged arc furnace at Village Ghutgoria, P.S. Bankura, District Bankura in West Bengal. The total land required is 10.05 acres of which 8.07 acres will be developed as under green belt. Nearest habitation is Ghutgoria Village at 2.0 Km NE and nearest town is Durgapur at 16 Km NE. No sensitive parks/wildlife sanctuary/reserve forest is located within 10 km radius of the project site. Total cost of the project is Rs. 35.76 Crores of which Rs. 1.75 Crores & 14, 0.5 Lacs will be earmarked towards total capital cost and recurring cost/annum for environment pollution control measures.

The details of the products along with their capacity are given below:

Facility	Plant configuration	Products	Production Capacity (TPA)
Submerged Electric Arc furnaces	1 x 6 MVA (Phase-1)	Ferro Manganese	3,197
		Silico Manganese	3,245
		(or)	
		Ferro Silicon	6,500
		Ferro Manganese	3,245
		Silico Manganese	7,019
	1 X 9 MVA (Phase-2)	(or)	
		Ferro Silicon	9,900

1	Air Environment (Emission)	1.0 g/s	1.0 g/s	1.0 g/s
2	Water (Consumption)	155 KLD	900 KLD	50 KLD (95% reduction)
3	Wastewater	Nil	Nil	Nil
4	Solid waste	Char - 27,000 TPA	Char – 24,530 TPA	2,100 TPA (77.1% reduction)

Feasibility will be given configuration after proposed amendment

S.No.	DETAILS		CONFIGURATION	PROPOSED CAPACITY
1.	DI with Hot Metal, Hot Briquetted Iron & Pellet plant		1 X 2,40,000 TPA	3,20,000 TPA
2.	Sponge Iron Cold Briquetted Iron		2 x 102 TPD 1 X 150 TPD	60,000 TPA 30,000 TPA
3.	M.S. Billets/Ingots		2 x 15 MT	1,50,000 TPA
4.	Power	WHRB	6 MW	12 MW
		FBC	6 MW	

The committee noted that there is no increase in the production capacity, there is decrease in pollution load, water requirement etc. and hence, recommended for the above amendment in the environment clearance dated 31st October, 2011 subject to the environmental safeguards.

37.2.20 Proposed 0.7 MTPA Alumina refinery Complex along with 35 MW Co-generation power plant at Villages Talasamudrampalli, Bansi, Rasinda, Lakhpal, Marlampalle, Dandugula, Gangurthi, Belasal, Kolabhirgal, Durmalai, Lambadi in Rayagada District in Odisha by M/s RSB Metal Tech Pvt. Limited – regarding extension of validity in TORs

The above proposal was accorded ToRs by MoEF vide letter no. J-11011/358/2009-IA II (I) dated 20.1.2010. The PP vide letter dated 12.4.2012 has requested MoEF for extension of validity of ToRs for submitting the EIA report. The PP and their environmental consultant, M/s Vimta Labs, Hyderabad has also made a presentation before the committee.

It was informed that the EIA report was submitted to SPCB on 7.5.2012, the public hearing was scheduled for 24.8.2012 and 27.10.2012 but could not be conducted due to law & order problems. The main issue of protesting villagers is regarding the land acquisition, which has been taken up with the District Administration for an amicable solution.

After detailed deliberations, the committee recommended the extension of validity of ToRs for a period of 1 year with presumption of latest additional ToRs.

37.2.21 Enhancement in the capacity of Cement from 1.56 MTPA to 4.33 MTPA, clinker from 0.75 MTPA to 2.00 MTPA and Captive Power Plant from 25 MW to 60 MW at Jamul Cement Works, Village Jamul, Taluk Jamul, District Durg in Chhattisgarh by M/s ACC Limited – regarding amendment in Environmental Clearance

The above proposal was accorded environmental clearance by MoEF vide letter no. J-11011/23/2002-IA II (I) dated 10th May, 2003. Vide letter dated 23rd May, 2012, the PP has requested MoEF for amendment in the above EC for change in project configuration i.e. increase in the clinker production and decrease in the cement production & CPP capacity. The PP and their environmental consultant M/s R.S. Env Tech Pvt. Ltd., Hyderabad have also made a presentation before the committee.

It was submitted that as per the technology & equipment supplier, the 2.0 MTPA capacity will has the potential to produce 2.5 MTPA with the following changes in configuration:

1. Increasing the RPM of the KKD
2. Increase in the surface area by increasing the number of chambers in the cooler
3. Six stage preheater will be converted to Low pressure cyclones
4. Improvement in the efficiency and capability of upstream and downstream electrostatic precipitators
5. Low NOx burners for kiln for reduction of NOx emissions.

The following amendment is requested:

	Existing	As per EC letter EC granted	Amendment in EC requested
Clinker production , MTPA	0.75	2.00	3.00
Cement production (PSC, PPC), MTPA	1.50	4.00	1.50
Captive Power Plant, MW	23	30	25

The key changes in environmental parameters due to the above modification would be as follows:

S.No	Parameter		For EC Granted	After Amendment	Change in %
1	Energy Consumption,	kwh/t of cement	70	68	↓ 7.1
		kwh/t of Clinker	60	56	↓ 6.7
2	Specific Heat Consumption	kcal/kg of clinker	730	717	↓ 2.0
3	Water Consumption, m³/day		5130	3900	↓ 29.8
4	Wastewater generation, m³/day		1558	686	↓ 35.1
5	Solid Waste generation, t/day		492	221	↓ 55.0
6	Air Emissions, Kg/hr	Particulate Matter	106.8	94.53	↓ 11.5
		Sulphur Dioxide	522.85	402.84	↓ 23.0
		Oxides of Nitrogen	1082.38	752.04	↓ 30.5
7	Incremental Ground Level Concentrations (ug/m³)	Particulate Matter	4.6	3.00	↓ 34.8
		Sulphur Dioxide	15.69	9.28	↓ 41.0
		Oxides of Nitrogen	21.07	12.00	↓ 42.8

Note: ↓ decrease ↑ increase

There is no change in the project cost until the project cost would increase from Rs 1,120 crores to Rs 1,600 crores. The reduction in GLCs are due to reduction of pollution load as follows:

24 Hourly Concentrations	EC Granted			Amendment in EC requested		
	Suspended Particulate Matter (SPM)	Sulphur Dioxide (SO_2)	Oxides Of Nitrogen (NOx)	Suspended Particulate Matter (SPM)	Sulphur Dioxide (SO_2)	Oxides Of Nitrogen (NOx)
Baseline Scenario (98th percentile) max	176	17.5	19.1	170	17.5	18.1
Predicted Concentration (Max)	4.60	15.69	21.07	3.00	9.28	12.00
Overall Scenario	180.6	33.19	40.17	173.03	26.78	31.19

[illegible]

The committee noted that there is increase in pollution load, water requirement, energy consumption etc. and hence, recommended for the above amendment in the environmental clearance dated 17th May, 2012 subject to the environmental safeguards.

37.2.23 Expansion of Steel (Hot Metal 4,00,000 MTPA to 7,03,000 MTPA, Rolled product, 185,000 MTPA to 3,00,000 MTPA) at Hospet Road, Sirigeri, Koppal, Karnataka by M/s Kalyani Steels Limited- regarding amendment in Environmental Clearance

The above proposal was accorded environmental clearance by MoEF (vide letter no. J-11011/172/2007-IA II (I) dated 27th September, 2007. Vide letter dated 21st May, 2012 the PP has requested MoEF for amendment in the above EC for setting up of Sinter Plants in the existing unit. The PP has also made a presentation before the committee.

It was submitted that, due to the scarcity of allocated iron ore in the market coming out of the ban on mining in the Districts of Bellary, Chitradurga and Tumkur in Karnataka, they are unable to source allocated iron ore. To utilise the iron ore fines, it is proposed to set up sinter plants of 1 MTPA in 2 phases of 0.5 MTPA in the existing Hindi plant. The hot metal capacity and rolling capacity shall remain with the approved limits only as it is being set up to utilise the iron ore fines. The required water from power plant blow down will be used by the units and no additional water drawl is required. No additional land is required. The transport of iron ore fines would be through covered conveyor belts with dedusting systems at transfer points. Two ESPs will be installed to control the emissions and the dust from APCD will be reused in the sinter plant. The benefits due to the sintering like usage of coke and iron ore fines and reduction in consumption of coke were also elaborated.

The committee has sought a detailed comparative pollution load of various parameters due to the proposed inclusion of sinter plant and the technologies/environment friendly features of sinter plant vis-à-vis the latest benchmarks of the same for sinter plant.

37.2.24 Expansion of Ferro Alloy Plant (Fe-Si 7200 TPA, Si-Mn 17,648 TPA, Fe-Mn 22500 TPA, Pig Iron 126140 TPA), Ferro Chrome (18200 TPA) at Sy. No. 235/A, 236/A, 237 & 320, Bhimasamudhy Road, Village Rachihally, Mandal Chegunta, District Medak in Andhra Pradesh by M/s GSN Ferro Alloys Pvt. Limited- regarding amendment in environmental clearance

The proponent informed that they will not be able to attend the meeting. The Committee decided to consider the project as and when rescheduled by the proponent.

37.2.24 Proposed Cement Plant at Village Jamunamukh, Tehsil Umrangso, North Cachar Hills in Assam by M/s Calcom Cement India Limited – regarding extension of validity

The above proposal was accorded environmental clearance by MoEF vide letter no. J-11011/367/2006-IA II (I) dated 20th July, 2007. Vide letter dated 24th May, 2012 the PP has requested MoEF for extension of validity of EC for 5 years. The PP has also made a presentation before the committee.

It was submitted that, due to major insurgency activities in the area, non availability of the sanctioned power from the State Electricity Board, financial constraints as well as transfer of New Umrangshu Mining Lease (417.5 ha), Tehsil Umrangshu, District Jirni Hasao (North Cachar Hills) from Assam Industrial Development Corporation Ltd (AIDC) to M/s Calcom Cement India Limited, the project has been delayed. It was also submitted that M/s Dalmia Cements Ltd. has entered into an MoU/contract with the PP to purchase 50% clinker capacity. A letter from M/s Dalmia Cements Ltd in this regard and requesting for extension in validity of EC was submitted.

After detailed deliberations, the committee recommended the extension of validity of environmental clearance by a period of five years subject to the environmental safeguards.

F. No. J-11011/[illegible]/2009-IA II (I)
Government of India
Ministry of Environment and Forests
(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003

Email: [illegible]
Telefax: 011- 2436 [illegible]
Dated: 11th January, 2011

To,

The Project Head
M/s ACC Limited,
Kymore Cement Works
Katni-483332
Chhattisgarh

Email: [illegible]@acclimited.com Fax: 0788-2282585

Sub: Enhancement in the capacity of Cement from 1.65 MTPA to 4.35 MTPA, Clinker from 0.76 MTPA to 2.00 MTPA and Captive Power Plant from 25 MW to 50 MW at Jamul Cement Works, Village Jamul, Taluka Jamul, District Durg, Chhattisgarh by M/s ACC Limited - regarding amendment in Environmental Clearance for change in product configuration.

Ref: 1) MOEF letter no. J-11011/[illegible]/2008-IA II (I) dated 13.5.2009
2) Your letter no. [illegible] dated 29.5.[illegible]

Sir,

This is in continuation to this Ministry's letter referred above and your letter under reference wherein you have requested for amendment in the above environmental clearance for change in product configuration i.e. increase in the clinker production and addition in the cement production & CPP capacity.

2.0 The proposal for above amendment in environmental clearance was placed before the Expert Appraisal Committee (EAC) (Industry-1) in its 3rd Meeting held during 14th & 15th June, 2010 wherein you and your environmental consultant M/s E.S. Envi-Tech Pvt. Ltd., Hyderabad also made a presentation before the Committee. It was noted that, as per the technology & equipment supplier the 2.0 MTPA capacity will be the capacity to produce 1.0 MTPA with changes in combination (increasing the RPM of the Kiln, increase in the clinker area by increasing the number of chambers in the cooler, converting the stage pre-heater to low pressure cyclones, improvement in the efficiency and capability of coal mill and cement mill auxiliaries, low NOx burner for Kiln for reduction of NOx emissions.

3.0 The variance in plant configuration is as follows:

	As per EC letter		Amendment in EC requested
	Existing	EC granted	
Clinker production, MTPA	0.76	2.00	3.20
Cement production (OPC, PPC), MTPA	1.65	4.35	1.50
Captive Power Plant, MW	25	50	25

6.8 It is known that there is no change in the project cost. The project cost would increase from Rs 1,710 Crores to Rs 1,805 Crores. The energy consumption would decrease from 70 to 68 KWH of coal and oil to 25 KWH of power. The specific heat consumption would increase from 7,350 to 7,717 Kcal/Kg of clinker. The water consumption would decrease from 2,100 to 2,000 m³/d and wastewater generation from 1,050 to 850 m³/d. The solid waste generation would decrease from 467 to 231 TPD. There would be decrease in the emission of SPM, SO2 & NOx and accordingly the SLCs.

6.9 The Sub-station would not have a decrease in pollution load, water requirement, energy consumption etc. and hence, unconnected for the above amendment in the environmental clearance dated 13th May, 2009 subject to the environmental safeguards.

6.10 The Ministry accepts the recommendation of the EAC [Industry-I] and amends the environmental clearance dated 13.5.2009 for increase in the clinker production from 2.45 MTPA to 3.30 MTPA and decrease in the cement production from 4.00 MTPA to 1.55 MTPA & CPP capacity from 60 MW to 25 MW.

7.0 Further, the following additional conditions are being stipulated for compliance:

i) Provisions shall be provided for the proper and full utilization of gases generated from the kiln in waste heat recovery boiler (WHRB) and a feasibility report shall be prepared and submitted to the Ministry and its Regional Office at Bhopal within 3 months from the date of issue of this letter.

ii) The National Ambient Air Quality Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November, 2009 shall be followed.

iii) Regular monitoring of treated and effluent surface, ground and ground water shall be ensured and treated wastewater should meet the norms prescribed by the State Pollution Control Board or prescribed under the EPA Act whichever are more stringent. Feasibility study for the efficient utilization and if feasible should also be thereby carried out and report submitted to the Ministry's Regional Office at Bhopal, CPCB and SPCB.

iv) Adequate funds shall be allocated towards the environmental pollution control measures and shall judiciously be implemented for the conditions stipulated by the Ministry of Environment and Forests as well as the State Government. The funds so provided shall not be diverted for any other purpose.

v) The company shall adopt well laid down corporate environmental policy and identify and designate responsible officials at all levels of its hierarchy for ensuring adherence to the policy and compliance with environmental norms, standards, terms and conditions.

vi) The company shall comply with all the conditions stipulated in the environmental clearance dated 13.5.2009.

vii) If there is change in the scope of the project, the proponent shall obtain fresh environmental clearance.

This issues with the approval of the Competent Authority.

(Sandip Ramdhanwar)
Deputy Director(S)

-2-

Copy to:

1. The Secretary (Member Secretary), Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032
2. The Chairman, Chhattisgarh Environment Conservation Board, Nawa Nikora, Old Link Road, Chhattisgarh
3. The Chief Conservator of Forests (Eastern), Regional Office (Western Zone), E-3/240, Arera Colony, Bhopal - 462 016, M.P.
4. Monitoring Cell, Ministry of Environment & Forests, Paryavaran Bhawan, CGO Complex, New Delhi
5. Guard file/ Record file.

[Sundar Ramamurthy]
Deputy Director(S)

ACC 264

ACC Limited
Jamul Cement Works
Dist. Durg- 491 441
Chhattisgarh, India

Phone +91 788 2287231 to 38
Fax +91 788 2287285
www.acclimited.com

JC/ENV/11/37
July 30, 2011

Member Secretary
C.G.Environment Conservation Board
1-Tilak Nagar, Shiv Mandir Chowk,
Main Road, Raipur (C.G.)

Sub.: Application for Consent for Establish for new Nandini Khurshipi limestone mine (53.57 ha) production 0.15 MTPA

Dear Sir,

This has reference to the above subject please find enclosed an application form in triplicate for Consent for Establish of new Nandini Khurshipi limestone mine (lease 53.57 ha) production 0.15 MTPA under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 and under section 25/26 Water (Prevention and Control of Pollution) Act, 1974.

Kindly also find enclosed a Multi-city Cheque no.117238 dtd. 30.07.2011 of Rs. 1,20,000.00 (One lakh twenty thousand only) as an application fee.

Kindly grant us consent for establish.

Thanking you,

Yours truly,
For ACC Limited

Gopika P. Tiwari
Director Plant
Jamul Cement Works

End: Application Forms with annexure

D/c

छत्तीसगढ़ पर्यावरण संरक्षण मंडल
[illegible]

क्रमांक 6016/मु/सक/छ.प.सं.रा./2011 रायपुर, दिनांक 11/20 Oct 2011

प्रति,

मेसर्स एस.सी.सी. लिमिटेड,
पोस्ट- जामुल सीमेंट फैक्टरी,
जिला-दुर्ग (छ.ग.)

विषय :- मेसर्स एस.सी.सी. लिमिटेड द्वारा ग्राम-कंदनी-धुंधनी तहसील-धमधा, जिला-दुर्ग (छ.ग.) के प्रस्तावित लाईम स्टोन माईन्स (माईन लीज एरिया- 35.67 हे. आकार-2.15 मिलियन टन/वर्ष के स्थापना सम्मति बाबत् आपके द्वारा प्रेषित तत्संबंधी आवेदन के संबंध में।

संदर्भ :- 1 आपका पत्र क्रमांक-जे.एस.सी./ई.एन.वी./11/37 दिनांक 30/07/2011
2 मंडल का पत्र क्रमांक 2868 दिनांक 17/08/2011
3 स्मरण पत्र क्रमांक 3704 दिनांक 23/09/2011

---ooo---

उपरोक्त विषयान्तर्गत संदर्भित पत्रों का अवलोकन करें। मंडल के पत्र दिनांक 23/09/2011 के प्रतिपक्ष में आपके द्वारा वांछित के अनापत्ति प्रमाण पत्र प्रेषित नहीं किया गया है। अतः पत्रिका जानकारी एवं कार्यवाही 07 दिवस के भीतर मंडल मुख्यालय एवं क्षेत्रीय कार्यालय, सिलई को आवश्यक रूप से उपलब्ध कराएं। उपरोक्तानुसार जानकारी प्राप्त होने के उपरांत ही आपके द्वारा प्रस्तुत आवेदन पत्र पर आगामी कार्यवाही किया जाना संभव हो सकेगा।

आपको सूचित किया जाता है कि जल के प्रदूषण निवारण तथा नियंत्रण) अधिनियम 1974 की धारा 25/26 एवं वायु प्रदूषण निवारण तथा नियंत्रण) अधिनियम 1981 की धारा 21 के अंतर्गत बिना सम्मति प्राप्त किये किसी प्रकार का निर्माण एवं संचालन कार्य प्रारंभ न करें। ऐसा करना उक्त अधिनियमों के प्रावधानों का उल्लंघन होगा, जिसके लिए वैधानियमानुसार कार्यवाही हेतु बाध्य होना। जिसकी संपूर्ण उत्तरदायित्व प्रबंधन/फर्म/संस्था की होगी।

कार्यपालन अभियंता
छत्तीसगढ़ पर्यावरण संरक्षण मंडल
रायपुर (छ.ग.)

क्रमांक /मु/सक/छ.प.सं.रा./2011 रायपुर, दिनांक / /2011

प्रतिलिपि :-

क्षेत्रीय अधिकारी, क्षेत्रीय कार्यालय छ.ग. पर्यावरण संरक्षण मंडल, सिलई जिला-दुर्ग (छ.ग.) को अति सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

RECEIVED
18 JUN 2012
Legal Cell

कार्यपालन अभियंता
छत्तीसगढ़ पर्यावरण संरक्षण मंडल,
रायपुर (छ.ग.)

ANNEXURE 8

Proposed Five Year (2013 – 2018) Production Plan

ANNEXURE 8

NANDINI KHUNDINI LIMESTONE MINE

FIVE YEAR PRODUCTION PLAN: 2013-2014 TO 2017-2018

YEAR	Bench	Bench RL from - to	Avg. Length (Mtrs)	Avg. Height (m)	Avg. Face advance (m)	Area (sq. mtrs)	Volume (cubic metres)	Tonnage (metric tons)	Location between section lines, Distance, Direction	Weighted Avg. Quality (CaO%)	Related plate and sheet
2013-2014	II	277 - 270	422	7	12.50	5485	38395	148137.5	2 - 3 to SL - 6, 5 W side	43.2	PLATE - VI, SHEET - 1
								148137.5		43.2	
YEAR	Bench	Bench RL from - to	Avg. Length (Mtrs)	Avg. Height (m)	Avg. Face advance (m)	Area (sq. mtrs)	Volume (cubic metres)	Tonnage (metric tons)	Location between section lines, Distance, Direction	Weighted Avg. Quality (CaO%)	Related plate and sheet
2014-2015	II	277 - 270	516	7	13.00	6708	46956	169425	SL - 3 to SL - 5, 5W side	43.5	PLATE - VI, SHEET - 2
								169425		43.5	
YEAR	Bench	Bench RL from - to	Avg. Length (Mtrs)	Avg. Height (m)	Avg. Face advance (m)	Area (sq. mtrs)	Volume (cubic metres)	Tonnage (metric tons)	Location between section lines, Distance, Direction	Weighted Avg. Quality (CaO%)	Related plate and sheet
2015-2016	II	277 - 270	1055	7	13.00	9200	64414	91035	SL - 3 to SL - 6, SW side	43.5	
	III	270 - 263	252	7	13.00	4130	28910	91035	SL - 3 to 5 - 4, E side	43.6	PLATE - VI, SHEET - 3
								182070		43.55	
YEAR	Bench	Bench RL from - to	Avg. Length (Mtrs)	Avg. Height (m)	Avg. Face advance (m)	Area (sq. mtrs)	Volume (cubic metres)	Tonnage (metric tons)	Location between section lines, Distance, Direction	Weighted Avg. Quality (CaO%)	Related plate and sheet
2016-2017	II	277 - 270	1014	7	13.00	21280	91728	97765	SL - 3 to SL - 6, SW side	43.2	
	III	270 - 263	431	7	16.00	18538	79918	448770	SL - 3 to SL - 6, SW side	43.6	PLATE - VI, SHEET - 4
	IV	263 - 256	451	7	16.00	18532.5	81452.4	203531	SL - 3 to SL - 6, SW side	44	
								1510000		43.67	
YEAR	Bench	Bench RL from - to	Avg. Length (Mtrs)	Avg. Height (m)	Avg. Face advance (m)	Area (sq. mtrs)	Volume (cubic metres)	Tonnage (metric tons)	Location between section lines, Distance, Direction	Weighted Avg. Quality (CaO%)	Related plate and sheet
2017-2018	II	277 - 270	440	7	16.00	9091	63637	214447.5	SL - 2 to SL - 5, SW side	43	
	III	270 - 263	831	7	16.00	13192.43	134157	452107.5	SL - 2 to SL - 5, SW side	44.2	PLATE - VI, SHEET - 5
	IV	263 - 256	765	7	16.00	12000	126000	356250	SL - 2 to SL - 5, SW side	43.8	
								1033698		43.67	

ANNEXURE 9

Proposed Five Year (2013 – 2018) Development Plan

ANNEXURE 9

NANDINI KHUNDNI LIMESTONE MINE

FIVE YEAR DEVELOPMENT PLAN: 2013-2014 TO 2017-2018

YEAR	TYPE	Location between section lines, Distance, Direction	Length (m)	Bench RL from - to	Height (m)	Face advance (m)	Area (sq mtrs)	Volume (cubic metres)	Tonnage (metric tons)	Reference plate and sheet
2013-2014	OB	SL – 3 to SL – 0, W side	450	280-277	3	9.00	5001	[illegible]	27010	PLATE - VI, SHEET - 1
2014-2015	OB	SL – 3 to SL – 5, EW side	851	280-277	3	30.00	13379	40129	72233	PLATE - VI, SHEET - 2
2015-2016	OB	SL – 3 to SL – 5, EW side	1321	280-279	3	18.00	11992	35976	64758	PLATE - VI, SHEET - 3
2016-2017	OB	SL – 3 to SL – 7, EW & N side	787	280-280	3	65.00	13815	41445	74601	PLATE - VI, SHEET - 4
2017-2018	OB	SL – 3 to SL – 7, EW & NS side	418	280-281	3	53.00	13827	41487	74663	PLATE - VI, SHEET - 5

ANNEXURE 10

Ambient Air Quality details of Nandini Khundini Mine (Base line Data, Anticipated impacts, Mitigation measures & Env Monitoring Plan)

CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT (Base Line Information)

The environmental components, study area, period of study and methodology of data generation is shown in Table 3.1.

Table 3.1 Components, Study Area, Study Period and Methodology of EIA

Environmental Components	Study Area	Study Period Pre-Monsoon	Methodology
Ambient Air Quality	Core zone and Buffer zone, impacted area due to the mining and upwind direction	(1st April 2009 –30th June 2009)	AAQ monitoring was done at 8 locations by following the CPCB methods. SPM, RSPM, SO_2, NO_2 and CO levels were measured. Metallic content of the dust was also analysed

3.1 Air Environment

3.1.1 Meteorology

The historical met data of nearest IMD station at Raipur is shown in Table 3.2. The crow fly distance from site to the IMD station is about 40 km. The wind rose diagram of wind speed and direction generation close to the site is presented in Figure 3.1.

Table 3.2 Meteorological Data (Source-IMD Raipur 30 years average)

Month	Temperature (deg C) daily Max	Min	Relative Humidity, % Max	Min	Rainfall (mm)	Wind speed kmph	Predominant wind direction (from)	Cloud cover Octas
January	27.9	12.3	60	32	0.7	4.0	N,NE	1.7
February	31.1	16.5	61	30	12.3	5.1	N, NE	1.8
March	35.6	20.8	41	24	24.6	6.2	N, NE	1.9
April	39.8	25.3	36	23	15.7	8.0	SW,W	2.2
May	42.6	28.9	38	23	18.8	8.1	SW,W	2.5
June	37.1	26.5	64	51	155.6	12.5	SW,W	5.5
July	30.8	24.9	85	76	351.9	13.7	SW,W	7.9
August	30.2	23.9	87	78	344.7	9.4	SW,W	7.9
September	31.3	23.9	81	72	330.2	7.1	SW,W	5.5
October	31.9	21.5	71	55	55.6	4.9	N, NE	3.2

November	28.8	16.8	82	48	7.4	3.3	N, NE	2.1
December	27.9	12.8	81	43	3.7	3.2	N, NE	1.7

Wind Direction: The predominant wind direction is from southwest and west direction in summer season. During winter the predominant wind direction is from north and northeast. During the study period the predominant wind direction at site is from west direction.

Wind Speed: The wind speed ranges from 3.2 – 10.9 km/hour. The wind speed during summer season ranged from 8.0 – 10.9 km/hr, during rainy season it was between 7.4 – 10.7 km/hr and in winter months wind speed ranges between 3.2 – 4.9 km/hr. During the study period, that is summer season the wind speed was found to vary from 2.0 – 5.5 km/hr.

Calm Periods – The calm period constitute an important factor in the dispersion of air pollution. The calm period is more during daytime compared to nighttime. The maximum calm period occur during October to February months. Monthly calm period values obtained from nearest IMD is shown in Table 3.3. 25% time was observed as calm during the study period.

Table 3.3 Monthly Percentages of Calm Periods (IMD Raipur)

Calm	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Day	31	25	18	13	9	6	7	5	10	24	27	33
Night	38	25	18	15	9	5	4	8	15	27	43	37

Temperature – December and January constitutes winter month with daily mean minimum temperature around 13.2°C and daily mean maximum temperature around 27.5°C. May is the hottest month with daily mean maximum temperature at 42.0°C and daily mean minimum temperature at 28.3°C. During the study period the ambient temperature was found to vary from 25.9°C to 47.3°C.

Relative Humidity – The air is generally dry in the region driest during monsoon. March and April are driest with relative humidity between 23% – 41%. The maximum humidity during rainy season is 87% and minimum was 70%. High humidity is found during daytime.

and low humidity values during nighttime in all the months. Humidity levels during the study period varied from 25% to 43%.

Rainfall – The annual total rainfall is 1293 mm. Over 90% of the total annual rainfall is received during the monsoon period between June to September. During the study period 38 mm rainfall was observed.

Cloud Cover – In the study area clear weather prevails in most of the time during post monsoon, winter and summer seasons. Only during monsoon months of July, August and September, moderate to heavy clouds are observed. Relevant details about the number of days with zero oktas of cloud cover (all clouds) for all months are presented in Table 3.4. The sky was mostly clear (less than 1 oktas) during the study period. The cloud height ranged from 10 km – 16 km.

Table 3.4 No. of days with zero oktas of cloud cover (Raipur)

Cloud	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Day	16	16	17	12	10	2	0	0	01	7	14	16
Night	15	12	13	0	3	0	0	0	0	5	10	14

Special Weather Phenomena (IMD Raipur) – The occurrence of thunderstorm is 53 days per year, mostly spread across the months of May to September. Annual Dust Storm is 8.8 days during summer. Annually 0.4 days have visibility less than 1 km, 11.4 days have visibility in the range of 1 - 4 km, 102.3 days have visibility in the range of 4 -10 km, 214.4 days between 10 - 20 km and 36.5 days have visibility above 20 km. No dust storm or thunderstorm occurred during the study period.

Inversion Occurrence - IMD station at Nagpur generates radiosonde flight data that are used for calculation of mixing height and knowing inversion conditions. High ground based inversions at 5.30 am of the order of the 90% and above is observed over central India during November and December. At 5.30 pm the ground based inversions are below 35 % over central India. The distribution of the top heights of the inversion layers over Central India for 5.30 am shows deep formation with heights varying between 400 to 1500 m. at 5.30 pm the frequency of occurance of elevated inversion at 5.30 am to 5.30 pm over central India shows lower values of 15% and less. The percentage frequencies of ground

based inversions with top height at 00 GMT and 12 GMT as well as the percentage frequencies of elevated inversion at 00 GMT and 12 GMT are shown below:

Percentage frequencies of ground based inversions with top heights (00 GMT)

Range (m)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct.	Nov	Dec
0-1	0	0	0	0	0	0	0	0	0	0	0	0
101-200	0	2	9	0	0	0	0	0	0	0	1	0
201-300	0	3	1	1	1	1	0	0	1	1	0	1
301-400	5	3	10	0	3	1	0	0	3	3	5	5
401-500	22	20	22	10	14	4	2	3	11	23	10	21
501-600	21	20	26	17	21	1	1	1	9	17	20	21
601-700	18	19	17	14	9	1	1	0	1	7	25	14
701-800	10	4	9	11	6	0	0	0	0	5	5	9
801-900	5	11	4	6	3	1	0	0	1	4	5	7
901-1000	1	4	1	0	0	0	0	0	0	0	1	3
1001-1200	2	1	2	1	0	0	0	0	0	1	1	1
1201-1500	0	0	1	0	1	0	0	0	0	0	0	1
>1501	0	0	0	0	0	0	0	0	0	0	1	0

Percentage frequencies of ground based inversions with top heights (12 GMT)

Range (m)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
0-1	0	0	0	0	0	0	0	0	0	0	0	0
101-200	0	0	0	0	0	0	0	0	0	0	1	0
201-300	0	0	0	0	1	1	0	0	1	1	0	1
301-400	4	1	1	0	2	0	0	0	3	1	1	1
401-500	0	1	2	1	0	1	0	0	1	1	1	0
501-600	1	1	0	0	1	0	0	0	0	0	0	0
601-700	0	0	0	0	1	1	0	0	0	0	0	0
701-800	0	0	0	0	0	0	0	0	0	0	0	0
801-900	0	0	0	0	0	0	0	0	0	0	0	0
901-1000	0	0	0	0	0	0	0	0	0	0	0	0
1001-1200	0	0	0	0	0	0	0	0	0	0	0	0
1201-1500	0	0	0	0	0	0	0	0	0	0	0	0
>1501	0	0	0	0	0	0	0	0	0	0	0	0

Percentage frequencies of ground based inversions with top heights (00 GMT)

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
03	04	06	05	10	00	03	05	11	04	03	01

Percentage frequencies of ground based inversions with top heights (12 GMT)

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
00	04	01	04	02	04	02	01	05	02	03	01

Mixing Height values (hourly) of the site for summer season has been obtained from IMD is shown below (CPCB Publication):

Time (IST)	Value (in m)	Time (IST)	Value (in m)

7.00	100	13.00	1000
8.00	200	14.00	1100
9.00	400	15.00	1000
10.00	600	16.00	800
11.00	800	17.00	600
12.00	900	18.00	500
		19.00	500

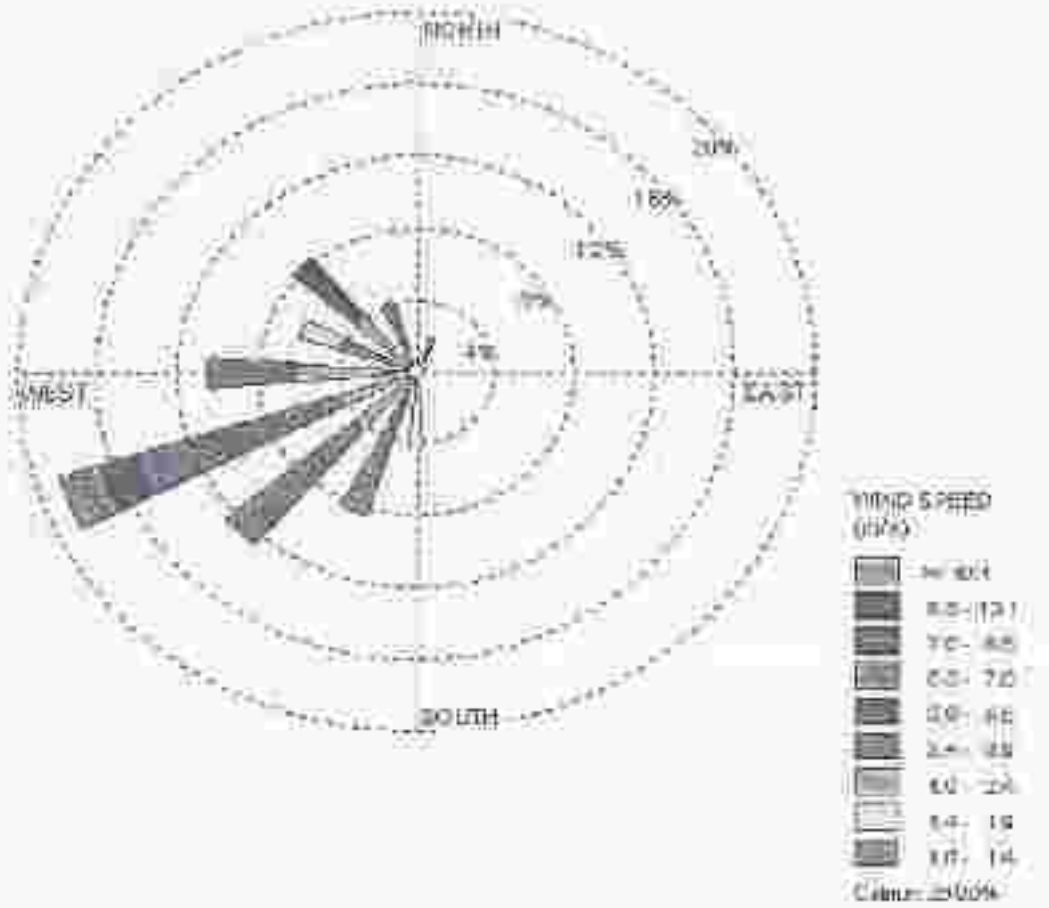


Figure 3.1 Wind Rose Diagram

3.1.2 Ambient Air Quality

The locations of the ambient air quality monitoring stations were established after studying the predominant wind direction, topographical features, vegetation, receptors' sensitivity etc and also the relative location of the core zone (mine site). Sites having higher coverage factor has been considered for monitoring (using the formula $e_{jk} = [\text{frequency (k)}\ (1/1+D)]$ where D is the distance of proposed site. The air quality monitoring locations are shown in Table 3.5.

Table 3.5 Name of Ambient Air Quality Monitoring Locations

	Location	Distance wrt site	Terrain features
AQ 1	Pathuria Mine Office	1.8 km N	Near mining zone, flat terrain, trees are present, upwind direction of NKM
AQ 2	Nandani Khurshipur Mines (NKM)	Core Zone	Barren land, rugged terrain, water body present at many places,
AQ 3	Handi	4.4 km NE	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction during summer
AQ 4	Girlola	4.2 km E	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction during summer
AQ5	Ahiwara	3.4 km S	Urban area, flat terrain, Concrete buildings, downwind direction of NKM
AQ6	Pella	1.8 km S	Rural village, flat terrain, surrounded by agriculture land, downwind direction of NKM
AQ7	Madesara	1.5 km SW	Rural village, flat terrain, surrounded by agriculture land, lies in downwind direction of NKM
AQ 8	Nandini Khurshipur village	0.5 km NE	Rural village, flat terrain, surrounded by barren land, closest to NKM site

Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM), Sulphur dioxide, Nitrogen dioxide and Carbon monoxide were measured. The SPM content was analysed for Heavy Metals by following the APHA method. The ambient air quality results are presented in Table 3.6. Values of metallic content of SPM are shown in Table 3.7. The ambient air quality meets the 24-hour average National Ambient Air Quality Standards (MOEF Notification - November 2009) meant for residential area.

Radiological parameters like radon in mine exhaust air, radium and uranium in mine water and radionuclides, specified to be monitored as per CPCB Norms. No norms have been prescribed by CPCB (Central Pollution Control Board) for monitoring those parameters. The mining activity at Nandini Khurshipur is a proposal. No mining activity is being carried

out now. Therefore no mine-exhaust air or mine water is available. Hence this point is not applicable for this EIA study.

Fugitive emission in and around the area of mining operations, crushing operations are processing operation and beneficiation plant, as also along the transportation routes to be specified. The mining activity at Nandini Khandini is proposed. No mining activity is carried out. Therefore no fugitive emission is generated. Hence this point is not applicable for this EIA study.

Table 3.6: Ambient Air Quality Monitoring Results (24-h average)

Location	SPM (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)		
	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
Patharia Mines	147	112	130	5.7	<4.0	5.0	13.0	9.0	10.7
NKM (Core)	152	114	134	6.1	<4.0	5.5	14.4	9.0	11.2
Hardi	145	108	130	5.5	<4.0	4.8	12.5	9.0	10.5
Girhola	146	110	131	5.8	<4.0	5.0	13.2	9.0	10.7
Ahiwara	154	114	138	6.0	<4.0	5.3	14.8	9.0	11.2
Pota	161	112	129	5.5	<4.0	5.2	13.5	9.0	10.9
Madesara	148	110	124	5.6	<4.0	4.8	12.2	9.0	10.2
Nandini Khandini	144	102	122	5.7	<4.0	5.0	12.4	9.0	10.0

Table 3.6 Ambient Air Quality Monitoring Results

Location	RSPM (µg/m³)			CO (ppm)
	Max	Min	Mean	
Patharia Mine Office	48	36	42	<0.5 ppm
NKM	53	41	45	<0.5 ppm
Hardi	46	38	42	<0.5 ppm
Girhola	49	40	43	<0.5 ppm
Ahiwara	50	40	43	<0.5 ppm
Pota	50	38	42	<0.5 ppm
Madesara	47	40	43	<0.5 ppm
Nandini Khandini Village	47	38	42	<0.5 ppm

Table 3.7 Metallic Contents of SPM

Location	Fe (%)	Ni (mg/g)	Pb (mg/g)	Mn (mg/g)	Cr (mg/g)	Cd (mg/g)
Patharia Mine	14.3	0.05	0.12	6.03	0.1	0.2

Office						
NKM	14.2	0.05	0.13	5.02	0.2	0.3
Hardi	5.2	0.04	0.22	5.06	0.1	0.1
Gidhola	8.3	0.09	0.18	5.00	0.2	0.1
Ahiwara	5.4	0.04	0.11	5.03	0.3	0.4
Patia	5.7	0.00	0.13	5.05	0.1	0.2
Medeshra	5.6	0.04	0.12	5.03	0.2	0.1
Nandini Khalwatini village	6.1	0.00	0.13	5.02	0.2	0.1

CHAPTER 4 : ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Impact on Ambient Air Quality

Drilling, blasting, excavation, transportation are the air polluting activities at the mining site. To reduce the impact of air pollution, best available measures have been taken at the mining site. Ambient air quality monitoring has been conducted at 8 locations including mine and around the mine to know the background level of ambient air quality. The impact during the limestone mining operation on the ambient air quality of the study area has been predicted using mathematical modeling (ISCST3) by following the guidelines developed by CPCB ("Assessment of Impact to Air Environment : Guidelines for Conducting Air Quality Modeling" Protocol/70/1997-98). Atmospheric dispersion models are mathematical expressions, which attempt to describe the following processes in the order of emission release rate to atmospheric concentrations. Upon discharge to atmosphere, the air emissions from stationary sources are subjected to following physico-chemical processes:

1. An initial vertical rise, called plume rise due to initial buoyancy and momentum of discharge;

2. Transport by wind in its direction;

3. Diffusion by turbulence, and

4. Gravitational settling of particles, chemical reaction, transformations and decomposition, deposition on vegetation and other surfaces, washout due to rain and other complex physical and chemical process.

Gaussian Plume Model has been followed for the study. Modelling was carried out using the software ISCST3 developed by the US-Environment Protection Agency. The software meets the requirement of CPCB and calculates worst-case 24-hour average values. The modelling procedure is described below:

Methodology

The Industrial Source Complex Short Term (Version 3) dispersion model provides option to model emissions from a wide range of sources. The basis of the model is the straight-line

Gaussian plume equation, which is used with some modification point source emission, storage piles, conveyor belts and the like. Emission sources are categorized into three basic types of sources, point source, volume source and area source. The volume source may also be used to simulate line sources. The input parameters vary depending upon the source type. ISCST3 model accepts hourly meteorological data records to determine the conditions of plume rise, transport and diffusion. The model estimates the concentration value for each source and receptor combination for each hour of input meteorology and calculates user selected short term averages. The model also calculates the averages for the entire period of input meteorology.

The model uses a virtual point source algorithm to model the effects of volume sources. Therefore the basic equation is also used to calculate concentration produced by volume source emission. If the volume source is elevated the user assign the effective emission height. The user also assigns initial lateral and vertical dimensions for the volume source, which are actually added to the downwind distance for the calculation of dispersion coefficients. There are two types of volume sources, surface based sources which can be modeled as area sources, and elevated sources.

The area source model is based on the equation for a finite crosswind line source. Individual area source have the normal east-west and north-south orientations. The effect of an area source with an irregular shape can be simulated by dividing the area source into multiple squares that approximate the area of the area source. The only requirement is that each grid must be square.

Volume and Area Source Emissions: The volume and area sources options of the ISCST3 model are used to simulate the effects of emissions from a wide variety of emission sources. The model is used to simulate the effects of emission from sources such as building roof monitors, line sources, conveyor belts and continuously moving vehicles. The model is also used to simulate the effects of fugitive emissions from sources such as storage piles (stockpiles, overburden, etc) and dump.

The ISCST3 model typically follows the CPCB guidelines. ("Assessment of Impact to Air Environment : Guidelines for Conducting Air Quality Modeling" Probes/70/1997-98, CPCB

guidelines (1995) on dispersion modeling states that the area sources which do not emit into a wake region should be treated as either point source with initial crosswind spread or as non-buoyant volume source with initial vertical and cross wind spread.

If an area source is treated as an effective point source modeling may proceed as it would for a point source located at the centre of the area. Area sources treated as point sources may have release heights which are above the ground level but usually these sources are emitting into a structure wake. If a non buoyant area source is treated as a volume source, it is assumed to be located at the centre of the area and have initial spreads in the vertical and crosswind direction.

Emission Inventory of Limestone Mines: The limestone production is 150000 tons per annum, which corresponds to 410 tons per day or 17 tons per hour. Emission factors recommended in USEPA's AP42 have been followed to prepare the emission inventory of limestone mines. The emission inventory of limestone mines is shown below.

Emission Inventory of Limestone Mines

	Sources, Location Coordinates and Type of Source	Emission Factor (TSP)	Release rate g/s
1	Drilling (wet) Max 30 holes/week, (Volume)	1.3 lb/hole	0.1
2	Topsoil removal by scrapper, (Volume)	0.058 lb/ton	0.1
3	Scrapper loading (Volume)	0.012 lb/ton	
4	Blasting (controlled) (9170 feet², 1 blast/week Volume)	$0.0005A^{0.5}$ lb/blast	0.3
5	Limestone loading in dumper, 5.5 tons per bucket (Volume)	0.025 lb/ton	3.2
6	Wind erosion of exposed areas (stripped cover) (Area, = 0	0.36 ton/acre/year	$(0.3 \times 10^{-6}$ g/s/m²)

	acre/year)		
	Vehicular Movement		
7	General Traffic Movement Transportation length: 180 km, 20 kmph (Volume with centre to centre distance divided by 2.15 for lateral dimension)	4.83 (SAS)* lb/vmt	1.4
8	Haul Trucks Movement Vehicle trips for transfer of limestone by dumpers 60 km, 20 kmph (Volume with centre to centre distance divided by 2.15 for lateral dimension)	22 lb/vmt	4.3

Note 1 : A = area blasted in square feet, M = moisture content in %, S= mean vehicle speed in miles per hour, lb=pounds, vmt =vehicle miles traveled.

Meteorological Data: Meteorological file comprising wind direction, wind speed, ambient temperature, stability class and mixing height has been prepared for modeling purpose. Surface meteorological data for wind speed, wind direction and ambient temperature has been generated at the project site. Historical (seasonal) data on stability class and mixing height were obtained from published document of CPCB ("Spatial Distribution of Hourly Mixing Depth over Indian Region" Probes/88/2002-03). F Class stability during night time and B and C Class stability were assumed during day time.

Default Values: The ISCST model by default does the extrapolation of wind speed (in the exponential) to the effective height of release and calculates final plume rise as per Briggs equation. Since 99% of land inside a circle of 3 km radius around the site does not have considerable build-up area, rural dispersion coefficient is considered for modeling. The model used regulatory default options for stack tip downwash, buoyancy induced dispersion, calm processing routines, default wind processing components, vertical potential temperature gradients.

Results and Discussion: The model was set up for calculation of 24-hour average values, so that the values could be compared with the baseline levels and national ambient

air quality standards. Cartesian Grid with varying spacing was applied to calculate the GLC. Significant GLC values were observed within 2.5 km area of the mines. Hence the ground level concentrations (GLC) were plotted as isopleths for following scenarios.

The summary of impact prediction, that is the impact of air emissions due to mining activity on the baseline environmental quality vis-a-vis National Ambient Air Quality Standards is shown below:

Impact of Air Emissions of Mines on Baseline Environment (24 - hour avg in $\mu g/m^3$)

Parameter	Incremental glc (max)	Background Level (max in the site)	Superimposed value	National Standard
SO_2	0.3	5.7	6.0	80
NO_x	0.3	12.4	12.7	80
RSPM (PM-10	10.0	47	57	100

The ambient air quality of study area around the mines site will remain within the national standards. There will be no instance of violation of national standards.

The worst incremental glc value of Particulate Matter (SPM / RSPM) due to limestone mining activity will be 10.0 $\mu g/m^3$. High PM level will be observed close to the blasting and dumper loading site. Since the wind is blowing from southwest side, downwind northeast side showed higher values. Maximum ground level concentration of SPM/ RSPM will be observed at a distance of 250 m to 500 m from boundary.

4.1.1 Proposed Mitigating Measures

A. Prevention and Control of Fugitive emissions

I. **During drilling operations**

a) The drilling machines equipped with dust collector arrangement and wet drilling arrangement will be used to prevent the generation and spread of dust.

b) The personnel working on the drills will be being provided with dust mask.

II. **During blasting operation**

a) Blasting will be conducted at different faces at different times.
b) Blasting of limited holes will keep vibrations under control.
c) Use of delay detonators will also help in controlling ground vibration and noise.
d) Blasting will be done at midday during the lunch break.
e) Secondary blasting will be eliminated and hydraulic rock breaker will be used.
f) High-density primers in conjunction with ANFO with millisecond delay detonators will be used to minimize air blast and vibrations.

III. During loading operation

a) Optimum bucket size loading equipment will be used which reduces the number of buckets passes to fill the dumper by dropping material from height and thus have comparatively less dust generation. However the propagation of this dust will be confined to loading point only and will not affect any person, as the operators of excavator and dumpers sit in closed cabin and equipped with dust mask. The water sprinkled over blasted muck pile will also reduce dust generation during loading.
b) Skilled operators will operate the excavators.
c) Haul roads inside mines will be stabilized and water sprinkling using road tankers will be done every hour.

IV. During transportation of limestone

a) Asphalted road from NK Mines to JCW for transportation exists.
b) Trees will be planted on roadside from NK mines to JCW, wherever feasible.

V. Plantation work

a) In order to minimize dust pollution, five tier green belt will be developed from mines boundary to Nimbol Khurd village.
b) Waste dumping sites will be vegetating by suitable plant species to prevent air pollution during stormy winds. Details are given in EMP.

B. Prevention and Control of Gaseous Pollution

Vehicular exhaust and DG sets will generate gaseous pollutants like SO2 and NO2. Proper maintenance will improve the combustion and reduce gaseous emission.

CHAPTER 6 : ENVIRONMENTAL MONITORING PLAN

Monitoring plan has been prepared to ensure compliance with the applicable environment laws and conditions that would be stipulated in the environmental permits. The monitoring plan also ensures compliance with the recommended safeguards for pollution prevention and abatement and sustainable development of the project. The objectives of the monitoring plan are as follows:

- To verify the results of the impact assessment study.
- To study the trend of concentration values of the parameters which have been identified as critical and planning the mitigative measures.
- To check and assess the efficacy of pollution control equipment.
- To ensure that any additional parameters, other than those identified in the impact, do not become critical after the commissioning of proposed plant.

The effectiveness of monitoring plan depends mainly how best the objective of the monitoring is addressed through its core elements for e.g.

a) Man power and instruments
b) Monitoring networks
c) Frequency of monitoring
d) Parameters to be monitored
e) Methods and duration of sampling
f) Method of analysis

Table 6.1 Manpower for Environmental Monitoring

	Designation	Qualification	No. of staff	Experience
1	General Manager – EMD	B.Tech Engg. or M.Sc-Science	1	10 years in environmental management of mines or in regulatory authority.
2	Manager Horticulture	M.Sc – Botany	1	5 years in related field
3	Manager Housekeeping	B.Sc	1	5 years in related field.

Fugitive dust monitoring:

Components	Location	Parameter	Monitoring &Analysis Method	Monitoring Frequency
Fugitive Dust Monitoring	Near dust generation points	SPM	CPCB Method High Volume Sampling at upwind and 500m downwind direction simultaneously for 1-2 hour @ 1100 LPM sampling rate	Daily

Ambient Air Quality Monitoring:

Components	Location	Parameter	Monitoring &Analysis Method	Monitoring Frequency
Ambient Air Quality	At mines boundary in upwind and downwind direction, and surrounding villages (Nandini Khurdoni, Pathoria, Modsara	RSPM SO2 NO2	SPM, RSPM, SO2, NO2- CPCB Method, Duration of sampling- 24 hours Sampling volume- > 1100 LPM	Twice a week

ANNEXURE 11

Water Quality (SW & GW) details of Nandini Khundini Mine (Base line Data, Anticipated impacts, Mitigation measures & Env Monitoring Plan)

4	Chemist	M.Sc- Chemistry	1	2 years experience in environmental laboratory and pollution monitoring system.
5	Field Assistants	B.Sc –Science	2	2 years experience in environmental laboratory, sampling, pollution monitoring etc.

The instruments required for routine environmental monitoring is given in Table 6.2

Table 6.2 Instruments for Environmental Monitoring

	Name of Instruments	Number	Purpose
1	Respirable Dust Sampler	2	Ambient Air quality Monitoring
2	Spectrophotometer	1	Analysis of air and water sample
3	pH meter	1	pH measurements
4	Conductivity meter	1	Conductivity measurement
5	DO Meter	1	DO measurement
6	Refrigerator	1	Storing samples
7	Electronic Balance	1	Weighing
8	Oven	1	Drying
9	Desiccator	1	Desiccation
10	PM2.5 sampler	2	Ambient Air quality Monitoring
11	High Volume Sampler	2	SPM Monitoring

6.3.1 Ambient Air Quality and Fugitive Emission Monitoring

Ambient air of the premises and surrounding area shall be monitored using high volume sampler with attachment for sampling particles less than 10 microns size and 2.5 microns size (respirable particles) as per method prescribed by CPCB. The monitoring height shall not be less than 3 m from the ground. The station shall not have any obstacle around 500 m area. Station shall be 500 m away from road. Monitoring shall be done during construction phase as well as operation phase.

Fugitive dust monitoring shall be carried out to know the impact during blasting, excavation and loading of limestone. It shall be done using RVS at upwind and downwind direction (500 m) to know the impact.

CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT

The environmental components, study area, period of study and methodology of data generation is shown in Table 3.1

Table 3.1 Components, Study Area, Study Period and Methodology of EIA

Environmental Components	Study Area	Study Period Pre- Monsoon	Methodology
Surface & groundwater quality	Upstream and downstream of streams / rivers/ canals / ponds and ground water of nearby villages.	(1st April 2009 –30th June 2009)	Grab sampling was done and the samples were preserved and analysed for all relevant parameters following the methods prescribed by APHA. Eight samples of surface and eight samples of ground water were collected.

3.3 Water Environment

Reconnaissance survey was undertaken to locate the monitoring places for groundwater and surface water. There is no springs, lakes, wetland in the study area. There is a Dam located near Dhamda. Sheonath river and its tributary (Amner river) is the main water body of the study area. There are four Irrigation Canals, Tandula Canal and its minor distributaries in the study area. All the canals were dry during the summer season therefore sampling was not possible. There are several small village ponds located in the study area, where villagers go for bathing. Rainfall data is given in Table 3.2. Runoff and sediment data of the area is not available with any reputed institutions (including IMD, WRD-CG, CWC, CGWB). Radiological characterization of surface and groundwater quality is not required for limestone mines, because limestone is not a radioactive material. The mining activity will not disturb any surface water course, hence no meandering effect on the surrounding surface water course is anticipated. No surface water or ground water will be used in this project (4 KLD water accumulated inside mined out pit will be used). Therefore specific data on Water balance of river / stream in study area and withdrawal of surface water for the project activity is not applicable. No wastewater will be generated from mining operations. Toilet wastes (less than 1 KLD) will be disposed in septic tanks. The mined out areas will be partially used for backfilling with overburden. Remaining voids will be developed as rainwater harvesting structures, which will form waterbody inside the mining area.

The name of monitoring stations with their direction and distance from the core zone is presented in **Table 3.9.** The analysis results of surface water and groundwater samples are shown in **Table 3.10 and 3.11** respectively. Map showing surface and ground water sampling location is shown in Figure 3.5.

Table: 3.9 Water Sampling Locations

Code	Location	Distance & direction with respect to core zone
SW1	Shasthri River near Kushan	3.5 km N
SW2	Seemeh River before confluence of Arkere R	5.0 km SW
SW3	Seemeh River after confluence of Arkere river	6.0 km SW
SW4	Arkere River (50 m upstream)	5.0 km SW
SW5	Arkere River (50 m downstream)	6.5 Km SW
SW6	Bhamidi Dam	8.0 km NW
SW7	Ahiwara Pond	4.5 km SE
SW8	Nandihal Kharisamudram Mine Pit	Core zone
GW1	Hanji village	5.0 km NE
GW2	Ahiwara village	4.5 km SE
GW5	Kolalu village	8.0 km W
GW4	Pooja village	2.5 km E
GW5	Pandithpur	1.5 km N
GW6	Dichchi village	4.5 km NE
GW7	Kanchanahalli village	Near Mine site
GW8	Medapura village	1.5 Km SW

Table 3.10 Analysis Results of Surface Water

	Parameters	SW1	SW2	SW3	SW4
1	pH	8.62	8.75	8.45	8.36
2	Conductivity, µs/cm(max)	411	460	442	485
3	Temperature deg C	30	30	30	30
4	Dissolved Oxygen	6.3	6.2	6.0	4.8
5	Turbidity (NTU)	5	5	0	0
6	Dissolved solids	279	269	289	320
7	Suspended solids	6	7	8	5
8	Total Hardness as $CaCO_3$	120	116	105	112
9	BOD	0.1	0.2	0.2	0.3
10	COD	6	8	8	10
11	Chlorides as Cl	70	68	74	80
12	Sulphates as SO_4	7.2	7.6	9.2	11.5

13	Nitrates as NO_3	2.5	2.4	2.3	2.6
14	Flourides as F	0.06	0.05	0.02	0.05
15	Iron as Fe	0.075	0.075	0.061	0.065
16	Lead as Pb	0.01	0.01	0.02	0.01
17	Copper as Cu	0.01	0.01	0.02	0.03
18	Mercury as Hg	NT	NT	NT	NT
19	Nickel as Ni	0.01	0.01	0.02	0.03
20	Zinc as Zn	1.0	1.0	1.0	0.8
21	Chromium (Total as Cr)	0.03	0.03	0.05	0.05
22	Arsenic as As	NT	NT	NT	NT
23	Manganese as Mn	0.04	0.04	0.06	0.05
24	Cadmium as Cd	0.01	0.01	0.02	0.02
25	Oil and grease	0.3	0.3	0.5	0.8
26	Total Coliform MPN/100ml	89	86	112	128

Table 3.10 (Continued) Analysis Results of Surface Water

	Parameters	SW5	SW6	SW7	SW8
1	pH	8.42	8.0	7.81	7.65
2	Conductivity , mhos/cm	492	368	542	486
3	Temperature, deg C	35	35	36	36
4	Dissolved Oxygen	4.9	4.6	4.2	4.3
5	Turbidity (NTU)	6	4	7	5
6	Dissolved solids	324	245	360	299
7	Suspended solids	8	6	9	7
8	Total Hardness as $CaCO_3$	114	92	212	150
9	BOD	0.2	0.1	3.0	0.3
10	COD	9	6	10	10
11	Chlorides as Cl	98	74	98	92
12	Sulphates as SO_4	11.0	11.2	9.7	8.0
13	Nitrates as NO_3	3.3	2.6	2.3	2.2
14	Fluorides as F	0.50	0.08	0.74	0.78
15	Iron as Fe	0.069	0.096	0.045	0.053
16	Lead as Pb	0.05	0.13	0.16	0.12
17	Copper as Cu	0.03	0.11	0.13	0.12
18	Mercury as Hg	NT	0.03	0.02	0.02
19	Nickel as Ni	0.03	0.04	0.04	0.03
20	Zinc as Zn	0.9	1.5	2.9	1.9
21	Chromium (Total as Cr)	0.08	0.10	0.1	0.10
22	Arsenic as As	NT	NT	NT	NT
23	Manganese as Mn	0.09	0.13	0.12	0.13
24	Cadmium as Cd	0.02	0.03	0.04	0.04
25	Oil and grease	0.9	2.5	2.6	2.1
26	Total Coliform MPN/100ml	132	10150	11253	10950

Table 3.11 Analysis Results of Ground Water

	Parameters	GW1	GW2	GW3	GW4
1	pH	7.71	7.69	7.67	7.80
2	Colour	Colourless	Colourless	Colourless	Colourless
3	Turbidity, NTU	4	3	4	5
4	Conductivity in µmho/cm	1029	519	774	525
5	Total Suspended Solids	6	5	6	4
6	Total Dissolved Solids	678	342	512	214
7	Total Alkalinity	80	60	68	40
8	Total Hardness as $CaCO_3$	430	200	310	150
9	Chloride as Cl	64	42	134	21
10	Sulphate as SO_4	12.6	11.8	18.6	6.8
11	Nitrate as NO_3	4.7	3.6	8.2	4.6
12	Phosphate as PO_4	0.3	0.6	0.3	0.3
13	Fluoride as F	0.68	0.62	0.75	0.62
14	Dissolved Iron as Fe	0.042	0.033	0.048	0.042
15	Zinc as Zn	0.6	0.6	0.8	0.0
16	Calcium as Ca	72.1	68	84.1	48
17	Magnesium as Mg	34.1	24.4	24.4	7.3
18	Cadmium as Cd	NT	NT	NT	NT
19	Copper as Cu	0.04	0.03	0.04	0.02
20	Nickel as Ni	0.02	0.02	0.01	0.01
21	Arsenic as As	NT	NT	NT	NT
22	Mercury as Hg	NT	NT	NT	NT
23	Lead as Pb	0.04	0.03	0.02	0.01
24	Chromium as Cr	0.03	0.01	0.02	0.02
25	Oil and Grease	Nil	Nil	Nil	Nil
26	Total Coliform MPN/100ml	Nil	Nil	Nil	Nil

Table 3.11 (Continued) Analysis Results of Ground Water

	Parameters	GW5	GW6	GW7	GW8
1	pH	7.68	7.79	7.58	7.25
2	Colour	Colourless	Colourless	Colourless	Colourless
3	Turbidity, NTU	3	4	3	4
4	Conductivity in µmho/cm	810	431	345	810
5	Total Suspended Solids	6	4	4	6
6	Total Dissolved Solids	365	286	230	524
7	Total Alkalinity	72	52	42	90
8	Total Hardness as $CaCO_3$	312	224	164	412
9	Chloride as Cl	50	36	28	68
10	Sulphate as SO_4	16.2	9.4	7.2	16.2
11	Nitrate as NO_3	2.8	0.9	4.8	3.6
12	Phosphate as PO_4	0.3	0.4	0.5	0.05
13	Fluoride as F	0.58	0.76	0.62	0.72
14	Dissolved Iron as Fe	0.040	0.036	0.032	0.056
15	Zinc as Zn	0.7	0.7	0.58	0.79
16	Calcium as Ca	78	56	42	94

17	Magnesium as Mg	29.2	22.1	13.2	28.5
18	Cadmium as Cd	NT	NT	NT	NT
19	Copper as Cu	0.02	0.02	0.01	0.03
20	Nickel as Ni	0.03	0.02	0.03	0.04
21	Mercury as Hg	NT	NT	NT	NT
22	Arsenic as As	NT	NT	NT	NT
23	Lead as Pb	0.04	0.03	0.02	0.04
24	Chromium as Cr	0.03	0.02	0.02	0.04
25	Oil and Grease	Nil	Nil	Nil	Nil
26	Total Coliform MPN/100ml	Nil	Nil	Nil	Nil

All parameters in mg/l unless specified and except pH. NT denote not traceable (<0.1 mg/l)

Biological Characteristics

Algae Species found in Water Bodies of Study Area

	Parameters	Seonath River	Dhanda dam	Pond Water Hand
1	Algal Species Observed under Microscope	Euglena, Spirulatoria, Fragilaria, Chlamydomonas Cymbella, Cyclotella, Chlorella Closterium	Euglena, Oscillatoria, Fragilaria, Diatoma, Cymbella Closterium	Euglena, Phacus, Oscillatoria, Fragilaria, Diatoma Volvox colony, Tracelomonas Closterium Navicula
2	Zooplanktons Observed under Microscope	Amoeba, Paramoecium, Epiphanes, Philodena, Monostyla	Amoeba, Paramoecium, Epiphanes, Philodena, Monostyla Pleurotrocha	Amoeba, Paramoecium, Epiphanes, Philodena, Monostyla Pleurotrocha

Fe and Mn in Fish Flesh

Fishes (Rohu/ Tilapia) available in local village market were purchased (caught from village ponds, Dam and Shivnath river). The flesh was sub-dried. APHA method was followed for digestion of the flesh samples. Measurement was done using AAS. The Mn and Fe content of the fish flesh is given in Table 3.8.

Fish sample location	Mn content, mg/kg	Fe content, mg/kg
Shivnath pond	0.23	2.32

Nandini Khurdoni village	0.19	2.45
Dhamda Distt	0.15	1.55
Sheonath river	0.12	1.24

3.4 Hydrogeology

The study area falls under Mahanadi river basin. Seonath River is the tributary of Mahanadi river. Amner river is a small tributary of Sheonath river. Seonath river is perennial river and forms the main drainage of the study area. The Seonath River flows south to north in the western part of study area. The drainage is sub-annular to dendritic in pattern where the drainage density is moderate.

Hydro-Geology and Aquifer Characteristics: Hydro-geology and aquifer characteristics of the study area have been conducted by Sun GroundWater Consultants (No. C 052, Tower 4, Cadlon Estate, DLF City Phase V, Gurgaon 122 002, Haryana). The salient features of the report obtained from ACC are described below.

Geomorphology: The study area is characterized geomorphologically by peniplain of carbonate and argillaceous rocks. The area is having gentle contour separation. Geologically the entire study area is mainly occupied by Chandi Limestone of Raipur Group of Proterozoic age. Chhattisgarh Supergroup comprises of unmetamorphosed, structurally undisturbed marine sedimentary rocks and is equivalent to lower Vindhyan rocks and Kurnul rocks of North and South India respectively.

Hydrogeology: Hydrogeologically the rocks of the study area are grouped into hard rock category as the secondary porosity in these rocks much dominated over primary porosity. The ground water occurrence in these limestone are mainly restricted in weathered part and cavernous and fractured zone in unconfined to semi-confined condition. The ground water level varies from 1.35 to 6.60 mbgl in Post monsoon and between 1.85 and 21.0 mbgl in pre-monsoon. The ground water level around the core zone contained within 11 mbgl in pre monsoon and within 6 mbgl in post monsoon period. In the core zone of MK mine lease area no ground water abstraction structure exits. The ground water occurrence around the core zone of mining lease area (villages) are mainly restricted in weathered

part and cavernous and fractured zone in unconfined to semi-confined condition. Based on available reports with the Bhilai Steel Plant (who carried out the mining activity for nearly 25 years inside this NK lease area) the groundwater level inside the limestone bearing core zone area is reported to be very deep much below the 30 m level. Therefore there is negligible probability of intersecting the groundwater table due to mining activity. Groundwater seepage problems have been reported by BSP which has been adequately covered in the mitigation measures.

Aquifer Characteristics: The limestone is considered one of the best aquifer in this region. These thickly stratified carbonates are having prolific development of cavernous zone below weathered top layer. The caverns are dominant in upper 50 m zone, mainly filled with residual clays. However cavernous are found up to 150 m depth in these limestone. The drill hole discharge for the limestone varies from seepage to as high as 20 lps excluding massive area the average discharge remain between 2 and 7 lps for a moderate drawdown of 10-25 m. The transmissivity of these limestone ranges from 1 to 250 m²/day with moderate storability 0.003 to 0.000025. This aquifer is being tapped for irrigation purpose in the area and having good ground water development.

Ground water development in the area is moderate to good. It is estimated to be 68.70% of the available resource potential and hence the area falls under the safe category. Ground water development in the three blocks coming under study area (core and buffer zones) is reported to be above 70% in Durg, Dhamdha and Bemtara blocks and these blocks fall under Semi-Critical Category. Out of total irrigated area in the study area, the contribution of ground water irrigation is about 2700 ha. As the ground water development in the study area is about to touch the semi-critical category, more emphasis should be given towards conservation and protection of ground water resources.

The detailed hydrogeological investigations are carried out in the buffer zone comprising 314 sq.km area covering 20 villages falling in Dhamdha, Bemtara and Durg blocks of Durg district. Based on the detailed study, well inventory and available literature the hydrogeological conditions of the area are worked out.

Maximum part of the study area, including the entire core zone and most part of buffer zone is Chhaldi Limestone Group. The ground water occurrence in these limestone are mainly restricted in weathered part and cavernous and fractured zone in unconfined to semi-confined condition. Total 22 dug wells and hand pumps were monitored in nearby area where the ground water level varies from 1.35 to 8.90 mbgl in Post-mihsoon and between 1.30 and 21.0 mbgl in Pre-monsoon.

The depth to water table map prepared for pre monsoon and post monsoon period is shown in Figure 3.7 and Figure 3.8. The ground water level near the mine core zone lies within 11 mbgl in pre mohsoon and within 5 mbgl in post monsoon. The monitored data in the vicinity of mine area is shown in Table 3.12.

Table 3.12 Groundwater Level Data Around the Mining Lease Area

	Location	Type	Pre Monsoon mbgl	Post Monsoon mbgl	Fluctuation m	Conductivity µmho/cm
1.	Near Primary School, Pattera	HP	10.85	4.65	6.0	427
2.	Sahakrida Chabutara	DW	9.85	4.75	5.10	335
3.	House of Ex Sarpanch	HP	8.60	4.10	4.40	458
4.	House of Hemant Sahu	HP	7.85	4.70	3.20	463
5.	Opposite PHC	DW	3.20	2.10	1.10	420
6.	Mines Pit water	—	—	—	—	172
7.	Nahtini Khandini VII	BW	5.65	3.05	2.60	375

Ground Water Fluctuation: The study area shows low to high ground water fluctuation. Highest ground water fluctuation (21 to 24 m) is observed in Girhola- Khapri area. Lowest (0 - 3 m) fluctuation observed in four patches. The mined-out area outside the core zone is also included in lower fluctuating area.

Ground Water Flow Regime: The ground water flow in the study area broadly follows the surface drainage. The ground water in Seonath watershed flows towards Seonath river and in Kharun watershed it flows towards Kharun river forming a ground water divide nearly similar to surface water divide. Interestingly a ground water plateau is being seen in mine core zone representing sluggish movement of ground water in this part. This may be due to the huge rain water accumulated in the abundant mine pit in the area.

Groundwater Balance: The details of groundwater availability in the study area are given below.

	Dhanda Block	Durg Block
Annual ground water recharge from command area (ha.m)	1101	915
Annual ground water recharge from non-command area (ha.m)	6047	3658
Available ground water Resources (ha.m)	8239	4025
Gross water draft (ha.m)	4434	2808
Allocation for domestic & industrial uses (ha.m)	458	432
Balance ground water resources for future irrigation uses (ha.m)	3677	1527
Ultimate irrigation potential (ha)	11149	5127
Gross draft for irrigation (ha.m)	4060	2568
Ground water development (%)	53.85	72.69
Category	Safe	Safe

CHAPTER 4 : ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.3 Impact on Water Quality

Impact on water sources due to shifting of water courses: No meandering of water sources or canal will occur due to this mining activity. No natural nalla flows through the mining lease area, hence no diversion is needed.

Impact of water withdrawl on surface water and groundwater resources / Impact of exploitation of surface or groundwater: The mining activity will not require any drawl from surface water or groundwater resources. Water will be taken from existing pits. Requirement is only 4 KLD.

Impact of mining on hydrogeology with special reference to situation when mining will intersect groundwater: The mining activity will create large voids, which will be filled with rainwater. Seepages from mine surface will be dewatered, as and when required. The mine core area is Underlain by limestone and sometimes overlain by thin-bedded shale. These rock formations are poor in porosity and permeability. The hydraulic conductivity and storativity values are moderate.No ground water extraction structure is present within 1000 m radius of the core zone. Hence there will be negligible impact on surrounding ground water quality and quantity due to mining operation.

The mining activity involves excavation of huge quantities of earth and blasting of massive rocks. In the process artificial structural disturbances are created in the massive bed rock leading to the development of secondary porosity by way of cracks and joints. These fractures in adjoining rock formations will enhance the transmissivity and specific yield of the aquifer. The blasting and mining of limestone will lead to opening up fractures thereby improving ground water flow. The water accumulated in the abandoned pits of the mine would stabilize the ground water table.

Review of the groundwater quality data indicates that the quality is potable. Rainwater harvesting in site would have dilution effect on the ground water of the surrounding area to

the mine lease. Ground water pollution can take place only if the overburden contains harmful chemical substances. Limestone constitutes harmless constituents and does not contain any toxic metals that could leach down to the water table.

Generally water environment would have adverse effects due to mine discharges and siltation due to storm water. As this is an open cast mining method it will not generate any wastewater as no mineral processing is involved. This mining activity does not involve any treatment or bifurcation by using water.

Removed overburden will be dumped within 10m of the lease boundary along Eastern, Southern & Western side to form bunds. Garland drains with adequate height and width will be provided at the toe of these unstable OB benches. These drains will carry the wash off from the benches during rainy season. Coconut fibre filters and baffles will be provided in the drains at regular intervals to arrest the silt. This would help in preventing silting of water drains and nullas. All drains will join the sedimentation pond. Water collected in the sedimentation pond will be used for water sprinkling and greenery development in the mine. Regular arrangement for de-silting of the filters and pond will be made. Silt collected from the pond will be used in the reclamation of mine.

Impact due to Groundwater table intersection: The ground water occurrence around the core zone of mining lease area (villages) are mainly restricted in weathered part and cavernous and fractured zone or unconfined to semi-confined condition. Based on available reports with the Bhilai Steel Plant (who carried out the mining activity for nearly 20 years inside this NK lease area), the groundWater level inside the limestone bearing core zone area is reported to be very deep, much below 30 m. Mining will be done till 30 m depth. Therefore there is little probability of intersecting the groundwater table due to mining activity.

Impact of mining activity including tailing pond on surface and groundwater quality: No tailing pond will be created, hence there will be no impact.

4.3.1 Proposed Mitigating Measures

- No surface or groundwater will be used during the mining operations. Only water that has been accumulated in abandoned pit will be used.
- Overburden dump will be made and maintained to avoid any erosion.
- Garland drains will be constructed around the dump to carry wash off from the bunds. Gully checks will be made along the dump slope.
- Sedimentation pond will be constructed to which all drains carrying runoff water will be connected.
- Coconut fibre filters will be used all along the gully and drains to arrest the silt from runoff. At least 68 such filters are necessary. The fibres will be disposed as overburden after each rainy season.
- This water will be harvested for utilization in plantation watering, spraying on the haulage roads and mineral and waste dumps.
- The overburden slopes will be stabilized with vegetation. Details are given in EMP.
- Wastewater generated from workshop will be collected in a tank. Oil will be skimmed off, mixed with used oil and lubricants and given to authorized recyclers. Since the wastewater generation is intermittent (about 5-10 lit/day), the tank will be left for evaporation. Wastewater from toilets and washrooms will be taken to septic tank for disposal.
- ACC will supply tanker water (5 KL tankers / day) to the villagers of Nandini Khoordini for potable use. ACC will supply water accumulated in pits to the nearby ful mars for irrigating their land.
- ACC will use the water bodies created in abandoned pits for development of fish farms in association with local fishermen.

CHAPTER 6 : ENVIRONMENTAL MONITORING PLAN

6.3.3 Water Quality Monitoring

The storm water shall be analyzed in the rainy season. The ground and surface water quality shall be monitored in every season at selected locations. The groundwater depths shall be monitored in the wells and handpumps of surrounding villages in every season.

Component	Location	Parameter	Monitoring & Analysis method	Monitoring frequency
Ground water quality	Observation wells (inside mine (2 Nos. of Piezometer) ground water of all villages around the mine (Hand pumps/ borewells/ dug wells)	Ground water level pH, TDS, TSS, Total hardness, Fluoride, Nitrate, Sulphate, Chloride	Standard methods APHA	Once during pre-monsoon and once during post monsoon
Surface water quality	Nearby streams	pH, TDS, TSS, Total hardness, BOD, COD, O&G, Coliform Count	Standard methods of APHA	Once during pre-monsoon and once during post monsoon

ANNEXURE 12

Ambient Noise Quality details of Nandini Khundini Mine (Base line Data, Anticipated impacts, Mitigation measures & Env Monitoring Plan)

CHAPTER 6 : ENVIRONMENTAL MONITORING PLAN

6.3.2 Equipment and Ambient noise

Noise monitoring is recommended for all work areas inside the mining lease area and surrounding villages.

Component	Location	Parameter	Monitoring & Analysis method	Monitoring frequency
Ambient noise levels	Mine's boundary and all villages surrounding the mine	Leq values in dB (A)	CPCB method using equipment as per IS- 9989 & IS 3779	Monthly (separately for day and night time)

CHAPTER 3: DESCRIPTION OF THE ENVIRONMENT

The environmental components, study area, period of study and methodology of data generation is shown in Table 3.1:

Table 3.1 Components, Study Area, Study Period and Methodology of EIA

Environmental Components	Study Area	Study Period Pre- Monsoon	Methodology
Noise Quality	Locations covering all area category	(1st April 2009 –30th June 2009)	Noise level monitoring was done at 8 locations using Integrated sound level meter. Measurements were taken by following the CPCB procedure.

Noise Environment

Ambient noise measurements were taken at some locations where ambient air monitoring was carried out. The terrain features and distance and direction from NKM are shown in Table 3.6. Measurements were noted at an interval of 5 seconds over a period of 10 minutes per hour for 24-hours. The noise monitoring results is presented in Table 3.6. Noise levels due to mining operations, crushing operations, ore processing operation and beneficiation plant as also transportation routes, separately for surface transportation (vehicular or rail) and conveyor belt (covered or open) are to be specified, as per TOR points. The mining activity at Nandini Khaudani is proposed, hence this point is not applicable for this EIA study.

Table 3.6 Ambient Noise Quality Results of the Study Area

	Name of Location	Day time dB(A) Leq	Day time standard	Night time dB(A) Leq	Night time standard
1	Pathariya Mine Office	49.6	55	41.6	45
2	NKM (Core Zone)	47.3	55	40.2	45
3	Hardi	48.4	55	40.4	45
4	Gimola	48.3	55	40.5	45
5	Achwara	53.9	55	43.8	45
6	Potia	48.5	55	42.3	45
7	Medesara	48.3	55	40.2	45
8	Nandini Khaudani village	48.2	55	40.7	45

CHAPTER 4 : ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.2 Impact on Ambient Noise Quality

Ambient Noise Quality Data has been collected from the 8 locations of the core and buffer zone. Noise generating sources during the mining activity and the intensity of the noise generated by these sources is shown below:

Typical monitored Noise Levels [dB(A)] for Mining Machinery

Machines	Conditions	Monthly Avg.	
		At source	At 10 m
Dumper HD 325	Travelling With Load	86.1	82.0
	Travelling Without Load	84.5	79.9
Dumper HD 465	Travelling With Load	81.8	79.1
	Travelling Without Load	75.3	72.4
Excavator PC-600 (Komatsu)	Running Idle	72.6	78.8
	Running On Full Load	80.9	84.4
Excavator EX-600	Running Idle	79.0	83.5
	Running On Full Load	84.9	87.6
Excavator PC-850	Running Idle	76.9	72.7
	Running On Full Load	83.1	86.3
Excavator PC-1250	Running Idle	78.5	78.7
1.0H Drill	During Operation	82.0	88.7

The standards for occupational exposures reveals that tolerable level is 90 dB(A) for 8 hours exposure. 90 dB(A) noise level is generated from the activity of drilling and the rock breaker. The noise generated from other machines involved in the mining activity is in the range of 80-85 dB (A). About, 80-90 dB(A) noise level is generated from the stone crushing activity. If the difference of noise levels of two sources is 10 dB(A) or more, impact of lower noise generating source will be negligible. Even the multiple noise source generating sources of low intensity would have insignificant impact. The resultant of noise reaching to the person /worker would be much lower because of the distance from the source of generation of noise. The noise level reduces with distance as per formula

$Lp2 = Lp1 - 10 \text{ Log} S$
$S = \pi \times 3.14 \times r^2$
Where r is distance between source and receiver

Noise due to Blasting: Noise due to blasting increases the peak level graph since very high level noise generated for short duration say for 5 seconds. It ranges between 120 dB(A) to 130dB(A) at distance about 50 m to 200m. 100 dB(A) noise level intensity is achieved at 300 m from source. With increasing distance from the source the noise level decreases due to wave divergence. Additional decrease also occurs due to atmospheric effects and interaction with objects in the transmission paths. For hemispherical sound wave propagation through homogeneous medium, one can estimate the noise levels at various locations due to different sources using a model based on the following principle:

$L_{p2} = L_{p1} - 20 \text{ Log } (r_2/r_1)$, where L_{p1} and L_{p2} are the sound levels at points located at distances r1 and r2 from the source. Combined effect of all the sources (A, B, C... etc) can be determined at various locations by the following equation:
$10 \text{ Log } (10^{(Lpa/10)} + 10^{(Lpb/10)} + 10^{(Lpc/10)})$, where Lpa, Lpb and Lpc are noise pressure levels at a point due to different sources.

Based on the above principle a Noise Model has been developed. The details of model are (Similar to Dhwani Model):

i. Maximum number of sources that can be modeled is 25.
ii. Noise levels can be predicted at any distance from the sources.
iii. Model is designed for flat terrain or topography.
iv. Coordinates of the sources with respect to locations can be fixed.
v. Isopleths can be drawn.
vi. Attenuation factors are not applied hence the modeled results are overestimate.

Noise level at core zone has been considered as background noise for prediction of impact.

4.2.1 Proposed Mitigating Measures

A. Noise Pollution Abatement and Control

a) HEMM will be procured from reputed manufacturer and care will be taken to minimize generation of noise.
b) Controlled blasting will reduce noise generation.
c) Earmuffs will be provided to operators and other employees working in higher noise area.
d) Green belt will be developed to check the propagation of noise.
e) The practice of wet drilling will be carried out with the help of sharp drill bits. This will help in reducing noise generation during drilling.

f) Proper stemming of blast holes will be done.

g) Blasting will avoided in the morning and evening hours.

h) High density primers and millisecond delay detonators shall be used to reduce air blast, vibration and noise.

i) The noise pressure level and vibrations generated by blasting will be of very short duration, generally less than 0.5 second.

j) Speed of trucks entering or leaving the mine will be limited to moderate speed of 15 km/h to prevent undue noise from empty trucks.

8. Ground Vibration Abatement and Control (Due to Blasting)

Sources of vibration due mining activity in the area are anticipated due to operation of Heavy Earth Moving Machines like dozers, dumpers, drill machines and blasting. However, following precautions are taken for abatement of vibration due to present mining project. The factors affecting ground vibration include, geological structures, explosive charge per delay, blast design parameters, method of initiation, explosive type used etc.

a) Vibration due to Machines

Taking following measure minimize vibrations due to machines:

- Proper maintenance, oiling and greasing of machines at regular intervals reduced generation of vibration due to machines.
- Machines will be operated by trained operators.

b) Ground Vibration due to Blasting

Depending on the type of structures and the dominant excitation frequency, the peak particle velocity (ppv) on the ground adjacent to the structures is not exceeding the values given below in the table as per the DGMS (Director General of Mines Safety) guidelines. Permissible standards of ground vibration due to blasting as per guidelines of Director General of Mines Safety (DGMS), Dhanbad are as follows:

Types of structure	Dominant Excitation Frequency, Hz		
A. Buildings/structures not belongs to the owner	<8 Hz	8-25 Hz	>25 Hz
Domestic houses/ structures (kachaa Brick & cement)	5	10	15

Industrial buildings (RRC & framed structures)	10	20	25
Objectives of historical importance & sensitive structures	2	5	10
B. Buildings belongings to owner with limited span of life			
Domestic houses/ structures (kachha Brick & cement)	10	15	25
Industrial Buildings (RRC & framed structure)	15	25	50

*Source-DGMS Tech Circular No. 7 of 1997

To keep ground vibration due to blasting well within the prescribed limits, following measures shall be used.

a) Drilling and blasting will be carried under the supervision of qualified persons.
b) ANFO explosive will be used which has low velocity of detonation reducing the ground vibrations.
c) The limestone mine will be a strike wise stretch of working. Therefore blasting will be conducted at various points at different time. Blasting of limited holes at any given time will keep vibration under control.
d) Delay detonators will also help in controlling ground vibration.
e) Workers near excessive noisy areas will be given ear plugs / ear muffs to avoid noise exposure.

ANNEXURE 13

Risk Assessment details of Nandini Khundini Mine

Annexure No 13

JAMUL CEMENT WORKS
ASSESSMENT OF HAZARDS AND ASSOCIATED RISKS IN MINING ACTIVITIES

[illegible] [illegible] [illegible] [illegible]

Sl. No.	Activity	Hazard Description/Nature	[illegible]	[illegible]	Frequency	Risk Consequence	Hazard Control Measures
A1	Drilling	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] [illegible]
		[illegible]	[illegible]	[illegible]		[illegible]	[illegible] [illegible]
A2	Blasting	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	do
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	do
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A3	Loading	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] [illegible] [illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A4	Transportation by Dumpers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] [illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] [illegible] [illegible] [illegible] [illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] [illegible]
		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
A5	Unloading of Dumper	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

ANNEXURE 14

Adequacy of Proposed Mining Machinery at Nandini Khundini Mines.

ANNEXURE NO. 14

ADEQUACY OF MINING MACHINERIES AT NANDINI KHUNDNI LIMESTONE MINES

ANNUAL LIMESTONE PRODUCTION (Max in scheme period): 1030000 Tonnes
APPROX. OVERBURDEN REMOVAL(Max of scheme period): 74865 Tonnes
TOTAL MATERIAL HANDLING : 1104865

1.SHOVEL :

$$Cd = \frac{PT}{3600xDxSxHxBdxUxFxAxUs}$$

Where
Cd = Capacity in m^3
T = Time Cycle = 30 seconds
P = Total Material Handling in Tonnes = 1104865 Tonnes
Bd= Bulk density= 2
U = Net Utilisation Factor = 0.40 under indian condition
F = Fill factor = 0.7
A = Angle of Swing factor = 0.90
Us = System Utilisation Factor = 0.70
D = No. of working days = 300
S = No. of Shifts = 2.
H = Hours = 8.

$$Cd = \frac{1104865x30}{3600x300x2.0x8x2x0.4x0.7x0.9x0.7}$$

$$= \frac{33130950}{6096384}$$

= 5.44 m^3

We propose to have one Shovel L&T Komatsu make of 4.5 m³ capacity and another back hoe shovel of same capacity. There will be arrangement to use back hoe either for loading or to be used as rock breaker.
There will be adequate loading machines to take care of 1104655 Tonnes Handling per annum.

2.Drills :

$$N = \frac{786xP}{nexlxcxdxdxk}$$

Where
N = No of Drills
P = Planned Production in Tonnes = 1030000 Tonnes (not required for OB)
l = rate of drilling = 15 mts/hour
c = cavdness of limestone = 1.2
k = constant depending upon type of rock = 30
d = dia. of bit = 115 mm
l = in-situ density of rock = 2.6

$$= \frac{786x1030000}{15x1.2x30x30x115x115x2.6}$$

$$= \frac{789980000}{892687500}$$

= 0.88
= 1 Nos.

We propose to have one Atlas Copco ROC L6 Drill Machine.
There will be adequate no of of Drill Machines to take care of Production of 1030000 Tonnes per annum.

3.OTHER ANCILLARY MACHINERIES :

There will be adequate no of other Ancillary Machines such as Dozer,water tanker, explosive van to take care of Production of 1030000 Tonnes per annum.

ANNEXURE 15

Time Scheduling for Abandonment – Year Wise

ANNEXURE – 15

TENTATIVE TIME SCHEDULING FOR ABANDONMENT OF NANDUR KHURD (N) LIMESTONE MINE

2013-14 to 2057-58

ACTIVITY NOS.	ACTIVITY	IMPACT ATTR (DURATION/AREA & LOCATION)
1.	Time for training of area to be utilized for the post	Yes: Five (5) to seven (7) years
2.	(A) Reclamation & rehabilitation of mined out area	(i) Backfilling:
		Time-line | Backfilled (Ha.) | Location
		2013-2018 | 4.0 | Quarry No. 1
		2018-2023 | 5.5 | Quarry No. 2
		2023-2028 | 6.2 | Quarry No. 3
		2028-2043 | 4.5 | Quarry No. 4
		2044-2057 | 7.0 | Quarry No. 1 to 4
		(ii) (a) Plantation on the backfilled area
		Year-wise | AREA (HECT.) | Location
		2013-2018 | 3.5 | Back filled Area
		2018-2023 | 4.2 | Back filled Area
		2023-2028 | 5.2 | Back filled Area
		2028-2043 | 5.7 | Back filled Area
		2043-2057 | 8.5 | Back filled Area
		(ii) (b) Converting mine water reservoir:
		Time-line | Area (Hect.) | Location
		2013-2018 | 4.0 | Mine Void of Qry No. 1
	(B) Plantation & Rehabilitation of Dumps (within lease)	(i) Concentration of planned trees at the dumps
		Year-wise | AREA (HECT.) | Location
		2013-2018 | 1.75 | Dump Nos. 1 to 4
		(ii) (a) Plantation on the dumps
		Year-wise | AREA (HECT.) | Location
		2013-2018 | 1.75 | Plantation is completed on the dumps
		2018-2023 | NIL |
		2023-2028 | NIL |
		2028-2043 | NIL |
		2043-2057 | NIL |
	(C) Rehabilitation of farm / waste land (if any)	(i) Greenbelt development:
		Year-wise | AREA (HECT.) | Location
		2013-2018 | 0.12 | Along Lease boundary
		2018-2023 | 0.34 | Along Lease boundary
		2023-2028 | 0.4 | Along Lease boundary
		2028-2043 | 0.6 | Along Lease boundary
		2043-2057 | 1.4 | Along Lease boundary
		Total | 3.0 |
3	Time for aging assessment for protection of water bodies available in the area	From 2057-58 to 2058 (1 to 2 years) at last year	From year 1 to 2 during ultimate pit mining
4	Time for corrective measures for prevention of pollution of air & water	From 2013 to 2058 (45 years)	Within life of mine and to be continued after closure of mine with all precautions
5	Time for application of air and protective measures to be taken during generation of air, water and land pollution while handling OB	From 2013 to 2058 (45 years)	Within life of mine and to be continued after closure of mine with all precautions
6	Time for the recovery of top soil & its protective measures to be taken	From 2013 to 2058 (45 years)	After mining of mine and to be continued after closure of mine with all precautions
7	Time for proper maintaining, storing, using and disposal of various chemicals / fuels	Year - 2058 (45th year)	During last year of mining utilized for one
8	Time for decommissioning of mining machineries	Year - 2058 (45th year)	During last year of mining utilized for one

TIME SCHEDULING FOR ABANDONMENT FOR RING NEKKUNDINI LIMESTONE MINE – 45 YEARS FROM 2013 (REVISED)

ANNEXURE 16

Abandonment cost Calculation – Year Wise

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ANNEXURE - 16

ABANDONMENT COST CALCULATION - YEAR-WISE PROPOSAL (FOR ITEM NO.6 & 7 OF PMCP)

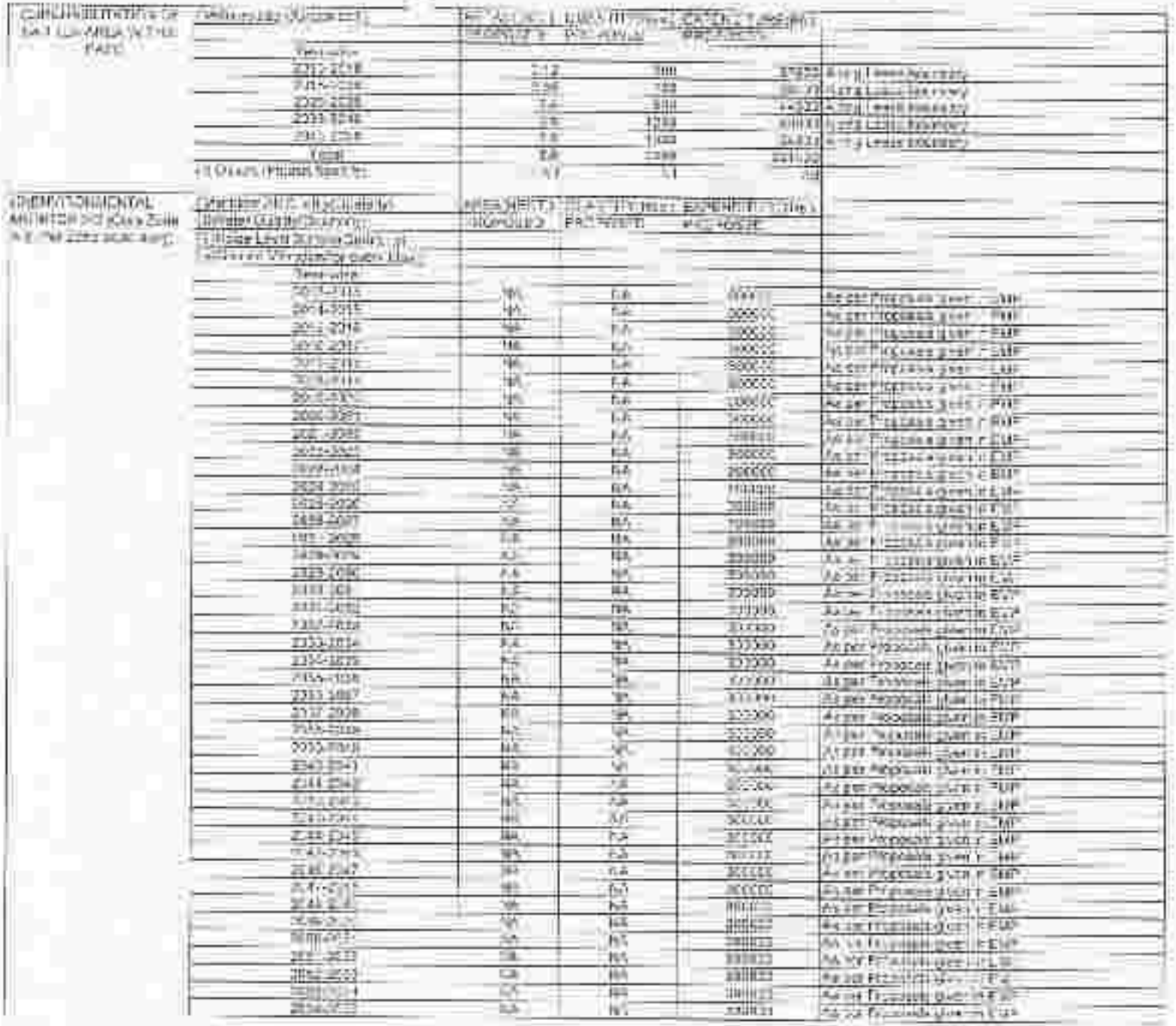
2013-14 to 2017-2018

ITEM	DETAILS	AREA (Ha) PROPOSED	QUANTITY PROPOSED	EXPENDITURE (Rs) PROPOSED	REMARKS
[illegible]	(i) Backfilling				
	Year-wise				
	2013-2014	[illegible]	[illegible]	[illegible]	[illegible]
	2014-2015	NIL	NIL	NIL	
	2015-2016	[illegible]	[illegible]	[illegible]	[illegible]
	2016-2017	[illegible]	[illegible]	[illegible]	[illegible]
	2017-2018	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	
	(ii) Afforestation on the backfilled area	AREA (Ha) PROPOSED	QUANTITY PROPOSED	EXPENDITURE (Rs) PROPOSED	
	Year-wise				
	2013-2014	NIL	NIL	NIL	
	2014-2015	NIL	NIL	NIL	
	2015-2016	NIL	NIL	NIL	
	2016-2017	[illegible]	[illegible]	[illegible]	[illegible]
	2017-2018	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	
	(iii) [illegible]				
	(a) [illegible]	NIL	NIL	NIL	
	(b) [illegible]	NIL	NIL	NIL	
	(iv) [illegible]	AREA (Ha) PROPOSED	QUANTITY PROPOSED	EXPENDITURE (Rs) PROPOSED	
	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	
[illegible]	(a) [illegible]	[illegible]	NIL	NIL	
	(b) [illegible]	[illegible]	NIL	NIL	
	(c) [illegible]	[illegible]	NIL	NIL	
	(d) [illegible]	AREA (Ha) PROPOSED	QUANTITY PROPOSED	EXPENDITURE (Rs) PROPOSED	
	Year-wise				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	
	(e) [illegible]	NIL	NIL	NIL	
	(f) [illegible]	NIL	NIL	NIL	
	(g) [illegible]	NIL	NIL	NIL	
	(h) [illegible]	AREA (Ha) PROPOSED	QUANTITY PROPOSED	EXPENDITURE (Rs) PROPOSED	
	Year-wise				
	2013-2014	[illegible]	[illegible]	[illegible]	[illegible]
	2014-2015	[illegible]	[illegible]	[illegible]	[illegible]
	2015-2016	[illegible]	[illegible]	[illegible]	[illegible]
	2016-2017	[illegible]	[illegible]	[illegible]	
	2017-2018	[illegible]	[illegible]	[illegible]	
	Total	[illegible]	[illegible]	[illegible]	
	[illegible]	NIL	NIL	NIL	

ANNEXURE - 16

ABANDONMENT COST CALCULATION - YEAR-WISE PROPOSAL (FOR ITEM NO.6 & 7 OF PMCP)
2013-14 to 2057-58

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]				
	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	
	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Total	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]				
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	
	[illegible]	[illegible]	[illegible]	[illegible]	



ANNEXURE 17

Financial Assurance Calculations

Annexure- 17

Calculation for Financial Assurance

Name of The Mine (Nandini Khadan) Limestone Mine
Date of Submission Of Progressive Mine Closure Plan : 01.04.2008
Name of Lessee : Nandini Khadan Mining Lease
Total Lease Area (Ha) -15.87 Ha — Mining Plan Period : 2008-2028
Lease Period - 20 years — Date of expiry of Mining Plan : 31.03.2028
Scheme of Mining Period : 2013-14 to 2017-2018
Date of expiry of Mining Plan /Scheme of Mining : 31.03.2018

a)Area put to use for mining and allied activities

Sl. No.	Used	Area in Ha.				
		Area to be put to use at start of Mining Plan	Additional requirement during 5th to 9th Year	Total Area (Ha)	Area of Non-recurring activity required after Mine Closure	Net area to be considered for Calculation
a	b	c	d	e = (c+d)	f	g = (e-f)
1	Area to be excavated	11.44	6.50	17.94	0.00	17.94
2	Storage for top soil	0.30	0.00	0.30	0.00	0.30
3	Overburden dump	1.00	0.42	1.42	0.00	1.42
3(a)	Back Fill	0.00	0.19	0.19	0.00	0.19
4	Mineral storage	0.00	0.00	0.00	0.00	0.00
5	Infrastructure (Mine office)	0.20	0.08	0.28	0.00	0.28
6	Roads	0.00	0.18	0.18	0.00	0.18
7	Railways	0.00	0.00	0.00	0.00	0.00
8	Green Belt	0.00	0.00	0.00	0.00	0.00
9	Tailing Pond	0.00	0.00	0.00	0.00	0.00
10	Effluent Treatment Plant	0.00	0.00	0.00	0.00	0.00
11	Mineral separation Plant	0.00	0.00	0.00	0.00	0.00
12	Township area	1.00	0.00	1.00	0.00	1.00
13	Other to specify(Pond,Nursery)	0.00	0.00	0.00	0.00	0.00
	Total	13.13	7.38	20.51	0.00	20.51

Financial assurance to be paid for the area that shall be under use at the end of the Period :
Area put to use = 20.51 Ha
Financial assurance = 20.51 X 25000 = 512750
Financial assurance =Rs.5,12,750 (In words Rupees Five Lakhs Twelve Thousand Seven Hundred Fifty only)

ANNEXURE 18

Cash Flow Forecast, Sensitivity Analysis & UNFC Economic Analysis of Nandini Khundini Mines

ANNEXURE - 18

We do not have separate Profit and loss account for individual mines as we have multi locational plants. However we have prepared the cash flow analysis and sensitivity analysis based on present NPV of cement and the market value of the limestone in the surrounding area.

CASH FLOW STATEMENT FOR THE YEARS :

Year	Cement Sales (Qty in tonnes)	Receipts from sales at works level	Quantity of LS Consumed in tonnes	Proportionate royalty At mines level	Cost of LS	Royalty at mines level
2015-2016	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2014-2015	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2013-2014	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2012-2013	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2011-2012	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

INVESTMENT CRITERIA :-

Value of investment is Rs. 3,65,27,2 crores as Rs.[illegible] Crore block
Anticipat investment to be made in next 5 years period is Rs.[illegible] Total = [illegible]

1.Calculation of NPV :

Year	Cash Inflows	Cash Outflows	Difference	Discounted factor @ 10%	NPV
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
					[illegible]
					[illegible]
			NPV		[illegible]

ESE : Capital investment at the beginning of the year

2. Calculation of Pay back period :-

		Rs.
	Capital Investment	105000000
1st	Net Discounted cash flow at the end of 1st yr.	[illegible]
		9258191
2nd	Net Discounted Cash flow at the end of 2 yr.	5830001
		0

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
		[illegible]
		[illegible]
		[illegible]

Pay Back period for the above will be 1 year and 10 months.

3. Calculation of IRR :-

NPV	10805136.49	
Present value of outflows	105000042.34	1:10

4. Sensitivity Analysis :-

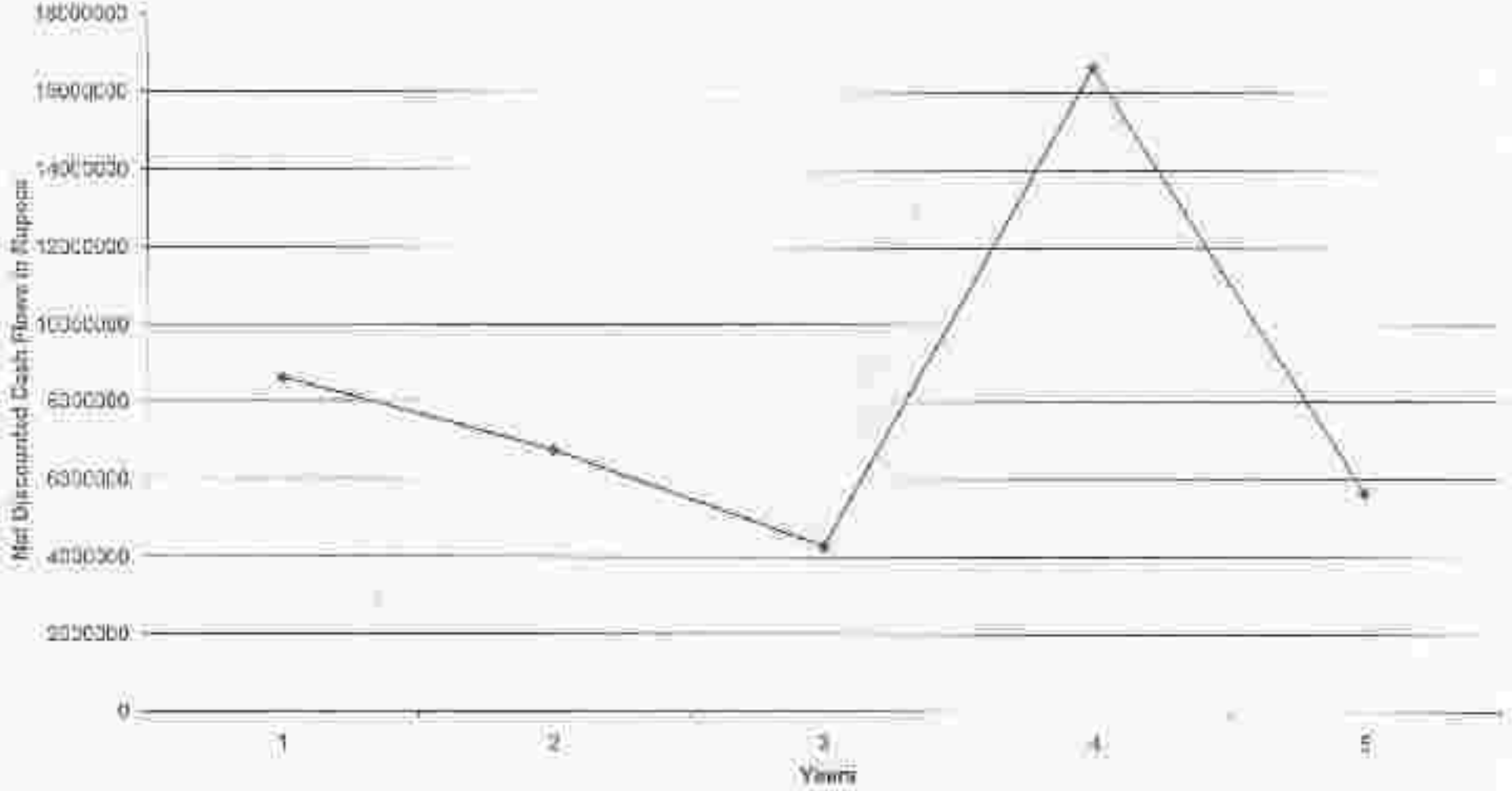
i) With respect to increase in cost of LS :-

Year	Sales (Tonnes)	Sales (Rs.)	5 % increase in cost of Lime stone	Diff.	Discount @ 10%	Net Flow: Cash Flows
2013-2014	140137.6	474048000	3282000	8430000	0.909	8518909
2014-2015	149426	510165000	4086440	8922560	0.826	8748000
2015-2016	159656	481772881	4286560	8956200	0.751	8210005
2016-2017	1063000	5234660000	2653+2000	29357440	0.683	18030000
2017-2018	1053000	5299000000	3508548[illegible]	9[illegible]	0.621	5847473
						4[illegible]200
		LESS :- Capital Investment at the beginning of the year				105000000
					NPV	6.50[illegible]816

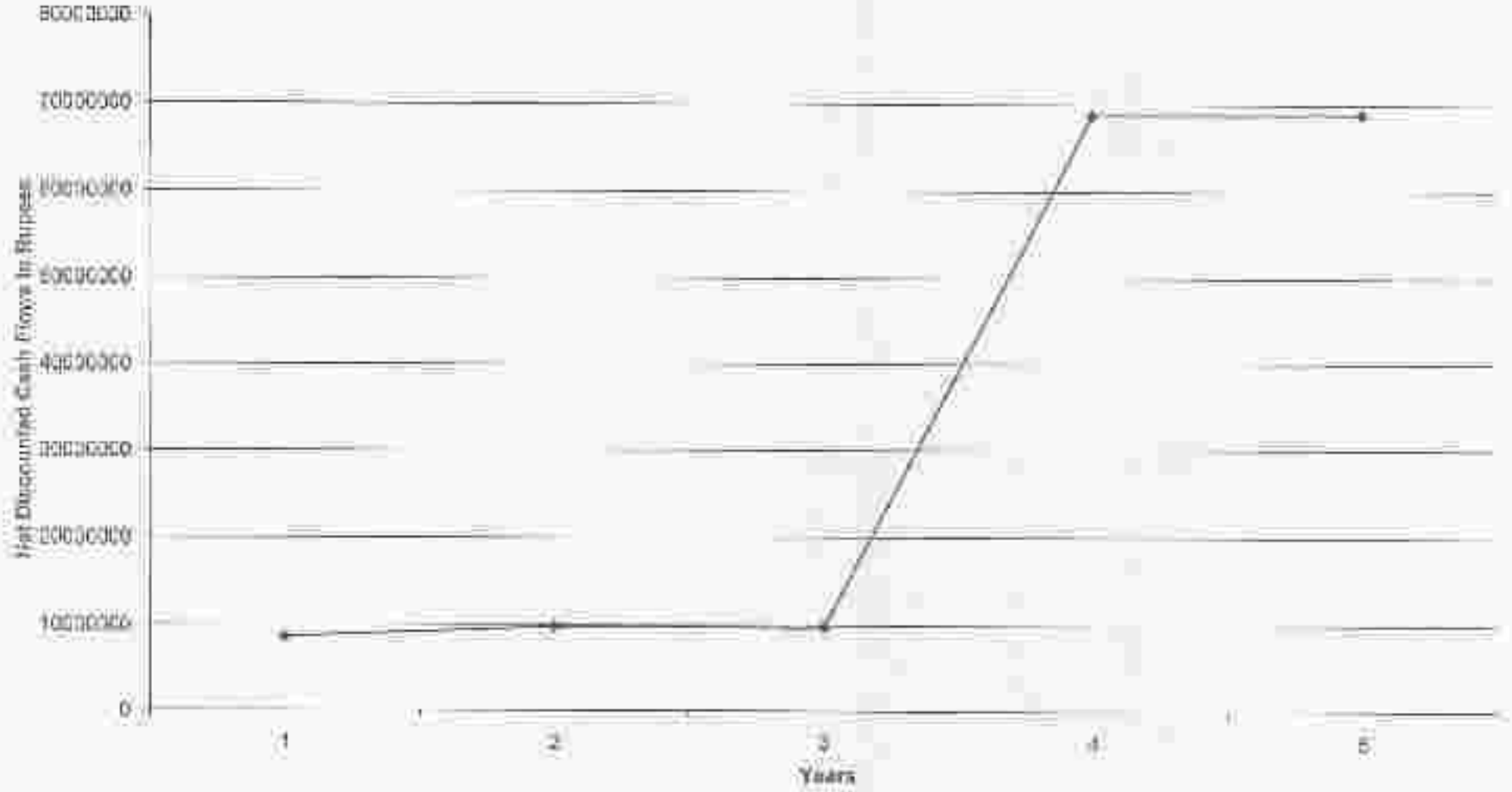
ii) With respect to increase in Sale Price :-

Year	Sales (Tonnes)	5 % increase in Sale Price	Limestone Cost (Rs.)	Diff.	Discount @ 10%	Net Flow: Cash Flows
2013-2014	140137.6	474048000	1761200	8430000	0.909	8[illegible]0
2014-2015	149426	5[illegible]51	4[illegible]600	[illegible]29	0.826	8[illegible]4
2015-2016	159656	5[illegible]239	3[illegible]589	[illegible]271	0.751	8[illegible]79
2016-2017	1063000	5[illegible]3500	2[illegible]4000	30[illegible]500	0.683	[illegible]0
2017-2018	1053000	5[illegible]30	2[illegible]0000	30[illegible]000	0.621	[illegible]3
						18[illegible]4
		LESS :- Capital Investment at the beginning of the year				(105000000)
					NPV	8.65[illegible]44

Sensitivity Analysis wrt Increase in cost of Limestone



Sensitivity Analysis wrt increase in Sale Price of Cement



Projected Cost of production per tonne of mineral sold :-					
	Rupees in Rupee				
	Cost per metric tonne				
Description	2013-14	2014-15	2015-16	2016-17	2017-18
(i) Direct Cost:					
(a) Exploration					
(b) Mining	75.00	78.75	82.69	86.82	91.16
(c) Beneficiation (mechanical only)					
(d) Overhead cost	15.63	16.52	15.25	16.01	16.81
(e) Depreciation	0	0	0	0	0
(ev) Interest	0	0	0	0	0
(v) Royalty	63	63	63	63	63
(vi) Cess	1	1	1	1	1
(vii) Infra and Dev Cess	0	0	0	0	0
(viii) Others (specify)					
Salary & wages	32.92	34.46	36.18	37.99	39.89
Power	2.66	2.76	2.93	3.08	3.25
Stores	35.56	40.18	42.45	44.57	46.80
Quarry	16.00	16.80	17.64	18.52	19.45
Miscellaneous	13.19	13.89	14.64	15.37	16.03
Total (i)	254.00	266.60	275.68	286.26	297.36

	118138	165485	193595	1650000	1000000
CASH FLOW STATEMENT FOR THE YEARS :					
	Cash Flows				
Description	2013-14	2014-15	2015-16	2016-17	2017-18
Cash Outflow :-					
(i) Direct Cost					
(a) Exploration					
(b) Mining	11118578	12558719	15487903	9462691	9568709
(c) Processing (Beneficiation only)					
(ii) Overhead cost	2249749	3316000	2256264	15400302	17514789
(iii) Depreciation @	0	0	0	0	0
(iv) Interest	0	0	0	0	0
(v) Royalty	8332504	10043778	5497705	6497664	6496209
(vi) Cess	145158	165485	193595	1650000	1000000
(vii) Infra and Dev Cess	0	0	0	0	0
(viii) Others (specify)					
Salary & wages	4061005	6403040	5438858	3013000	4169709
Power	434547	493274	441455	3111881	3330244
Stores	5193512	6444758	6099010	4290819	4823030
Spares	2379508	2678341	2855437	16037000	2203154
Miscellaneous	1903940	2327857	2150076	1527246	1661305
Total:	37923338	42043388	41455488.8	29488920	30629516

Note: There will not be cash inflows as investment is being captively consumed for cement manufacture @ Depreciation will not involve any cash outflow and in this case it is nil

UNFC ECONIMIC ANALYSIS

SENSITIVITY ANALYSIS FOR TOTAL COST OF PRODUCTION WITH EVERY 5% GRADUAL DECREASE IN LIMESTONE RAISING FROM NANDINI KHUNDNI MINES AND CORRESPONDING INCREASE IN JAMUL MINES

Total Extraction sufficient per year for 2013-2014: 715500 Tonnes

Scenario	Extraction of Limestone from		Total Cost	% Increase in cost
	Nandini Khundne	Jamul		
Present	146139	531862	218663160.4	0
5% Decrease in Nandini Khundni	140231.1	537770.9	216538600.6	16.05%
10% Decrease in Nandini Khundni	133324.2	543678.8	218144400.3	16.74%
15% Decrease in Nandini Khundni	126417.3	549586.7	217735190	16.82%
20% Decrease in Nandini Khundni	119510.4	555494.6	217325981.7	16.31%
25% Decrease in Nandini Khundni	111103.5	563896.5	2189192773.4	16.05%

NOTE:

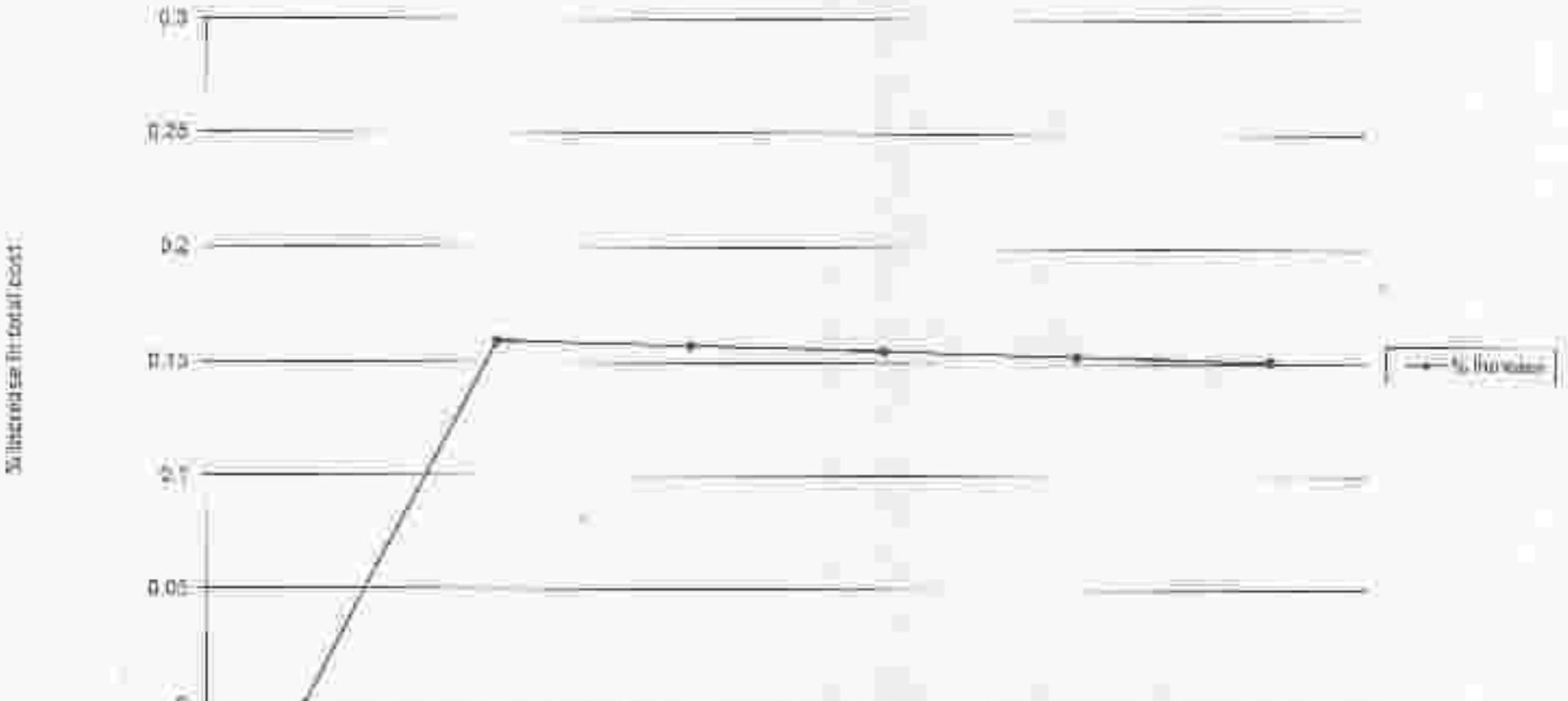
NPV (Net Present Value) cannot be calculated as the mineral has not got any marketability. The entire production is captively consumed for cement manufacturing.

We have four captive mines namely Jamul, Pathariya LT and LT and Nandini Khundni. The cost of production from Nandini Khundni Mine will be approx Rs 356 per ton, which will be more as compared to that of Jamul as well as Pathariya.

In case of any decrease in limestone production from Nandini Khundni Mine, the total requirement will have to be compensated from Jamul mines.

In that case the total cost of production will increase. In this Sensitivity Analysis, we have shown comparative decrease in total cost of production for every 5% decrease in limestone production from Nandini Khundni mine and corresponding increase from Jamul mines.

% decrease in Total Cost with every 5% increase in Jamun and Corresponding decrease in Nandini Khurdini



ANNEXURE 19

Executive Summary of EIA Report of Nandini Khundini Mine

EIA REPORT OF NANDINI KHUNDINI LIMESTONE MINE

(EXECUTIVE SUMMARY)

Introduction

ACC Limited operates a cement plant at Jamul, District Durg, Chhattisgarh. The production capacity of clinker at Jamul Cement Works (JCW) is 2.78 Million Ton Per Annum. ACC proposes to increase the clinker production to 2.0 MTPA. In order to meet the additional limestone requirement, ACC proposes to operate the limestone mines at Nandini Khurdini village of Dhamda Tehsil, District Durg. The Nandini Khundini mines is located about 20 km away from JCW. The mine is located on the left side of Jamul – Dhamda road, near Nandini Khundini village.

The Mining Lease area at Nandini Khundini comprises 53.57 Ha. Mining Plan has been approved by Indian Bureau of Mines. The project cost is Rs 4.0 crores. Elevation is 282 m above mean sea level, gently sloping towards west. The limestone production capacity will be 0.15 MTPA. About 25 workers will get employment. The Nandini Khundini mines area was earlier obtained by Bhilai Steel Plant from 1971 to 1991. After that mining was discontinued. The mined out pits has now converted to water bodies. The mining lease was freshly granted to ACC by the Chhattisgarh Government on 5th February 2009. The proposed mines contain 4.01 Million Tons proven limestone reserve. The average quality of limestone at Nandini Khundini mines contains 43.5% CaO, 2.6% MgO, 11.3% SiO_2, 3.1% Al_2O_3, and 1.7% Fe_2O_3.

The following factors were considered for selecting Nandini Khundini limestone mines:

- It is partially worked out limestone mine of Bhilai Steel Plant. The left over sub-grade limestone will be extracted. There will be optimum utilization of natural resource.
- There is no requirement of any displacement of people
- There are no forests, wildlife sanctuary or any ecosensitive areas around the mine.
- Mining land is flat, barren with no vegetation and natural water.
- There is no requirement for ground water because water accumulated in the mined out pits is available in plenty.

Mechanized opencast mining method comprising shovel - dumper combination will be adopted by ACC. Non electric delay detonators type blasting will be applied. One drill, one hydraulic rock breaker, one hydraulic excavator and one dumper truck will be employed. The boreholes will be 115 mm diameter, 6.5 m depth and spacing will be 4 m. Blasting will be done once a week. The height of bench will be kept 6 m and width of bench will be kept 15 m. The ultimate depth of mine will be kept 30 m from ground level. The ultimate pit slope will be 69° from the horizontal. The stripping ratio is 0.14 : 1. About 850000 tons of overburden will be generated during the life of mine. Overburden of first five years shall be stacked along the lease boundary. The height of the dump shall be 3 m. From sixth year onwards the overburden will be backfilled in mines. Initially 40000 tons limestone will be extracted every year till 4th year. After development and formation of benches, the mine will produce 150000 tons limestone every year (from 5th year onwards). The expected life of mine is 27 years.

Final Environmental Impact Assessment Report has been prepared according to the Terms of Reference issued of Ministry of Environment and Forest issued vide letter No. J-11015/23/2009/IA-II (M) dated 29-10-2009 of Ministry of Environment and Forest. Public Hearing for this project was done on 29-4-2010.

Description of Environment

Baseline data was generated during the period 1st April 2009 to 30th June 2009. 10 km area around the mines boundary was considered as study area. Data was generated by following the standard procedures of the Ministry of Environment & Forests and the Central Pollution Control Board.

Meteorological data on wind speed, wind direction, relative humidity and temperature was generated close to the site at Pethenja limestone mines office. Baseline ambient air quality was measured at 8 locations within the core and buffer zone. Noise levels were measured at 8 locations. Surface water quality of 8 locations, groundwater quality of 8 locations and soil quality of 8 locations was collected and analyzed. Data on plants and animals present in the core and buffer zone was collected from the published literatures and checked

during field survey. Data on landuse, demography, occupation pattern, cropping pattern, infrastructure facilities were collected from District Statistics Handbook and Tahsil records.

The study area falls under Seismic Zone II. The limestone of this area is of lower Vindhyan age occurring as hill terrain. No forest, national park, wildlife sanctuary, tiger reserve, biosphere reserve, wetland, heritage site, archaeological monument, etc are present within 10 km radius of mines.

The predominant wind direction is from southwest to west direction. Wind speeds are moderate, 2.7 m/s is average speed and 4.1 m/s is the maximum speed observed. Calm conditions remain 28% of the time. The annual rainfall is 1359 mm. The observed 24-hour average SPM in the study area ranges from 108 to 154 µg/m³. PM_{10} from 39 to 55 µg/m³. SO_2 from 4.0 to 9.5 µg/m³ and NOx from 9.0 – 14.4 µg/m³. The 24 hour average national ambient air quality standard for residential area is as follows: PM_{10} - 100 µg/m³, SO_2 - 80 µg/m³ and NOx – 80 µg/m³. The ambient air quality of the study area is well within the prescribed National Ambient Air Quality Standards.

The observed noise level in the study area ranges from 45.4 dB (A) to 48.2 dB (A) during day time and 40.4 dB (A) to 41.8 dB (A) during the night time. The standards for residential area are as follows: 45 dBA during night time and 55 dBA during day time. The noise levels in the study area were found to be well within the prescribed national standards.

Shivnath river located 4 km from mines boundary flows towards south to north direction. Tandula canal, small nallas and village ponds are the main water body of study area. The surface water quality is satisfactory and meet the designated uses. Groundwater availability at mine site and Nandini Khurdini village is poor due to deep limestone deposits. At few pockets in these areas groundwater is available at greater depths, ranging from 40 m to 60 m and the yield is poor. The villagers of Nandini Khurdini uses water supplied by the local body for drinking. Groundwater at other villages away from mines are available at lower depths ranging from 3.2 m to 9.85 m during pre-monsoon and 2.1 to 4.75 m during post-monsoon. Groundwater quality of Patteria, Medesara and Hardi contains higher hardness content, ranging from 310 to 412 mg/l. At other places the groundwater is of potable nature. Metallic or bacterial contamination was not found in the water samples.

The soils are sandy loam and silty clay type. The fertility of the soil along the Sheonath river is of good quality that supports good agriculture. The soil quality around mines is of moderate quality. The soils around mines are not contaminated with heavy metals. Paddy is the main crop grown during monsoon. Other crops are wheat, maize, pulses and oilseeds. Tandula canal with its major and minor drains supplies water for irrigation only when the main canal has surplus water left after fulfilling the water requirement of BSP.

68% of land in the study area is covered under agriculture, 18% land is put to non-agriculture use, 4.5% land is fallow land, 4% land is cultivable wasteland, 5.5% land is barren land. There is no forest land in the study area.

The nearest major habitation around the mining site is Dhamda, located 8 km away in northwest direction. Jamul Cement Works and its township Bhilai and Durg are located about 20 km away from mine. The name of big and small villages, population, direction and distance from mining lease boundary are as follows: Pathariya – 2.0 km northwest (population : 1715), Nandani Khurdini 0.5 km north (population : 3084) , Matesara 2.0 km southwest (population : 2608), Pitora – 2.0 km west (population : 1401), Deophat – 1.3 km southeast (population :740) and Pottya 2.0 km south (population : 1226).

There are 45 villages within 10 km radius of the site. The population is 65795 comprising 15342 household. 41864 are males and 41941 are females. Literacy rate is 66.3%. 17% people belong to SC category, 6% people belong to ST category.

There are huge limestone deposits and mines within 5 km radius of mine site. About 40 – 50 medium and small sized stone crushers are operating within a radius of 2.5 km distance from mines site. The crushers are located near the Nandini – Pathania road.

School education facility is quite developed. Primary health centers / sub-centers, post office, telephone, internet and STD facility are available at several places. Electricity is available in all the villages. All villages are connected with roads. The nearest railway station is Bhilai Nagar and Durg located about 20 km away from mines site.

Environmental Impact and Mitigation Measures

Water Environment: Rainwater accumulated in abandoned pits inside mine area will be used for dust suppression, water sprinkling, gardening, sanitation, etc. The water requirement is approximately 4 KLD and the quality is suitable for the purpose. Tanker water will be supplied to workers for drinking purpose.

Mitigation Measures:

The surface runoff generated during rainfall event will be diverted to mined out pits inside the mines premises. This will act as rainwater harvesting structure. Garland drains with segmentation pits at appropriate intervals will be made around the overburden dump. Runoff from dump slopes will be passed through coir packed filters to arrest the silt before letting it to the water pits. Gully along the slopes will be provided with coir packed plugs to arrest the silt. The slopes will be compacted daily, soil will be spread over it and stabilized by planting hers and shrubs. This will prevent soil and silt erosion. Domestic wastewater will be treated in septic tanks and disposed in soak pits. All water accumulated inside the mines premises will be checked to avoid breeding of mosquitoes. Gambusia (topminy) fish will be cultivated specifically in the water pits that feed voraciously on mosquitoes. The spent oil and lubricants from workshop, vehicles, etc will be given to authorized re-processors. There will be no discharge of wastewater outside the mine premises.

Air Environment: Dust is the main pollutant generated during various mining operations, including blasting, loading and vehicular movement. DG set operated during grid power failure will generate air pollution. Vehicular exhausts are also the source of air pollution.

Mitigation Measures:

Stable roads will be made inside the mining premises for movement of vehicles. Water sprinkling system (truck mounted) will be applied for dust suppression on roads. Regular maintenance of vehicles and equipment will be carried out. Wet drilling and controlled blasting (using latest NONEL technology) will be adopted. Stacks as per CPCB norms will be provided for DG sets. Thick 30 m wide greenbelt will be developed on north side of the mine premises (towards Nandini Khurdmal village). Since the soil quality is poor along the mining boundary, small herbs and shrubs like Bawal, Ber, Custard apple, Cassia, Thor,

will be grown in the first 15 m. Thereafter trees like Bargad, Peepal, Shisham, Jamun, Neem, will be planted in next 15 m. The root of these trees is strong enough to penetrate the poor quality rocky soil strata.

Noise Environment: Material handling, movement of vehicle, crushing, blasting, loading unloading and DG sets are the main noise generating sources in the mine site.

Mitigation Measures:

Material handling operations and movement of vehicles will be properly scheduled to minimize noise. Maintenance program for heavy vehicles will be routinely followed. Non-electric delay detonator will be used to minimize the ground vibrations. Workers working inside crusher house will be given ear plugs and ear muffs. Acoustic enclosure will be provided for DG sets. In this manner the noise level within the mine boundary will be much lower than the national standard of 75 dBA during day time and 70 dBA during night time.

Land Environment: No top soil is present over the limestone deposits. At some places poor quality laterite red soil is present. Limestone is exposed at several places. Overburden produced during limestone mining, comprising poor quality material to the tune of 6.5 lakhs tons during the life of the mine and municipal garbage is the main solid wastes.

Mitigation Measures:

Overburden will be stacked at the periphery of mining lease boundary along the eastern, southern and western side to form bunds of 3 m height (15 m inside the mine boundary). The slope will be maintained at less than 45°, with adequate number and size of steps / trenches made. The slopes will be compacted and spread with 8-10 cm thick soil cover and grass, legumes and small shrubs will be planted along the slopes. Coir filled bags will be fixed with wire mesh at several places along the garland drain and gully at dump to arrest the erosion. Garbage will be collected in containers and segregated at source itself. Recyclable materials will be sorted out and sold to kabadis. Inert material will be reused as landfill. Organic and other green waste will be taken to compost pit. Use of plastic inside mine area will be strictly prohibited. Mined out area will be suitably reclaimed after

extracting the limestone. Reclamation will be done by backfilling the overburden. Voids will be converted to water body and used for fish cultivation.

For reducing adverse environmental impacts from other sources, following mitigation measures are recommended in the EIA report.

- Wet drilling will be practiced. The drilling machine will have inbuilt water sprinkling arrangement and dust extraction system.
- Controlled blasting technique will be followed. The site will be wetted before blasting. The safety fuse shall be covered with sand layer of 15 cm thick before blasting. Blasting will be done around noon.
- Non-electric shock tube initiating system like EXEL and Noiseless Trunkline Delay (NTD) and IKON (Digital Electronic System) will be used to keep the ground vibrations and air blast levels to the lowest possible limits and minimize noise. Delay detonators will be applied.
- Ground vibrations to be continuously monitored during blasting using Minimate Seismograph, through study of the peak particle velocity at different distances.
- Saw dust upto 10% will be mixed with the explosive to reduce bulk density of the explosive and the ground level vibration.
- Hydraulic rock breaker will be used to eliminate the use of secondary blasting.
- Combination of primary rock breaker and backhoe will be used for efficient collection and loading.
- Chemical binders / wetting agents/ surfactants will be used on haul roads to reduce water consumption during sprinkling for dust suppression. Compaction, gradation and proper drainage will be provided for haul roads. Road side plantations will be developed to arrest fugitive dust.
- Low sulphur fuel (Stage III compliant) will be used in the Heavy Earth Moving Equipment, trucks, dumpers, other vehicles and DG sets.
- Haul roads in mines will be stabilized. Vehicular speed in mines area will be restricted to 20 kmph.
- Depression area within the worked out site will be converted to water body. The water body will be used for Pisciculture in association with surrounding villagers.

Impact Assessment

The national ambient air quality standards prescribe level of air pollutants that will protect public health and vegetation. Air quality dispersion modeling study proved that the ambient air and noise quality of the area will remain within the national standards. No wastewater will be generated during mining. No toxic chemicals or wastes will be handled in the mines. Diesel and Explosives will be stored as per approval obtained from Chief Controller of Explosives.

Exposure to dust and respiratory disorders, noise induced hearing loss, mechanical injury to body parts are the identified occupational hazards. The workers will be checked during employment and then routinely checked for any clinical complaints and abnormal symptoms by the medical team of ACC. Workers will be given personal protective equipment like nose mask, ear plugs, safety boots, gloves, goggles, etc as well as clean drinking water and toilet facility. Drivers and their attendants will be given rest room facility, complete with toilet, bathroom and recreation facility. Canteen facility will be provided for all workers and drivers. Regular training and awareness programs will be conducted for the workers so that they are aware of the work hazards, vector borne diseases, HIV, etc and inculcate the behavior of using protective equipment.

The proposed mining activity will have certain negative impact on the environment. With implementation of recommended mitigation measures and safeguards, the adverse effects will get reduced to acceptable level. The groundwater level at mining site is below 40 m during post-monsoon. Due to presence of several mined out pits filled with water, the groundwater table of the area is stabilized. Since mining will be done upto 30 m, groundwater table will not be intercepted. Blasting and mining will lead to opening up of fractures and fissures thereby improving groundwater flow. Development of secondary porosity by cracks and joints will also enhance the transmissivity and specific yield of aquifer. Seepage water will accumulate in the mining pits. The accumulated water will be taken out by means of dewatering pumps and sprayed over the mine surface, used for dust suppression, creating stable dump and given to nearby farmers. During rainy season the surplus accumulated water will be discharged into nearby nalla / Irrigation minor canal.

The mining activity will have beneficial impacts in terms of direct and indirect employment opportunities. ACC will introduce a number of community development measures, which would improve the quality of life of the people living in the area.

Environmental Monitoring Plan

Environmental Management Cell (EMC) will be established to undertake routine environmental monitoring, evaluate performance of pollution mitigation measures adopted during mining, ensure compliance with the prescribed standards and report the results to regulatory agencies. Qualified scientists and engineers will be recruited to manage the EMC. Pollution monitoring laboratory will be established for regular monitoring of environment inside and outside the mines.

EMC will be responsible for the following functions:

I. Regular monitoring of –

1. Ambient air quality at upwind & downwind direction inside mine and at two villages in northeast and east side of the mines, throughout the year.
2. Collect and analyse the ground water quality of mine site (seepage water), and all the surrounding villages. The depth of the groundwater also to be checked every year during June and October.
3. Collect and analyse the water quality of Sheorath River, irrigation canals surrounding mines and village ponds, once during June and October.

II. Development and maintenance of greenbelt and greenery inside the mining lease area and between mines boundary and Nandlo Khurdni village.

Risk Mitigation Measures

Explosion / fire in explosive storage (magazine house) and diesel storage tank are the risks and accident hazards. The diesel tank will be designed as approved by Chief Controller of Explosives. The location of explosive storage area will be got approved by IBM. All safety measures recommended by the IBM and DGMS will be implemented. Mobile vehicles and arrangement for the first aid will be made available at mine site. An

effective communication system comprising landline and mobile phones facilities will be available at the mine site. Ground vibration measurements will be carried out and blasting will be done as per recommendation. The ground vibration (peak particle velocity) will be maintained within the DGMS limit, so as to ensure safety of surrounding buildings and houses of villagers. Blasting technology selected for mine operation will ensure that flyrocks are kept to the minimum and blast waves are of lower magnitude. The water pits will be properly fenced and warning signals and signboards put at various places stating the depth of the ponds.

Traffic Management

Limestone will be transported from the mines to Jamul cement Works by road. This will increase the daily truck / dumper movement by 80 dumper trucks. Traffic on the existing road from JCW to Nandini Khurdani Mines is low, maximum traffic being 1850 per day. The existing road is capable to handle the increased vehicular traffic from mines to JCW. There are about 7 – 8 small villages along this route. Traffic movement will be avoided during night time (from 8 PM in the evening to 10 AM in the morning). Exhaust checking will be done at routine intervals and emissions will be kept under prescribed limit.

Project Benefits

Limestone mining will generate substantial revenue for the state of Chhattisgarh through optimal utilization of natural resource and royalty. The project will boost the infrastructure development of the area.

About 25 persons will get employment. Local people will be preferred for jobs, depending upon their skill and experience. Transport business, vehicle drivers and attendants, repairing workshops, grocery and retail stores, school, coaching centers, restaurants, self employed persons like tailors, carpenters, plumbers, electricians, etc will get indirect employment / livelihood opportunity from this project.

ACC will continue to contribute in the field of social development. Rs.10 lakhs has been estimated annually for various community development measures. ACC will encourage formation of Self Help Group by the surrounding villagers. The water body located inside the mine area will be developed for rearing fishes by involving the local fishermen.

community. The social development scheme includes construction of community centers and schools, maintaining roads, rain shelters, providing drinking water facility to the nearby villages, making toilets in schools and for community, providing free medical camps, providing scholarships to bright students and sportsperson etc. Income generating schemes that will be implemented for upliftment of poor sections of the society includes vocational training in the field of bee keeping, mushroom cultivation, growing fruits and vegetables, development of fodder farms, etc.

Outcome of Public Hearing

The public hearing was organised on 29-4-2010 at 11 AM at Pathora limestone mine premises. Mr. J.P Pathak, ADM District Durg presided over the hearing. Dr.C.B.Patel, Regional Officer of CECB – Bhilai office explained the requirement of public hearing as per EIA Notification 2006. He requested the people present to view their comments, objections, etc. 118 people of nearby villages marked their attendance during the hearing. 17 people raised questions during the hearing. Nobody gave any written query or comments. The main 6 questions raised and the response of ACC is tabulated below (other questions were repetitive in nature and some people appreciated the proposal, hence not tabulated in this summary).

S.N	Points Raised during the PH	Response of ACC
1	Industry will provide employment to 25 people. Whether the employment provided by the company will be permanent or temporary? Industry will spend Rs.10 lakh per year under CSR activities. Whether this money will be spent in one village or in surrounding villages? Whether or not plantation will be done by the industry?	Industry will prefer employment to local people and permanent employment will be given to people who fulfill the skill and experience requirement. Rs.10 lakhs per year will be spent in Nandini Khurd village and also in surrounding villages for CSR activities. Proposal include organizing medical health check-up camps, making / developing roads plantation, organizing training programs for sustainable development like tailoring, etc and providing technical training to local youth 1000 plants will be planted during this monsoon season with the help of Nandini Khurd and village panchayat

2	Ground water level of houses decreases due to blasting, flyrocks falls and bore wells silting takes place? Water logging in houses happens during rainy season.	Blasting in mines will be done according to guidelines of IB&L. Latest technology will be used. Any problems occurred due to blasting will be solved by ACC. To solve the water logging problem ACC will provide pipes.
3	We have no objection to establish the mine. ACC has promised to concrete the Durg - Rahpur Road which is still incomplete. ACC promised to supply water from Patharia Mining Lease 1 and 2 to nearby farmers, which is still incomplete.	Three fourth of the road work has been completed. Remaining work will be completed as soon as possible. The water releases from leases 1 & 2 will be given to the local farmers according to requirement.
4	Some Dona Pattal making machine provided by the ACC to society villagers are not working properly. ACC should arrange to repair these machines. ACC is requested to solve the water problem of our village.	Regarding solving the water scarcity problem ACC will join hands with NABARD to create a watershed management project in the area.
5	ACC symbolizes growth. 20 year ago ACC had constructed a community building in our village for providing training in tailoring to women. Now the building is in bad shape. We request ACC to renovate the building and make a stage for promoting community programs.	Stage for organizing community programs will be made by ACC.
6	Employment should be provided to villagers of Medesara village according to their capability. There is scarcity of drinking water in Medesara village. We request ACC to make borewell. There is one pond in Patharia. No water is present. Provide water to this pond.	ACC will make one borewell in Patharia village.

Environmental Management Plan

Environment Management Cell will ensure that all pollution control devices function effectively. EMD will supervise disposal of spent oil and lubricants and used batteries to the authorized vendors. Plantation will be started from day one and continue throughout

the life of the project. Schemes for resource conservation, rainwater harvesting and social forestry development will be taken up. Regular environment, safety and health awareness programme for the workers will be conducted by the EMC.

Workers will be periodically subject to health check-up. EMC will ensure cleanliness and industrial hygiene inside the mine. EMC in association with the safety personnel will undertake full review of the potential hazards. The review will ensure enforcement of the proposed safeguards for pollution abatement, resource conservation, accident prevention and waste minimization. EMC in association with the HR department will review the CSR activities and attend to any pollution related complaints. EMC will also interact with the regulatory authorities, submit the monitoring reports and consent applications. The implementation of EMP would ensure that all elements of project comply with relevant environmental legislation throughout its life cycle.

The capital cost for environmental management of the mining project is estimated to be Rs 40 lakhs. This amount shall be used for procurement of pollution control devices, mitigation measures and establishment of environment department, occupation health and safety department, environmental monitoring facilities, greenbelt and greenery development, etc. About Rs 50 lakhs would be required as annual recurring expenses to implement the EMP.

प्रचालनालय भौमिकी तथा खनिकर्म, छत्तीसगढ़ क्षेत्रीय कार्यालय रायपुर
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क्रमांक 1996 /भौखनि / रा. क्र. 1/2012–13 रायपुर, दिनांक 29 JUN 2013

प्रति,

श्री संतोष त्रिपाठी,
एसी.सी. लिमिटेड जामुल सीमेंट वर्क्स,
सिलाई, जिला – दुर्ग (छ.ग.)

विषयः- खनिज नमूनों का विश्लेषण परिणाम।

संदर्भः- आपका आवेदन पत्र का. निरंक, ट्रेजरी चालान नं. 125, रू. 2400/- दिनांक 05.06.2013 एवं ट्रेजरी चालान नं. 121, रू. 2400/- दिनांक 05.06.2013

—xo—

उपरोक्त विषयांतर्गत एवं संदर्भित पत्र के तहत चालुक्य अन्वेषणिक परिक्षेत्र के अंतर्गत सिलाई, जिला – दुर्ग (छ.ग.) से आपके द्वारा एकत्रित 08 नग नमूनों का सिलाइ स्थित रासायनिक विश्लेषण परिणाम अपनी ओर प्रेषित है:-

S.No.	Sample No.	SiO2%	Fe2O3%	Al2O3%	CaO%	MgO%	LOI%	Total
1	PQLS 13060401	12.24	2.00	6.78	41.72	1.27	34.88	99.39
2	PQLS 13060402	11.64	1.80	5.66	43.29	1.45	35.92	99.76
3	PQLS 13060403	5.74	1.10	3.08	48.22	1.45	39.78	99.37
4	PQLS 13060404	6.54	1.10	4.86	46.88	1.93	37.82	99.13
5	NKLS 13060301	6.22	2.10	4.66	46.65	1.29	38.48	99.32
6	NKLS 13060302	10.16	1.90	4.08	45.31	1.12	33.24	99.81
7	NKLS 13060303	9.70	1.80	5.16	45.53	0.48	36.88	99.55
8	NKLS 13060304	9.84	2.00	4.20	45.31	0.96	37.12	99.43

क्षेत्रीय प्रमुख।

ANNEXURE 20

Chemical Analysis Report of Limestone Samples

ANNEXURE 21

Photographs of Nandini Khundini Limestone Mines including Exploration Activity and Boundary Pillars

NANDINI KHUNDINI LIMESTONE MINE: OLD WORKING PIT

NANDINI KHUNDINI LIMESTONE MINE: OLD WORKING PIT

NANDINI KHUNDINI LIMESTONE MINE: OLD OVERBURDEN DUMP

NANDINI KHUNDINI LIMESTONE MINE: OLD OVERBURDEN DUMP

NANDINI KHUNDINI LIMESTONE MINE: BOUNDARY PILLAR

NANDINI KHUNDINI LIMESTONE MINE: BOUNDARY PILLAR

NANDINI KHUNDINI LIMESTONE MINE: EXPLORATION UNDER PROGESS

NANDINI KHUNDINI LIMESTONE MINE: EXPLORATION UNDER PROGESS

NANDINI KHUNDINI LIMESTONE MINE: CORE SAMPLES

NANDINI KHUNDINI LIMESTONE MINE: CORE SAMPLES

NANDINI KHUNDINI LIMESTONE MINE: CORE SAMPLES

NANDINI KHUNDINI LIMESTONE MINE: CORE SAMPLES

STATE BANK OF INDIA
CORPORATE ACCOUNTS GROUP , MUMBAI
23 A N U BESEDIA MARG,NEVILLE HOUSE,
BALLARD ESTATE MUMBAI 400001

IBD NO:
FAX NO:
SWIFT NO:
STD CODE:

THE REGIONAL CONTROLLER OF MINES
RAIPUR REGION,INDIAN BUREAU OF
MINES,4TH FLOOR,B & C BLOCK,
INDIRA BHAWAN,MOTI BAG NR.

31/05/2013

DEAR SIRS,

GUARANTEE NO
AMOUNT OF GUARANTEE
GUARANTEE COVER FROM 01/06/2013 TO 31/05/2014
LAST DATE FOR LODGMENT OF CLAIM 31/05/2018

THIS DEED OF GUARANTEE IS EXECUTED BY THE STATE BANK OF INDIA CONSTITUTED UNDER THE STATE BANK OF INDIA ACT, 1955 HAVING ITS CENTRAL OFFICE AT NARIMAN POINT, MUMBAI AND AMONGST OTHER PLACES, A BRANCH AT CORPORATE ACCOUNTS GROUP, MUMBAI (HEREINAFTER REFERRED TO AS "THE BANK") IN FAVOUR OF THE REGIONAL CONTROLLER OF MINES (HEREINAFTER REFERRED TO AS "BENEFICIARY") FOR AN AMOUNT NOT EXCEEDING
INR 5,12,750.00
Rupees five lakh twelve thousand seven hundred fifty Indian Rupees only

AT THE REQUEST OF M/S
AND THE GUARANTEE SHALL REMAIN IN FULL FORCE UPTO 31/05/2018
AND CANNOT BE REVOKED OTHERWISE THAN BY ALL THE DEMAND OR CLAIM UNDER THIS GUARANTEE BEFORE ON THE BANK OR BEFORE THE 31/05/2018

SUBJECT TO AS APPEARING

NOTWITHSTANDING ANYTHING CONTAINED HEREIN ABOVE, THE LIABILITY UNDER THIS GUARANTEE IS RESTRICTED TO
INR 5,12,750.00
Rupees
Five lakh twelve thousand seven hundred fifty Indian Rupees only

OUR GUARANTEE SHALL REMAIN IN FORCE UPTO 31/05/2018. UNLESS A DEMAND OR CLAIM UNDER THE GUARANTEE IS MADE ON US IN WRITING ON OR BEFORE 31/05/2018 ALL YOUR RIGHTS UNDER THE SAID GUARANTEE SHALL BE FORFEITED AND WE SHALL BE RELIEVED AND DISCHARGED FROM ALL LIABILITIES THEREUNDER.

AUTHORISED SIGNATORY

AUTHORISED SIGNATORY

PLEASE CONTACT BRANCH FOR CREDIT FACILITY-GUARANTEE ADVISE TO BANK MANAGER

भारतीय गैर न्यायिक

एक सौ रुपये

Rs. 100

रु. 100

ONE HUNDRED RUPEES

भारत INDIA

INDIA NON JUDICIAL

महाराष्ट्र MAHARASHTRA

0853

HK 619059

20 JUN 2013

14 JUN 2013

श्री. विनोद मंचुरकर

This Stamp paper is an integral part of Sale Deed between Mrs. Sharmila Mayekar and Mr. Vinod Manchurkar

21 JUN 2013

Date: 21 JUN 2013

STATE BANK OF INDIA

Mr. MUKUL MUDGAL, Br. C

BANK GAURENTEE

Form No. ____

The Regional Controller of Mines,
Nagpur Region
Indian Bureau of Mines,
6th Floor, B and C Block,
Indira Bhawan, Civil Lines
Nagpur – Pin – 440001

Dear Sirs,

Guarantee No.	: 0409513 BG0078/13/
Amount of Guarantee	: Rs. 512750/-
Guarantee Period from	: 01.04.2013 to 31.03.2018
Last date for lodgment of claim	: 31.03.2018

This Deed of guarantee executed on 21 JUN 2013 Day of _____, 2013 by State Bank of India (bank name) constituted under the State Bank of India Act, 1955 having its central office at Mumbai and amongst other places, a branch at Neville House, Ballard Estate, J.N.Heredia Marg (hereinafter referred to as the bank) in favour of the Regional Controller of Mines, Indian Bureau of Mines, Nagpur Region, Nagpur (hereinafter referred to as the Beneficiary) for an amount not exceeding Rs. 512750/- (Rs. Five Lakhs Twelve Thousand Seven Hundred Fifty only) at the request of M/s ACC Limited (hereinafter referred to as the Contractor/s).

This guarantee is hereby subject to the condition that the liability of the bank under this guarantee is limited to maximum of Rs. 512750/- (Rs. Five Lakhs Twelve Thousand Seven Hundred Fifty only) and the guarantee shall remain in full force up to 31.03.2018 (date of expiry) and cannot be revoked on or before 31.03.2018 (last date of claim) by the Bank or Applicant.

SUBJECT TO AS AFORESAID
(Main guarantee matter may be typed hereafter)

Bank Guarantee
No. 0409513 BG0078/13/
Date 21 JUN 2013

For (Bank) Seal
Branch Manager
(_____ Branch)

STATE BANK OF INDIA
DY. MANAGER
FOREIGN EXCHANGE DEPT.
STATE BANK OF INDIA, MUMBAI, Br. CODE - 04093
BALLARD ESTATE, MUMBAI-400 001

BANK GUARANTEE AND CO-ACCEPTANCE BOND

1. Agreement on production of a Bank guarantee for **Rs. 512750/- (Rs. Five Lakhs Twelve Thousand Seven Hundred Fifty only)** under rule 23J of MCDR, 1988.

2. We, **State Bank of India** (bank name), at the request of **M/s ACC Limited, Regd Office at 121, M.K. Road, Mumbai, 400020** (lessee) do hereby undertake to pay to the Regional Controller of Mines, Indian Bureau of Mines, **Nagpur Region, Nagpur** or any other officer authority nominated by the Controller General, Indian Bureau of Mines an amount not exceeding **Rs. 512750/- (Rs. Five Lakhs Twelve Thousand Seven Hundred Fifty only)** against any loss or damage caused to or suffered or would be caused to or suffered by the Government or towards non compliance of provisions of Rule 23A, 23B, 23E & 23F of MCDR, 1988 i.e. Mine closure plan/progressive mine closure plan approved in respect of the mining lease for **Limestone** (reserves) over an area of **53.52** Ha granted by State Government of **Chhattisgarh** to **M/s ACC Limited, Regd Office at 121, M.K.Road, Mumbai, 400020** (lessee) situated in **Nandini Khandini** village, Taluka **Dhamdha**, District **Durg**, State **Chhattisgarh** by reason by any breach of the said lessee of any of the terms or conditions contained in the Mine closure plan / Progressive Mine Closure Plan.

3. We, **State Bank Of India** (bank) do hereby undertake to pay the amount due and payable under this guarantee without any demure, to the authority merely on a demand from the Regional Controller of Mines, Indian Bureau of Mines, **Nagpur Region, Nagpur** or any other authorized by the Controller General, Indian Bureau of Mines stating that the amount claimed is due by way of loss or loss of damage caused to or would be caused to or suffered by the government by reason of breach by the said lessee or any of the terms or conditions contained in the mining plan/ mining scheme or by reason of lessee's failure to perform the said mine closure plan / progressive mine closure plan. Any such demand made on the bank under this guarantee. However our liability under this guarantee shall be restricted to an amount not exceeding **Rs. 512750/- (Rs. Five Lakhs Twelve Thousand Seven Hundred Fifty only).**

4. We undertake to pay to the authority on a demand from the Regional Controller of Mines, Indian Bureau of Mines, **Nagpur Region, Nagpur** or any other officer authorised by the Controller General, Indian Bureau of Mines or Govt. of India any money so demanded notwithstanding any dispute or disputes raised by the lessee in any suit or proceedings pending before any court or tribunal relating thereto our liability under this present being absolute and unequivocal.

(Bank) Seal
Branch Manager
( ) Branch

Bank Guarantee
No. 01092 dt. 20/06/17

21 JUN 2017

BANK OF INDIA

The payment so made by us under this bond shall be valid discharge of our liability for payment there under and lessee shall have no claim against us for making such payment.

5. We, **State Bank of India** (bank name), further agree that the guarantee herein contained shall remain in full force and effect during the period up to the end of the Mining plan/Scheme of Mining period of five years that would be taken for performance of the said Agreement and that shall continue to be enforceable till all the dues of the Govt. under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged till Regional Controller of Mines, Indian Bureau of Mines, **Nagpur Region, Nagpur** or any other officer authorised by the Controller General, Indian Bureau of Mines certifies that the terms and conditions of the said progressive mine closure plan/final mine closure plan have been fully and properly carried out by the said lessee and accordingly discharge this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before **31.03.2018**, we shall be discharged from all liability under this guarantee thereafter.

6. We further agree that Regional Controller of Mines, Indian Bureau of Mines, **Nagpur Region, Nagpur** or any other officer authorized by the Controller General, Indian Bureau of Mines shall have fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said lessee from time to time or to postpone for any time or from time to time any powers exercisable by Regional Controller of Mines, **Nagpur Region, Nagpur** against the said lessee and to forbear or enforce any of the terms and conditions relating to the said agreement, we (bank) shall not be relieved from our liability by reason of any such variation or extension being granted to the said lessee or for any forbearance, act or omission on the part of Regional Controller of Mines, Indian Bureau of Mines, **Nagpur Region, Nagpur** or any indulgence by Regional Controller of Mine, Indian Bureau of Mines, **Nagpur Region, Nagpur** to the said lessee or any matter or thing whatsoever which under the law relating to sureties, would but for this provision have effect of so relieving us.

7. This guarantee will not be discharged due to change in constitution of the bank or lessee.

8. We, **State Bank of India** (bank name), lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Regional Controller of Mines, Indian Bureau of Mines, **Nagpur Region, Nagpur** in writing.

The period of bank guarantee submitted is valid for the period (01.04.2013 till 31.03.2018) of the proposals given in the Mining Plan / Scheme of Mining / PMCP etc.

(Bank) Seal
Branch Manager,
(Branch)

Bank Guarantee
No. 0005/3 BG000179/1
Date 21 JUN 2013

For BANK OF INDIA

If the bank guarantee is to be encashed through the court, in that case the at Nagpur court will have jurisdiction.

1. Not with standing anything contained herein:
   a. Our liability under this Bank guarantee shall not exceed **Rs. 512750/- (Rs. Five Lakhs Twelve Thousand Seven Hundred Fifty only).**
   b. The bank guarantee shall be valid up to **31.03.2018**
   c. We are liable to pay the guaranteed amount or any part thereof under this Bank guarantee and only if served upon us a written claim or demand on or before **31.03.2018.**

2. In witness whereof, the bank through its authorized officer has set its hand and stamp on this ____Day of _____2013 at **Mumbai.**

21 JUN 2013

Credit Guarantee
No. 09993/9 BG000179/
Date 21 JUN 2013

(Bank) Seal
Branch Manager,
(_____)Branch

STATE BANK OF INDIA

DY. MANAGER
INDUS FINANCE
BRANCH CODE 09993
MUMBAI-400 001

भारतीय गैर न्यायिक

एक सौ रुपये

Rs. 100

ONE HUNDRED RUPEES

रु. 100

भारत INDIA

INDIA NON JUDICIAL

महाराष्ट्र MAHARASHTRA

0984 HK 619058

श्री. विनोद नंदुरकर

14 JUN 2013

29 JUN 2013

21 JUN 2013

21 JUN 2013

BANK OF INDIA

21 JUN 2013

STATE BANK OF INDIA
CORPORATE ACCOUNTS GROUP, MUMBAI
23 J N HEREDIA MARG,BALLARD ESTATE,
BALLARD ESTATE MUMBAI -MAHA

SWIFT NO:SBININBBXXX
IFSC NO:SBIN0004252
MICR NO:400002002
PAN NO:AACCS8577K

21/06/2019

To

THE PROTOCOL OFFICER OF MINES
NAGPUR REGION,INDIAN BUREAU OF
MINES,SIR ROBERT,H & C BLOCK,
CIVIL LINES NAGPUR,MAHARASHTRA 440 001.

DEAR SIR/MA'AM,

CHARGEBACK NUMBER : 0000SCIBSC0001721
DATE OF ISSUE : 22/06/2019 Rec'd 21/6/2019
CHARGEBACK AMOUNT : INR 5,13,750.00
DATE OF REPLAY : 25/06/2019
DATE OF CLAIM : 01/08/2019
APPLICANT NAME : M/S ...

We confirm having issued / Extended the captioned bank Guarantee in your favour on behalf of our above named Constituents and the same closed by the decision of the Bank.

YOURS FAITHFULLY,

AUTHORISED SIGNATORY

The beneficiary/ies are advised to verify the genuineness of the Guarantee with the Issuing Branch.

PLEASE CONTACT BRANCH FOR transfer FACILITY. DELIVERY ACCESS TO YOUR BRANCH

366

REGD POST

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES
MCCM CENTRAL ZONE

No. 3140)/2012-MCCM(CZ)/MS-45

6th Floor, "D" Block, Indira Bhawan
Civil Lines, Nagpur 440001
Email : cmi.cz@ibm.gov.in
Telephone & Fax : (0712) 2565603

Dated 7th October 2013

To

M/s ACC Limited,
Nandini-Khundini Limestone Mines
Jamul Cement Works—490024
District—Durg, Chhattisgarh

Sub: Approval of scheme of mining alongwith Progressive Mine Closure Plan of Nandini Khondini Limestone mine, over an area 53.57 hectares in Durg district of Chhattisgarh state, submitted by M/s ACC Limited under rule 12 of MCDR 1988.

Ref : 1. Your letter no. JML/IBM/SM-NKQ-399 dated 29.11.2012.
2. This office letter of even no. dated 13.05.2013.
3. Your letter no. JML/SOM-NK/IBM/Q-18 dated 12.06.2013.

Sir,

In exercise of the powers conferred by sub-rule (4) of rule 12 of Mineral Conservation and Development Rules 1988, I hereby **APPROVE** the Scheme of Mining including Progressive Mine Closure Plan of Nandini Khubdini Limestone mines M/s ACC Limited over an area of 53.57 hectares, in Durg district of Chhattisgarh, submitted under rule 12 of MCDR, 1988. This approval is subject to the following conditions:-

i) This Scheme of Mining is approved without prejudice to any other laws applicable to the matters from time to time whether made by the Central Government, State Government or any other authority.

ii) It is clarified that this approval of the Scheme of Mining does not in any way imply the approval of the Government in terms of any other provisions of the Mines and Minerals (Development & Regulation) Act, 1957 or the Mineral Concession Rule, 1960 and any other laws including the Forest (Conservation) Act, 1980, Environment (protection) Act, 1986 and the rules made there under.

iii) It is further clarified that this approval of the Scheme of Mining is subject to the provisions of Forest (Conservation) Act 1980, Forest Conservation Rule 1981 and other relevant statutes, order and guidelines as may be applicable to the lease area from time to time.

iv) It is further clarified that the approval of Scheme of Mining is subject to the provision of the Mines Act 1952 and Rules & Regulations made there under including submission of notice of opening, appointment of manager and other statutory officials as required by the Mines Act 1952.

v) The execution of Scheme of Mining shall be subjected to variations of prohibitory orders / notices if any.

vi) This approval for mining operations and associated activities is restricted to the mining lease area only. The mining lease area is as shown on the statutory plans under Rule 28 of Mineral Conservation and Development Rules 1988, by the Lessee/ROM/Applicant, and Indian Bureau of Mines has not undertaken verification of the mining lease boundary on the ground.

vii) If anything is found to be concealed as required by the Mines Act in the content of the Scheme of Mining and the proposals for rectification has not been made, the approval shall be deemed to have been withdrawn with immediate effect.

viii) The approval of scheme of mining is subject to the compliance of CCOM's Circular No. 2/2010 regarding Geo-referenced cadastral map within 6 months from the date of approval failing which the approval of the document shall be deemed to have been withdrawn with immediate effect.

ix) This approval is restricted in respect of proposal given in the document for the period from 2013-14(from the date of approval) to 2017-18 with validity upto 31.03.2018 subject to all other statutory clearances.

x) At any stage, if it is observed that the information furnished in the document are incorrect or misleading or wrong, the approval of the document shall be revoked with immediate effect.

xi) The department does not undertake any responsibility regarding correctness of the boundaries of the lease area shown on the ground with reference to lease map & other plans furnished by the applicant/lessee, as it is the responsibility of the State Government & lessee under Rule 33 of MCR, 1960.

xii) Yearly report as required under Rule 28(2) of MCDR '88 stating forth the extent of protection and rehabilitation works carried out as envisaged in the approved progressive mine closure plan and if there is any deviations, reasons thereof shall be submitted before 1st July of every year to the Regional Office, IBM, Jabalpur.

xiii) The Scheme of Mining is approved without prejudice to any order or direction from the court of competent jurisdiction.

xiv) Your attention is invited to the Supreme Court interim order in W.P.(C) No.202 dated 12-12-96 for compliance. The approval of Scheme of Mining is therefore, issued without prejudice to and is subject to the said direction of the Supreme Court as applicable.

xv) A copy of Environment Impact Assessment – Environment Management Plan (EIA-EMP) as approved by MOEF (Ministry of Environment & Forest) shall be submitted to IBM within a month of approval alongwith a copy of their approval letter.

xvi) The Financial Assurance submitted by you for Rs. 5137500/- which is valid upto 31.03.2018 and next Financial Assurance shall be submitted on or before 31.03.2018.

xvii) The Scheme of Mining will be due for submission on 01.12.2012.

xviii) The Environmental Monitoring Cell established by the company shall continue monitoring ambient air quality, dust-fall rate, water quality, soil sample analysis and noise level measurements at various stations established for the purpose both in the core zone and buffer zone as per requirement of Environment Guidelines and keeping in view IBM's circular No. 3/92 & 2/93 season wise every year or by engaging the services of an Environmental Laboratory approved by MOEF/CPCB. The data so generated shall be maintained in a bound paged register kept for the purpose and the same shall be made available to the inspecting officer, on demand.

xix) If any comments are received from the State Govt. then the necessary action as per comments shall be taken immediately.

Yours faithfully,

Encl:- One copy of approved Scheme of Mining

(Ranjan Sahai)
Controller of Mines (CZ)

Copy for information to :-

1. Shri Sanjeev Tripathi, RQP & Chief Manager Mining, M/s ACC Limited, Jamul Cement Works – 490024 District – Durg, Chhattisgarh.
2. Shri SK Sharma, RQP & Manager Mining, M/s ACC Limited, Jamul Cement Works – 490024 District Durg, Chhattisgarh.
3. The Director of Mines Safety, Directorate General of Mines Safety, Bilaspur Region, SECL Campus, Sipat Road, Bilaspur alongwith one copy of approval scheme of mining.
4. The Director, Directorate of Mining & Geology, Government of Chhattisgarh, Soor Khan Bhawan, Ring Road No. 1, Village – Purena, Post – Raipur-a, District – Raipur, Chhattisgarh alongwith one copy of scheme of mining.

4/X/13

(Ranjan Sahai)
Controller of Mines (CZ)

SCHEME OF MINING ALONG WITH PROGRESSIVE MINE CLOSURE PLAN

Submitted under Rule 12 (2) of MCDR, 1988

NANDINI KHUNDINI LIMESTONE MINE

LEASE AREA: 53.67 HECTARES
AREA: NON-FOREST
CATEGORY OF MINE: 'A' (Fully Mechanised)
VILLAGE: NANDINI KHUNDINI
DISTRICT: DURG
STATE: CHHATTISGARH

PERIOD: 2013-2014 to 2017-2018

PREPARED FOR:
ACC LIMITED
JAMUL CEMENT WORKS
DIST: DURG (C.G)
PIN: 490024

Submitted for Approval of Scheme of Mining along with Progressive Mine Closure Plan through Authority notified by the Controller General of the Indian Bureau of Mines

Volume: II (Plates)

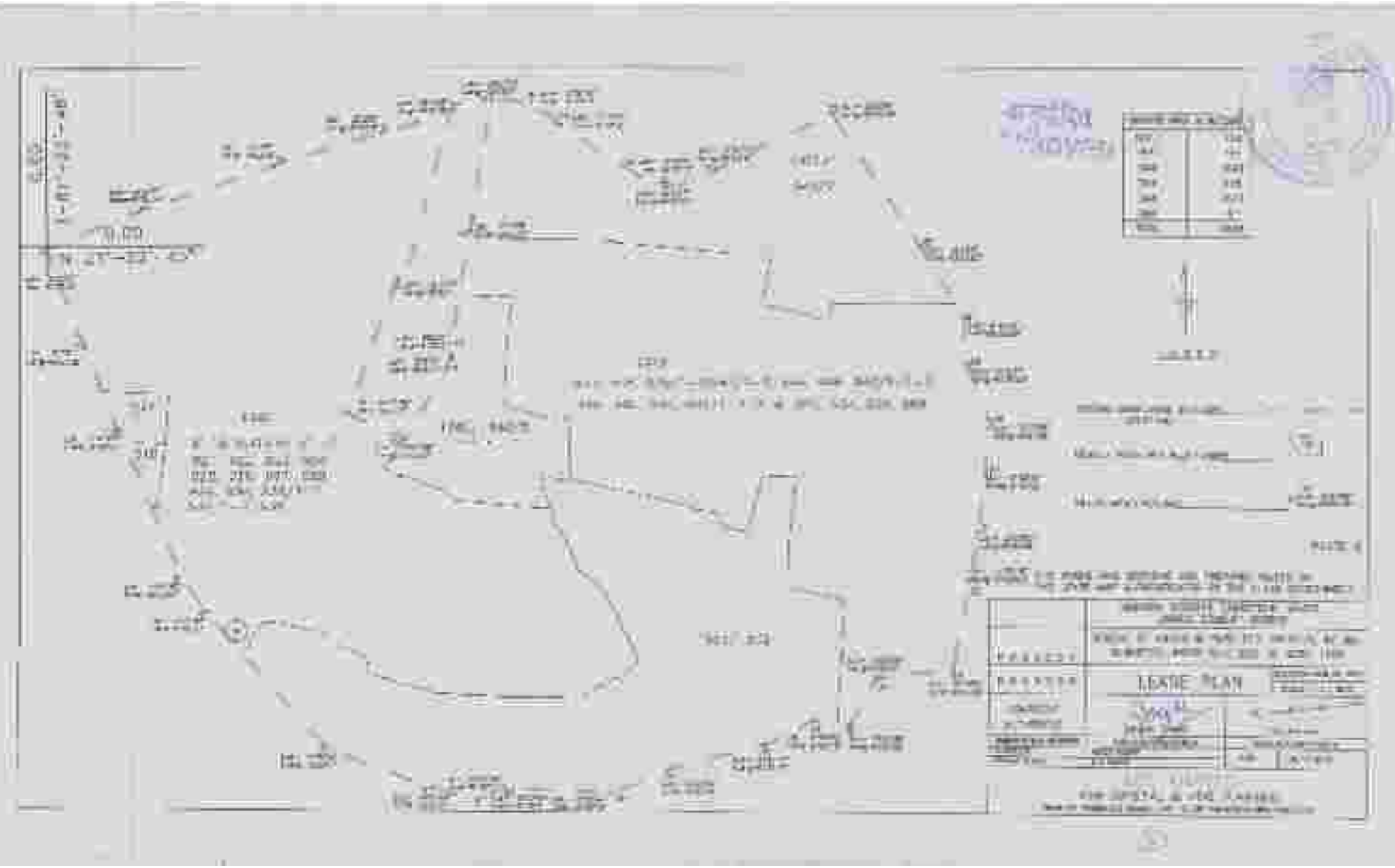
Prepared by

Sanjay Tripathi, RQP
Reg.No. - RQP/NGP/378/2008/A
Valid upto 05.10.2018

S.K.Sharma, RQP
Reg.No. - RQP/NGP/234/2000/A
Valid upto 30.04.2020

LIST OF PLANS AND SECTIONS

Serial No	Type of plan	Plate No	Scale
1	Key Plan	I	1:50000
2	Revenue Plan	II	1:4000
3	Certified Copy of Revenue Plan	II A	1:4000
4	Geological Plan	III	1:2000
5	Geological Cross Sections	IV	1:2000
6	Surface Plan	V	1:2000
7	Yearly Development & Production Plan and sections	VI (Sheet 1 to 5)	1:2000
8	Conceptual Plan and Section	VII	1:2000
9	Environment Plan	VIII	1:5000
10	Progressive Mine Closure Plan	IX	1:2000
11	Environment Management Plan	X	1:2000


LEASE PLAN